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Natural Disasters and Their Mitigation for Sustainable Agricultural Development

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Abstract :- Natural disasters play a major role in agricultural development and the economic cost associated with all natural disasters has increased 14-fold since the 1950s. Natural disasters are classified into hydro-meteorological and geophysical disasters. Definitions of various types of hydro meteorological disasters such as floods, droughts, cyclones, forest fires, and heat waves were presented. Evidence available from different parts of the world showed that there is a rising trend in the occurrence of natural disasters from 1950 to 2005. Impacts of natural disasters on agriculture, rangeland, and forestry were described. Environmental degradation is one of the major factors contributing to the vulnerability of agriculture, forestry, and rangelands to natural disasters because it directly magnifies the risk of natural disasters. Traditional definitions of sustainable development focused on balancing agricultural productivity and environmental concerns. Today, however, it is important that the idea of sustainable development be extended beyond the notion of minimizing environmental impact; it should address issues such as managing vulnerability and enhancing the capacity to adapt and respond to natural disasters. In this sense, the sustainable agricultural development matrix should include a component of disaster risk management and reduction. There is an urgent need to mitigate the effects of hydro meteorological disasters through the improved use of climate and weather information and forecasts, early warning systems, and appropriate methods of land management and natural resources.

Introduction :- Agriculture is a complex system, within which changes are driven by the joint effects of economic, environmental, political, and social forces (Olmstead, 1970; Bryant and Johnston, 1992). It is very well known that agriculture is inherently sensitive to climate conditions and is among the sectors most vulnerable to weather and climate risks.

One of the major development issues in agricultural meteorology, which is also linked to humanitarian aid, are natural disasters which have a major impact on agricultural productivity since the economic cost associated with all natural disasters has increased 14-fold since the 1950s.

According to statistics in the Emergency Events Data base (EM-DAT), compiled by the U.S. Agency for International Development Office of Foreign Disaster Assistance (USAID/OFDA) and the Center for Research in the Epidemiology of Disasters (CRED), the number of weather-related natural disasters has risen sharply during the past 50 years (CRED, 2000). The incidence of weather-related disasters per decade has risen from approximately 100 to 1,600 events during. the past 50 years in less developed countries, with the number of people impacted or killed per decade rising steadily from 15 million during the 1950s to four billion during the 1990s. These trends are a result of changes in the nature of natural hazards and demographic factors bringing greater numbers of people into harm's way.

During the past 4 decades, natural hazards such as droughts, floods, storms and tropical cyclones, and wildland fires have caused major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damages. Höppe (2007) showed the development in the number of great natural disasters (causing billion dollar losses and/or thousands of fatalities) since 1950 (Figure

1), which is broken down into the different perils: floods, windstorms, geophysical disasters (earthquakes, tsunamis, volcanic eruptions) and other weather-related events (heat waves, forest fires, droughts). Figure 1 clearly shows a steep increase in the number of such events. Deaths since the 1950s increased 50 percent each decade, whereas the corresponding population growth rate was only 20 percent (Kreimer and Munasinghe, 1991). For the period of 1974-2003, Guha and Sapir, et al., (2004) estimated the cumulative number of casualties at 2 million with 182 million people becoming homeless.

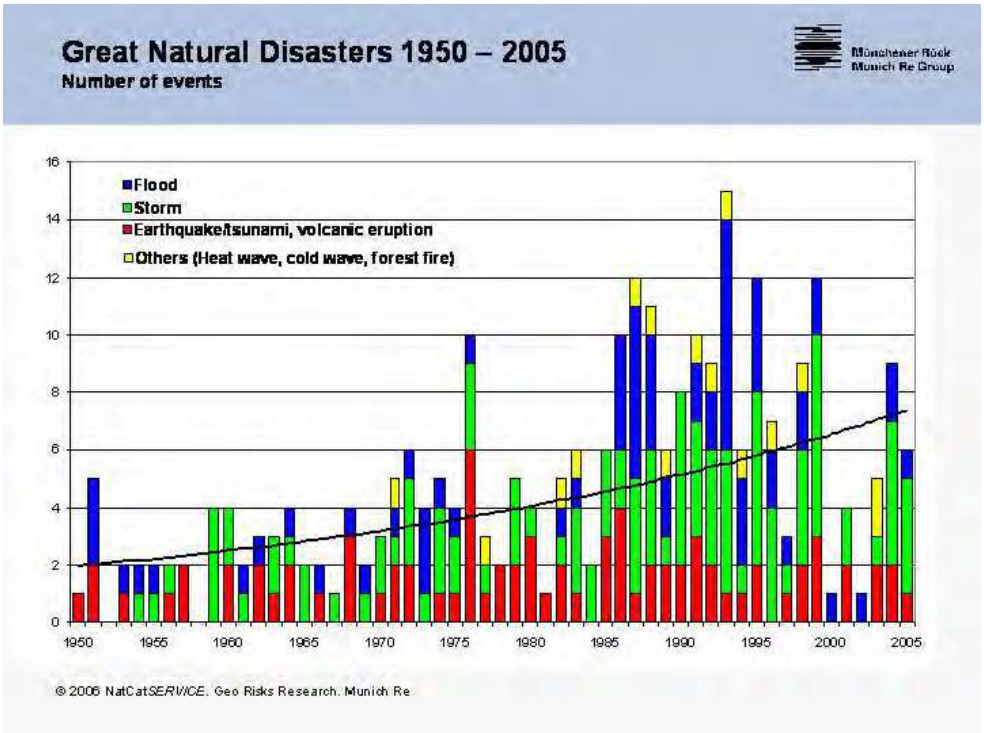

Figure 1. Development of the number of Great Natural Disasters between 1950 and 2005 (Source: Höppe, 2007).

Losses from natural disasters have increased dramatically (Höppe, 2007). In the second half of the 20th century the number of large natural catastrophes doubled and yearly damages in monetary terms increased by more than a factor of six (Munich Re, 2006). From 1980 through 2003, the economic costs of all weather-related natural disasters totaled $1 trillion, divided approximately 40/60 between wealthy and poor countries, respectively (Munich Re, 2004). Although all losses have increased in absolute terms, the rise in the relative incidence of weather-related events (such as wildfire, extreme temperature episodes, and epidemics) compared to non weather-related ones (such as volcano eruptions or earthquakes) is particularly notable (Vellinga, et al., 2001).

As Figure 2 shows, at the global level there has been an exponential increase in both overall economic and insured losses (both adjusted for inflation) since the 1950s, reaching a record level in 2004, which was topped again by new loss records in 2005. In 1995, the year of the Kobe earthquake in Japan, record losses of about U.S. $178 billion were recorded, the equivalent of 0.7 percent of global gross domestic product (Munich Re, 2002). The largest loss from a single event in history occurred in 2005, caused by Hurricane Katrina, with overall economic losses of U.S. $125 billion and insured losses of U.S. $60 billion.

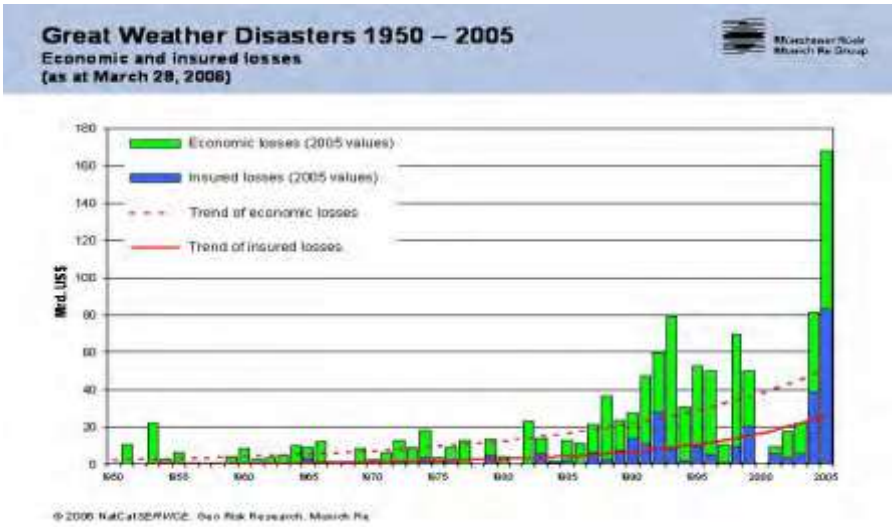

Figure 2. Development of economic and insured losses from Great Weather Disasters between 1950 and 2005 (Höppe, 2007).

Models of future changes in extreme weather events predict particularly large impacts in the developing world from flooding and drought as well as a likely increase in tropical cyclones. The impacts on the agricultural sector are projected to be more intense because developing countries are often closer to the margin of tolerance for temperature and precipitation changes (drought as well as flooding). According to a global insurance industry group studying the issue, economic costs associated with weather-related events are projected to triple to $150 billion/year by the year 2020 (UNEP and Innovest, 2002).

Impoverished people are more exposed to natural disasters because they tend to live in marginal areas and depend on high-risk, low-return livelihood systems, such as rain-fed agriculture, and face many sources of economic vulnerability including limited physical infrastructure.

Environmental degradation and the destruction of natural barriers is one of the major factors contributing to the vulnerability of agriculture, forestry, and rangelands. In order to ensure sustainable agricultural production and assure the livelihood of millions of people, especially in the developing countries, a better understanding of the natural disasters that impact agriculture, forestry, and rangelands is essential. Awareness of the need to give greater attention to disaster mitigation, preparedness, and management has been growing among decision makers. Pre-disaster preparedness now forms an integral part of national development planning in many countries.

Agriculture and Natural Disasters :- Agriculture and the rural sector, as a source of food, raw materials, employment, and markets have crucial backward and forward linkages with virtually every other part of the economy. In fact, the poorer the country, the larger the share of agriculture in terms of gross domestic product (GDP), total employment, and exports. Rural poverty is one of the key factors that shapes the risk to natural disasters. The situation is quite disturbing in the Least Developed Countries (LDCs) since agricultural production has not kept pace with population growth in the LDCs as a whole. Although agricultural output in 1990-99 rose at an annual average rate of 2.5 percent, exceeding the rate of 1.6 percent in the previous decade, in per capita terms there was virtually no increase in output, even a slight decline occurred (IFAD, 2001). While more than 25 LDCs experienced negative per capital growth rates during 1990-99, only five countries had positive growth. IFAD (2001) and World Bank (1997) estimate that about three quarters of the extreme poor currently live in rural areas and depend on agriculture and

related activities for their livelihood. Even under high assumptions of economic development and rural-to-urban migration, 60 percent of the extreme poor are likely to be in rural areas in 2020 and 50 percent in 2035. Hence the implication is that low agricultural productivity combined with extreme poverty makes the populations living in LDCs the most vulnerable to natural disasters. Disruption of economic activity and diversion of government funds to prepare for and recover from natural disasters constrains development.

According to UNISDR (2003), the economic impacts of natural disasters are greater in poorer nations; the costs of natural disasters between 1985 and 1999 equaled 13 percent of GDP in the poorest countries versus only two percent in the wealthiest countries. In a striking illustration of the potential adverse impacts of extreme weather events, the Honduran prime minister stated that Hurricane Mitch – which killed up to 20,000 Central Americans in 1998 – set the country's economic development back 20 years (IFRC/RCS, 2003). Losses in Honduras from Hurricane Fifi amounted to 50 percent of GDP (Hooke, 2000).

In addressing the impacts of natural disasters, the agricultural sector has not received the attention that it deserves from the policy makers since most of the economic impacts in this sector are attributable to relatively "small" events. Often it is the large headline-catching disasters that receive the attention of the public and policy makers. In the words of Swiss Re (2002), "unspectacular climatic anomalies, which the general public perceives as 'unusual,' 176 rather than 'catastrophic' weather conditions, can cause losses on a scale normally associated with natural catastrophes." The cost of coping with such climatic anomalies is rising because of a combination of changes in the nature of natural disasters and the increasing vulnerability of society to these disasters (IPCC, 2001). Costs not absorbed by national governments, foreign aid, or insurance fall on the poor farmers.

The poorest in the rural areas occupy the most marginal lands and this forces people to rely on precarious and highly vulnerable livelihoods in areas prone to natural disasters such as droughts, floods, etc. (UNDP, 2004). The ability to adapt to extreme weather events is lowest in the poorest segments of society and in countries where resources, information, and skills are limited; technology is often unavailable; institutions are unstable or weak; and empowerment and access to resources is inequitable (Smit, et al., 2001).

In the light of the issues mentioned above, it is important to reassess the issue of sustainable agricultural development. The traditional definitions of sustainable development focus on balancing agricultural productivity and environmental concerns. Swindale (1988) explained that sustainability conveys the idea of a balance between human needs and environmental concerns.

Sustainable agricultural systems should provide for the needs of current, as well as future generations, while conserving natural resources (Natural Research Council, 1991). The enhancement of the environmental quality and careful use of the resource base on which agriculture depends is viewed as a requisite to sustained agricultural productivity (American Society of Agronomy, 1989).

Today, however, it is important that the idea of sustainable development be extended beyond the notion of minimizing environmental impact; it should address issues such as managing vulnerability and enhancing the capacity to adapt and respond to natural disasters. In this sense, the sustainable agricultural development matrix should include a component of disaster risk management and reduction.

Natural Disasters – Definitions and Types :- In simple terms, a natural disaster is a natural event with catastrophic consequences for living things in the vicinity. But different definitions of natural disasters are often used and some of them are based primarily on loss of life. The emergencies database (EM-DAT) operated by the Centre for Research on the Epidemiology of Disasters (CRED)

classifies an event as a disaster if at least "10 people are killed and/or 100 or more are affected and/or an appeal for international assistance is made or a state of emergency declared" (CRED, 2000). Clearly, for agricultural purposes only the last part of this definition is applicable.

According to a 1992 disaster training programme, United Nations (UN) defines a disaster as "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the capacity of the affected society to cope using only its own resources." With suitable interpretation of some parts, this definition could be used by agriculture.

Anderson (1990) defines natural disasters as temporary events triggered by natural hazards that overwhelm local response capacity and seriously affect the social and economic development of a region.

Susman, et al., (1983) describe disasters as the interface between an extreme physical environment and a vulnerable human population. Such definitions emphasize the fact that the socio-economic and political factors are of paramount importance in understanding why populations are vulnerable to the environment and experience disasters. According to International Federation of Red Cross and Red Crescent Societies (2003), natural disasters include hydro-meteorological disasters and geophysical disasters. The hydro-meteorological disasters include landslides / avalanches; droughts / famines; extreme temperatures and heat waves; floods; hurricanes; forest/scrub fires; windstorms; and others (insect infestation and waves/surges). The geophysical disasters include earthquakes and volcanic eruptions. In this paper, only the hydro-meteorological disasters impacting agriculture, rangeland, and forestry are dealt with. Sivakumar (2005) provided a description of the definitions of each of these disasters which is given below.

A landslide is a geological phenomenon which includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flow. Although gravity acting on an overly steepened slope is the primary reason for a landslide, there are other contributing factors. An avalanche is caused when a build up of snow is released down a slope, and is one of the major dangers faced in the mountains in winter. An avalanche is a type of gravity current. Drought is the consequence of a natural reduction in the amount of precipitation over an extended period of time, usually a season or more in length, often associated with other climatic factors (such as high temperatures, high winds, and low relative humidity) that can aggravate the severity of the event. Drought is not a purely physical phenomenon, but instead is an inter-play between natural water availability and human demands for the water supply. The precise definition of drought is made complex due to political considerations, but there are generally three types of conditions that are referred to as drought.

- Meteorological drought is brought about when there is a prolonged period with below average precipitation.
- Agricultural drought is brought about when there is insufficient moisture for average crop or range production. This condition can arise, even in times of average precipitation, due to soil conditions or agricultural techniques.
- Hydrologic drought is brought about when the water reserves available in sources such as
- Aquifers, lakes, and reservoirs falls below the statistical average. This condition can arise, even in times of average (or above average) precipitation, when increased usage of water diminishes the reserves

A heat wave is a prolonged period of excessively hot weather, which may be accompanied by excessive humidity. The term is relative to the usual weather in the area, so temperatures that people from a hotter climate find normal can be a heat wave if they are outside the normal pattern for a cooler area. The term is applied both to "ordinary" weather variations and to extraordinary spells of heat, which may only occur once a century.

Flood is defined as the condition that occurs when water overflows the natural or artificial confines of a stream of other body of water, or accumulates by drainage over low-lying areas. A flood is a temporary inundation of normally dry land with water, suspended matter and/or rubble caused by overflowing of rivers, precipitation, storm surge, tsunami, waves, mudflow, lahar, failure of water retaining structures, groundwater seepage, and water backup in sewer systems.

Forest fire (or bushfire in Australasia) is an uncontrolled fire occurring in vegetation more than 6 feet (1.8 meter [m]) in height. These fires often reach the proportions of a major conflagration and are sometimes begun by combustion and heat from surface and ground fires.

Tropical cyclones, hurricanes, and typhoons are regional names for what is essentially the same phenomenon. Depressions in the tropics which develop into storms are called tropical cyclones in the southwest Indian Ocean, the Bay of Bengal, the Arabian Sea, parts of the south Pacific, and along the northern coast of Australia. These storms are called typhoons in the northwest Pacific and are known as hurricanes in the Caribbean, southeast United States, and Central America.

A tsunami (Japanese for big wave in port), which is often incorrectly called a tidal wave, is a series of massive waves that occur after an earthquake, a seaquake, volcanic activity, slumps or meteorite impacts in or near the sea. Since the constant energy of the tsunami is defined by height and speed, its height increases once its speed is reduced where the wave approaches land.

The waves travel at high speed, more or less unnoticed where crossing deep water, but rising to a height of 30 m and more when approaching land. Tsunamis can cause severe destruction on coasts and islands.

Impacts of Natural Disasters in Agriculture, Rangeland, and Forestry :- Impacts from natural disasters on agriculture, rangeland, and forestry can be positive or negative.
While the impacts are predominantly negative and do affect human society significantly, there are some positive impacts or benefits that can occur (Joy, 1991).

As Das (2003) explained, the impact of natural disasters on agriculture, rangeland, and forestry can be direct or indirect in their effect. Direct impacts arise from physical damage on crops, animals, and trees caused by the extreme hydro-meteorological event. The impacts may be considered in terms of short-term, temporary damage at a particular crop stage to complete crop loss. Within hours of their occurrence, natural disasters produce direct damage to agriculture in terms of total or partial destruction of farm buildings, installations, machinery, equipment, means of transport, storage as well as damage to crop land, irrigation works, dams, and destruction of crops ready for harvesting.

Disasters also cause indirect damage which refers to loss of potential production due to disturbed flow of goods and services, lost production capacities, and increased costs of production. Such indirect impacts appear progressively as a result of low incomes, decreases in production, environmental degradation, and other factors related to the disaster (Das, 2003).

Anaman (2003) pointed out that the impacts of natural disasters can also be classified as tangible or intangible. Tangible impacts are those that can be easily measured in monetary terms. Intangible impacts are often difficult to measure in monetary terms since they are not purchased or sold in well defined markets and hence direct market values do not exist, e.g., anxiety or fear of future natural disasters (Olive, 1989), inconvenience and disruption to farm work, and stressinduced ill health and human fatalities.

Many famines in pre-20th century Africa, Asia, and Europe were triggered by natural

disasters, including drought, extreme cold, pests, and diseases that devastated crops and livestock (Devereux, 2000). Loss of perennial crops such as banana trees or forests has long-term consequences on the ability to generate income. In the case of agricultural income generating assets, the loss might be temporary or permanent (Charveriat, 2000). Floods make land unsuitable for agricultural production until waters recede, while hurricanes might wash out arable land or permanently increase its salinity through storm surges and flash floods. Indirect impacts include the evacuation of people in the event of cyclone landfall, disruption to households, stress induced sickness, and apprehension (Handmer and Smith, 1992; Anaman, 1996).

Mitigating the Impacts of Natural Disasters :- Communities that are most exposed to risk from climate extremes and natural disasters and potentially at risk from climate change, are those with limited access to technological resources and with limited development of infrastructure. Countries, especially the geographically smaller ones, cannot be expected to cope alone because each one needs to have information on the full extent and magnitude of natural disasters. Socio-economic losses cannot be entirely eliminated, but timely and appropriate mitigation measures can certainly reduce the impacts.

The Plan of Implementation of the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 highlighted the need to mitigate the effects of droughts and floods through such measures as improved use of climate and weather information and forecasts, early warning systems, land and natural resource management, agricultural practices, and ecosystem conservation in order to reverse the current trends and minimize degradation of land and water resources. WSSD noted the need to promote the access and transfer of technology related to early warning systems and to mitigation programmes to developing countries affected by natural disasters.

Improved use of Climate and Weather Information and Forecasts :- The interaction between weather and agricultural production is so complex (Hoogenboom, 2000) that it is not just a case of developing a simple solution and expecting farmers to implement it. Each year or season will bring a different set of circumstances and hence the farmers have to make their decisions based on each situation. Hence a participatory approach involving the representatives of the National Meteorological and Hydrological Services (NMHSs), the agricultural extension agencies, and the farmers is necessary. One basic requirement is the awareness of the influence of weather and climate parameters on sustainable agricultural production. In many cases, this awareness is acutely present and many farmers often look for intelligent, low-risk solutions. This should stimulate an interest among the farmers to evaluate the forecast products produced by the NMHSs.

In the past 2 decades, significant advances have been made in the science and applications of seasonal climate forecasting. The principal scientific basis of seasonal forecasting is founded on the premise that lower-boundary forcing, which evolves on a slower timescale than that of weather systems, can give rise to significant predictability of atmospheric developments. These boundary conditions include sea surface temperature (SST), sea-ice cover and temperature, land surface temperature and albedo, soil moisture, and snow cover, although they are not all believed to be generally of equal importance. Climate variations, also called anomalies, are differences in the state of the climate system from normal conditions (averaged over many years, usually a 30- year period) for that time of the year. The strongest evidence for long-term predictability comes largely from the influence of persistent SST anomalies on the atmospheric circulation which, in turn, induces seasonal climate anomalies.

Seasonal forecasts can be produced using mathematical models of the climate system. A wide range of forecast methods, both empirical-

statistical techniques and dynamical methods, are employed in climate forecasting at regional and national levels (WMO, 2003). Operational empirical-statistical methods, based on statistical links between current observations and weather conditions in the future, include analysis of general circulation patterns; analogue methods; time series, correlation, discriminant, and canonical correlation analyses; multiple linear regression; optimal climate normals; and analysis of climatic anomalies associated with El Nino-Southern Oscillation (ENSO) events.

Dynamical methods (used principally in major international climate prediction centers) are model-based, using either atmospheric the General Circulation Models (GCMs) in a two-tiered prediction system, or the dynamically coupled atmosphere-ocean GCMs. These dynamical forecast models – an extension of the numerical methods used to predict the weather a few days ahead – are based on systems of equations that predict the evolution of the global climate system in response to initial atmospheric conditions and boundary forcing from the underlying ocean and land surfaces.

The forecasts of future trends in precipitation, 3 months or more in advance, could be extremely important to agriculture, forestry, and land management by potentially forecasting drought or heat waves. These outlooks have strategic relevance to national policy with respect to planning to help alleviate food shortages, lessen the impact of droughts, and provide distribution of energy. Seasonal forecasts, provided they are reliable enough, are already being successfully used in developed countries at the farm level to adapt seasonal crop planning (Meinke and Stone, 2005), but there is still a deficit when it comes to making such information usable for farmers in low-input systems (Salinger, et al., 2005). However, seasonal forecasts are already being used in developing countries for yield forecasting to support policy decision making (Hansen and Indeje, 2004) and the MARS project of the European Union, which has been extended to the African regions (Rojas, et al., 2005).

Early Warning Systems :- A fundamental condition for disaster preparedness is the availability of risk assessments and well functioning early warning systems that deliver accurate and useful information in a timely and dependable manner to decision makers and the population at risk. While natural hazards may not be avoided, the integration of risk assessment and early warnings with prevention and mitigation measures can stop many hazards from becoming disasters. This means that action can be taken to considerably reduce the resulting loss of life and socio-economic damages. Without doubt, a fundamental pre-condition for disaster preparedness is a well-functioning early warning system, capable of delivering accurate information to the population at risk, dependably, and in a timely manner.

There is a growing global awareness of the importance of early warning systems. During the Second World Conference on Disaster Reduction (Hyogo, Kobe, Japan, January 2005), 168 countries adopted the Hyogo Framework for Action 2005-2015 (HFA) and identified five high priority areas, of which the second stressed the need for "identifying, assessing, and monitoring disaster risks and enhancing early warnings," as a critical component of disaster risk reduction.

More Efficient Management of Land and Water Resources :- When prolonged natural disasters such as droughts occur, the high temperatures and low precipitation in the dry lands lead to poor organic matter production and rapid oxidation. Low organic matter leads to poor soil aggregation and low aggregate stability leads to a high potential for wind and water erosion. For example, wind and water erosion is extensive in many parts of Africa. Excluding the current deserts, which occupy about 46 percent of the landmass, about 25 percent of the land is prone to water erosion and about 22 percent to wind erosion. On the contrary, during periods of heavy rainfall, eg., during cyclones, rainfall can erode soil by the force

of raindrops, surface and subsurface runoff, and river flooding. The velocity of rain hitting the soil surface produces a large amount of kinetic energy which can dislodge soil particles. Erosion at this micro-scale can also be caused by easily dissoluble soil material made water soluble by weak acids in the rainwater. The breaking apart and splashing of soil particles due to raindrops is only the first stage of the process, being followed by the washing away of soil particles and further erosion caused by flowing water. The greater the intensity of rainfall and subsequent surface runoff, the larger the soil particles carried away.

Hence it should be apparent that natural disasters have a great impact on soils and the prevailing agricultural production systems, so farm technologies and management options have to be adapted to maintain soil functions for crop production to secure sustainable agricultural production. Agricultural practices adopted in regions that are continuously prone to natural disasters such as droughts and floods can strongly impact soil functions in the short term, and farming technologies and management can play an important role in these processes. For example, improper irrigation schemes and use of irrigation water with high salt content can increase salinity of soils, making them unusable for agricultural production. Other examples are overgrazing in the Sahel zone and other semi-arid regions which for various reasons can lead to wind erosion and desertification. In temperate regions with high-input systems, heavy machinery use, often in combination with slowly developing crops and soil cover, contributes to soil compaction; which can decrease water infiltration, increase runoff, and result in water erosion. New farm technologies and those that have been established for many generations – indigenous technologies – offer many opportunities to mitigate the impact of natural disasters. Because of the projected climate change, the optimization of farm technologies becomes even more important for the productivity of various agricultural production systems at different input levels (Sivakumar, et al., 2005). Farmers cannot only change crops and cultivars but also modify crop management, for example, by changing the sowing date according to the expected seasonal weather. The seasonal precipitation pattern (onset of rain, duration of rainy season, and distribution during crop-growing period) is one of the most important pieces of information for farmers in semi-arid regions using rain-fed cropping, especially for low-input systems in developing countries, which enables them to adapt their sowing dates and crop selection (Stigter, et al., 2005; Ingram, et al., 2002; Mati, 2000). Matthews, et al., (1997) reported that for rice production in Asia the modification of sowing dates at high latitudes, where higher temperatures allowed a longer potential crop-growing season, permitted a transition from single cropping to double cropping in some locations, which could had a significant effect on regional production.

Two shorter ripening varieties might be a better strategy than a longer maturing variety because the grain formation and ripening periods are pushed to less favorable conditions later in the season.

The ever-increasing water demand in contrast to the slow increase in water supply is leading to unsustainable water use and competition for water resources in agriculture. This trend has serious implications for sustainable agricultural development, especially in the developing countries. Proper management of water resources by application of appropriate farm technologies plays and will play a major role in both developed and developing countries in regions with limited resources for agricultural production. For example, irrigated agriculture in the Mediterranean area was introduced in ancient times and has been improved over time with experience. However, irrigation techniques have been maintained in the same way for centuries in most Mediterranean countries. Inefficient flooding irrigation systems, for example, can be still found in many areas of Spain and Egypt (El Gindy, et al., 2001; Neira, et al., 2005). Modern sprinkler and drip-irrigation systems have been introduced at great expense in some Mediterranean European

regions such as Spain (MAPA, 2005). These new techniques significantly reduce water use. The productivity of irrigated crops, such as maize, in Spain has increased in the last 15 years, compared with countries like Egypt, despite the fact that the total production is lower. The differences between Spain and Egypt may have many causes, but the new engineering irrigation infrastructures that have been introduced in Spain certainly have a strong influence on the yield increases reported (ANPC, 2003).

Improved management of watersheds through establishment of water spreading, harvesting, and storage facilities as well as the use of supplementary irrigation techniques are needed to improve and develop rain-fed agriculture. Techniques such as “deficit irrigation” should be considered as an option in the next decades, or irrigated agriculture will become unaffordable (Fereres, 2005).

At the same time, it is also essential to curtail losses of conveyance and on-farm use of irrigation water through appropriate measures. Guidelines need to be developed for the rational use and proper management of the vast but mostly non-renewable groundwater resources that are available in varied water qualities in huge aquifers.

Conclusion :- According to the International Federation of Red Cross and Red Crescent Societies (2003), natural disasters are on the rise and they continue to target the world’s poorest and least developed and there must be greater investment in disaster reduction rather than high-profile response efforts. Improved data on past disasters would help inform investment and policy decisions and thus help secure more appropriate levels and forms of disaster prevention, mitigation, and preparedness. Historical studies would also help inform the development of appropriate methodologies for the assessment of future disasters.

Priority should be given to supporting research with practical applications since research is needed to understand the physical and biological factors that contribute to disasters. Since the major impact of natural disasters is on poor farmers with limited means in developing countries, community-wide awareness and education programs on natural disasters should be a priority. Programs for improving prediction methods and dissemination of warnings should be expanded and intensified. Efforts are also needed to determine the impact of disasters on natural resources.

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Effects of agricultural reforms on the agricultural sector in Nigeria

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The various economic reform strategies undertaken by governments over a period of about three decades on the agricultural sector in Nigeria were the exploitative strategy, agricultural project strategy, direct production strategy and integrated rural development strategy. Overall, these economic reform strategies were geared toward the achievement of food self-sufficiency and food security, generation of gainful employment, increased production of raw materials for industries, increased production and processing of export crops, rational utilization of agricultural technologies for the improvement of life of its citizens. These strategies notwithstanding, government also pursued other on-going initiatives to step-up agricultural development across the country. The effects of economic reforms on the agricultural sector was examined alongside its fundamental roles of food security, supply of raw materials to industries, provision of market, employment and foreign exchange as well as generation of savings for investment in agriculture and other sectors. Agriculture contributed minimally during the period in terms of output, market, foreign exchange and capital formation or transfer as a result of policy instability, poor coordination of policies, poor implementation and mismanagement of policy instruments and lack of transparency. It is recommended that an enduring genuine democracy and good governance should be allowed to thrive in Nigeria in order to achieve poverty reduction, sustainable livelihood and food security which will guarantee comprehensive economic development and attainment of the Millennium Development Goals (MDGs).

Key words :- Agriculture reforms, effects, agriculture, Nigeria.

INTRODUCTION :- Nigeria is an agrarian country with about 70% of her over 140 million people engaged in agricultural production (NBS/CBN, 2006) and provides subsistence for two-thirds (2/3) of Nigerians who are low income earners (Usman, 2006). While the Northern part can guarantee the production of cereals such as sorghum, maize, millet, groundnut, cowpea and cotton, the Middle Belt and the South have the potentials to produce root tubers such as cassava, yam, cocoyam and other crops like plantain as well as maize (Abdullahi, 2003). In addition to crops, the country is also involved in the production of livestock, fisheries, forestry and wildlife.

Nigeria is generally endowed with abundant natural resources, numerous all-season rivers and a favourable tropical climate. Rainfall is generally adequate and fairly well distributed throughout the country (Ukpong et al, 1995). Out of the 98.321 million ha of land available in Nigeria, about 75.30% may be regarded as arable land, which 10% is under forest reserves and the remaining 14.70% is assumed to be made up of permanent pastures, built up areas and uncultivable waste (Olajide, 1980).In the light of the foregoing, agriculture is still a major sector as well as remains the cornerstone of theNigerian economy (Salami, 2006; Igboeli, 2000).

The problem :- lthough agriculture had remained the mainstay of the Nigerian economy, there has been declining contributions of agriculture to the gross domestic product (GDP) in the past three decades. This could be associated with the gross neglect of the agricultural sector and over dependence on the oil sector. In the pre-and post

independence era (1930 to 1965), the Nigerian economy was predicated on agriculture. Agriculture employed about 70 to 80% of the country's labour force (Falusi and Olayide, 1980) and contributed 60% of the nation's gross domestic product (GDP) and foreign exchange earnings (CBN, 1985).

In the oil boom era (1966 to 1977) the oil sector came to a prominent position as an important source of the national revenue. The oil sector which used to contribute a meager 2.6% of the GDP in 1960 contributed 57.6% to the GDP in 1970 and up to 99.7% in 1972 (Keke, 1992). Agriculture, on the other hand, contributed only 12% to the GDP in 1970 which culminated in rising food import bill leading to the persistent huge deficit in the balance of payments over the years (Ugwu, 2007).

In the post oil boom era (1977 to 2002), the price of crude oil started falling and/or fluctuating and there has been a growing concern to revitalize the agricultural sector as well as diversify the economy.

In order to revamp the agricultural sector, the federal government had embarked on and implemented several agricultural policies and programmes some of which are defunct or abandoned, and some restructured while others are still in place. These include the farm settlement scheme, National Accelerated Food Production (NAFPP), Agricultural Development Projects (ADPs), River Basin Development Authorities (RBDAs), National Seed Service (NSS), National Centre For Agricultural Mechanisation (NCAM), Agricultural And Rural Management Training Institute (ARMTI) and Agricultural Credit Guarantee Scheme Fund (ACGSF). Others were the Nigerian Agricultural Cooperative And Rural Development Bank (NACRDB)/agricultural bank, Operation Feed the Nation (OFN), Green Revolution Programme, Directorate Of Foods, Roads And Rural Infrastructure (DFFRI), Nigerian agricultural insurance company (NAIC), National Agricultural Land Development Authority (NALDA), Specialised Universities for Agriculture, Root and Tuber Expansion Programme (RTEP) and rural banking scheme, etc (Salami, 2007).

Furthermore, the Federal Government in 2004 launched another economic reform called National Economic Empowerment And Development Strategy (NEEDS) programme to encourage private sector participation in the development of the economy. It was also aimed at promoting growth and poverty reduction through a participatory process involving civil society and development partners. In the agricultural sector, NEEDS were directed to influence improvement in the production, processing and distribution of agricultural commodities. NEEDS was short-lived for only one year and therefore could not transform or make significant impact on the agricultural sector.

Despite all the aforementioned reform policies and programmes, the performance of the sector had not fared better than it was before independence. It is against this background that this research was designed and considered imperative at this time in the nation's history.

Research Objectives :- This study was therefore designed primarily to assess the performance and the effects of these government agricultural reforms and strategies on the agricultural sector. Specifically the study sought to:

1. Review the various federal agricultural reforms, programmes and interventions designed and implemented to restore agriculture to its prime position in the economy.
2. Determine the effects and nature of the individual contributions of these reforms and programmes on the agricultural sector.
3. Identify the problems and/or factors that militate against the achievement of the desired impact of these reform programmes/strategies on the agricultural sector.
4. Proffer recommendations for improvement based on findings.

RESEARCH METHODOLOGY

Study area :- Nigeria was the focus of the study. It has an area of 923,769 km2 and a population of over 140 million people. It is bounded on the West by the Republic of Benin and the Republic of Niger; on the East by the Republic of Cameroon; on the North by Niger and Chad Republic's and on the South by the Gulf of Guinea. The climate is equatorial and semi-equatorial. There are two seasons; the wet and dry season and agriculture is a major employer of labour, and the mainstay of the economy despite her dependence on oil.

The approach used for this research were mainly desk study, data collection from secondary sources as well as analysis of data using descriptive statistics and other qualitative methods.

Data Collection :- This involved desk study and/or review of relevant literature such as journals, technical documents, government gazettes, CBN annual reports and bullions, and published materials from the National Bureau Of Statistics and the National Planning Commission (NPC), among others. Internet resources were also consulted.

This also involved the collection of time series data on gross domestic product (GDP), output of agricultural products, exports and revenues, etc. The study focused on data/information available from 1960 to 2009.

Data analysis :- Data collected were analysed using such descriptive statistics as percentages, means/averages, frequency tables, charts as well as cross tabulations.

RESULTS AND DISCUSSION

Historical perspective of agricultural reforms / policies and programmes :_ Nigeria's perception of the place and role of agriculture in national development changed considerably over time. The affected policies, strategies and schemes used to address issues of the scheme equally changed. Different strategies adopted by the country shows dynamism and changing strategies that overlaps and cannot be appropriately segregated into time phases. Often it was a combination of two or more strategies to implement agricultural policies designed at different time periods. According to Olayemi (1998) agricultural development strategies that have been adopted in the country can be categorised into the exploitative strategies, the agricultural project strategy, the direct government production strategy and the integrated rural development strategy.

Exploitative strategy :- The Nigerian Government during the colonial period and early years of independence adopted this strategy for agricultural development. In the 1950s the traditional economists observed agricultural sector as a residual, subsistence sector made up of peasant farmers. Myint (1958) in his "Vent-for-surplus" theory particularly categorized a developing economy as consisting of a "modern sector" that is largely non-agricultural and a "subsistence sector" that is agricultural. The subsistence sector that is perceived to be unproductive but full of under-utilized resources is expected to feed the modern sectors. As such, the subsistence sector was expected to be taxed to finance the modern sector. This essentially was the basis of the agricultural strategy in the 1950s and the 1960s in Nigeria with levies on export crops providing revenue for government to develop the modern sector (Adubi 2004). The Government established institutions such as the agricultural marketing board system to boost revenue generation efforts through taxing of peasant farmers that produce export crops such as cocoa, groundnut, palm produce, cotton, etc.

Agricultural project strategy :- The period coincided with the time of internal self government up till 1968. Government intervention in agriculture was minimal. The small-scale farmers in Nigeria bore the brunt of agricultural development efforts (Egwu and Akubuilo, 2007). Agriculture was seen as a sector that has appropriate linkage with other sectors and should be developed in complementarity with other

sectors thereby effecting the needed forward and backward linkages. Agriculture was regionalized with the establishment of extension fields and research institutes. Regional public funds were invested in agriculture and there were new schemes such as farm settlement schemes (established to create modern literate farmers and promote agricultural development). Tree crop plantations, smaller farmer credit schemes, and Agricultural Development corporation projects were established to encourage development of tree crops.

Integrated rural development strategy :- The government realized in the mid 1970s that the strategy of direct agricultural production was not yielding the desired results. So, there was gradual shift to an agricultural development approach which involved the adoption of an integrated rural development strategy (Olayemi, 1998). Under this strategy, rural development was seen from a holistic perspective with agricultural development problems being only part of a larger rural development concern. This prompted the government to embark on multipurpose rural development programmes and implementing institutions such as the Agricultural Development Projects (ADPs), the River Basin Development Authorities (RBDAS), the Directorate Of Food, Roads And Rural Infrastructure (DFRRI), the National Agricultural Land Development Agency, (NALDA), the Operation Feed The Nation (OFN), the Green Revolution (GR), etc. This integrated rural development strategy was also adopted during the Structural Adjustment Programme (SAP) era but with significant changes in institutional design, intensity of activities and modes of operation.

Effects of agricultural reforms, policies and programmes on the agricultural sector :- The assessment of the effects of the agricultural reforms and policies on the agricultural sector is with respect to the fundamental roles, of agriculture, namely;

1. Provision of adequate food for a growing population and raw materials for industries.
2. Provision of an expanding market for non-agricultural products
3. Generation of savings for investment in agriculture as well as other sectors and release of surplus or under-utilized resources to other sectors.
4. Generation of foreign exchange.

These are discussed in line with the historical periods of the various policy reforms and programmes as follows:

The negative environmental effects of these policy reforms at this period, however, were noted to include increased deforestation of rain forests for cash crop production as well as loss of biodiversity including wildlife and indigenous plants.

Table 1. Share of agriculture in the GDP (1960 to2006).

Period/Year	Average share of Agriculture in GDP (%)
1960 to 1964	62.5
1965 to 1969	54.3
1970 to 1974	39.1
1975 to 1979	23.1
1980 to1984	23.3
1985 to 1989	37.9
1990 to 1994	29.93
1995 to1998	27.72
1999 to 2002	40.82
2003	32.60
2004	34.21

2005 1/	41.83
2006 2/	50.78

Source: CBN annual report and statement of accounts (various issues).

Fiscal policy : Budgetary allocations to agriculture were substantially increased to accommodate capital and recurrent expenditures. However large budget deficits were recorded. The capital expenditure on agriculture declined from 6.2% of total capital expenditure by the Federal Government in 1973 to 4.0% in 1985. The expenditure of state government followed similar pattern for the period under review (Egwu and Akubilo, 2007).

Tax policy : Income tax reliefs on incomes from new agricultural enterprises were pursued.

Wage policy : A unified wage structure for all public sector workers was put in place.

Monetary policy : Agricultural loans were given at concessionary interest rate of 6% per annum. In 1980s it was raised to 9% per annum.

Establishment of schemes, institutions etc. : The Nigerian agricultural and co-operative bank (NACB) was established in 1973 to facilitate the granting of credit to Nigerian farmers.

Table 2. Percentage contribution to gross domestic product by sectors.

Product	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Oil	13.5	12.97	13.0	13.4	13.05	14.17	11.60	10.7	11.5	11.6	9.7	41.50	37.22	49.64	61.19
Non oil	86.5	87.3	87.0	86.9	86.95	87.16	88.41	89.3	88.5	88.4	98.3	58.50	62.78	50.36	38.35
Crops	29.9	29.8	29.8	29.5	31.13	31.47	32.27	22.7	32.4	32.3	32.9	29.6	30.48	37.05	45.09
Livestock	5.23	5.19	5.21									2.04	2.14	2.75	3.32
Forestry	1.3	1.3	1.3	1.2	1.27	1.24	1.22	1.2	1.2	1.2	1.1	0.41	0.95	0.54	0.64
Fisheries	1.4	1.6	1.6	1.7	1.38	1.49	1.66	1.9	1.9	1.9	2.1	1.09	1.14	1.49	1.72
Agriculture	37.8	37.8	37.7	37.2	39.01	39.39	40.36	40.99	40.61	40.45	41.23	32.6	34.21	41.83	50.78

Source: CBN annual report and statement of accounts (several issues).

Mandatory sectoral allocation to agriculture :- Commercial and Merchant Banks were mandated to extend a minimum of 6% of their loan portfolio to agriculture which was later increased to 12%. Rural banking scheme was launched in 1977 while the agricultural credit guarantee scheme was established in 1977.

Trade policy on abolition of export duties on scheduled export crops in 1973 in order to promote agricultural export trade. Liberalization of imports in respect of food, agricultural machinery and equipment. A summary of the micro-economic Policies in Agriculture during the era were as follows:

1. Agricultural commodity marketing and pricing policy: In 1977, six national commodity boards were established which include; commodity

boards for cocoa, groundnuts, palm produce, cotton, rubber and food grains.

2. Land use policy was promulgated by the Federal Government in 1978 vesting the ownership of all lands on the government as to give genuine farmers access to farmlands.
3. Agricultural extension and technology transfer policy aimed at improving the adoption of improved agricultural technology by farmers with the national accelerated food production project (NAFPP) and agricultural development projects (ADPs) as implementing agencies.
4. Input supply and distribution policy was promulgated to ensure adequate and orderly supply of agricultural inputs notably fertilizers, agro-chemicals, seeds, machinery and equipment.

- In 1975 Government centralized fertilizer procurement and distribution with numerous agro-service centers nation wide.
- In 1972 Government created national seeds service (NSS) to produce and multiply improved seeds such as rice, maize, cowpea, millet, sorghum, wheat and cassava.

5. Agricultural input subsidy policy on fertilizer, seed (50%) agro-chemicals (50%) and tractor hiring services (50%).
6. Agricultural research policy: The policy was aimed at coordination and harmonization of agricultural research and extension linkage. Agricultural research council was established in 1971.The 1973 Decree empowered the Federal Government to take over all state research institutions. The 1975 reconstitution by the Federal Government of the Nigerian Agricultural research Institute network led to the establishment of 14 institutes which were later increased to 19 and the creation in 1977 of the national science and technology development agency to coordinate all research activities in Nigeria.
7. Agricultural co-operatives policy: In 1979, a department of agricultural co-operatives within the Federal Ministry of Agriculture, Water Resources and Rural Development was created to actualize this policy aimed at encouragement of farmers to form co-operatives and the use of same for the distribution of farm inputs and imported food commodities.

There was rapid decline in agricultural production with large food supply gaps (Sanyal and Babu, 2010) with attendant rapid increase in food imports from 7.7% in 1970 to 10.3% in 1979.

The 1985 to 1990 era (structural adjustment programme (SAP) and post SAP period) :- This era saw the Federal Ministry of Agriculture, Water Resources and Rural Development in 1988 produce an agricultural policy for Nigeria decreed to be operational for at least the next fifteen years. According to Ikpi (1995) the document embodied the following, among other policies;

- Agricultural sector policies and strategies on food crops, livestock and fish production, industrial raw material (crop and by-products) production, and forest products and wildlife.
- Policies on support services such as agricultural extension, technology development and transfer, agricultural credit; agricultural insurance; agricultural mechanization; water resources development; rural infrastructure; agricultural statistics and data bank; agricultural investment and management advisory services, and agricultural manpower development and training. The document assigned role and responsibilities to the three tiers of government, federal, state and local in the country. It also incorporated a mechanism for periodic policy review to allow for policy stability and perspective planning.

The Objectives of SAP were to:

1. Restructure and diversify the productive based of the economy so as to reduce dependency on the oil sector;
2. Achieve fiscal stability and balance of payments viability over the medium term; and
3. Promote economic growth with single digit inflation rates.

Some of the key policies designed to achieve these objectives were:

- Measures to stimulate domestic production and broaden the supply base of the economy
- Liberalization of trade and export controls;
- Elimination of price control and commodity boards;
- Decontrol of interest rates, and
- Further rationalization and restructuring of the tariffs to smooth the way toward industrial diversification (Sonyal and Babu, 2010).

In this phase also, which marked the SAP period, there was lower agricultural and economic growth with high rates of unemployment. Export earnings declined to less than 5% (Table 3) as well as widening gap in food supply and demand. Food prices increased from 2.6% in 1970 to 1979 period to almost 20% during 1980 to 1989.

The environmental implications of these policy reforms were quite significant. During this period, there was increased deforestation with adverse impact on biotic resources, loss of biodiverty, increased desertification in arid areas and flooding in lowland areas. There was also evidence of increased use of chemicals and abuse of fertilizer use which led to soil degradation in certain agro-ecological zones.

With respect to the index of real agricultural sector GDP between 1985 and 1990, it was fluctuating over these years. It was negative in 1985 and 1986 and positive in 1987 to 1990.

The new millennium agricultural policies (1999 to 2009) :- At the inception of the new democratic administration in May 1999 and shortly before then, several institutional changes were made in order to realize the sector's objectives and in line with its belief that agricultural and rural development are sin quo non for improved economic recovery (Olomola, 1998). These include the relocation of the department of co-operatives of the Ministry of Labour and its merger with the agricultural co-operatives division of the Ministry of Agriculture, the transfer of the Department of Rural Development from the Ministry of Water Resources to the Ministry of Agriculture (all before 1999), the scrapping of the erstwhile National Agricultural Land Development Authority (NALDA) and the merging of its functions with the rural development department, the scrapping of the Federal Agricultural Co-Ordinating Unit (FACU) and the Agricultural Projects Monitoring and Evaluation Unit (APMEU) and the setting up of Projects Co-Ordinating Unit (PCU) and later transformed into the National Food Reserve Agency (NFRA). Streamlining of institutions for agricultural credit delivery with the emergence of the Nigerian Agricultural Co-Operative and Rural Development Bank (NACRDB) from the merger of the erstwhile Nigerian Agricultural and Co-Operative Bank (NACB) and the Peoples Bank and the Family Economic Advancement Programme (FEAP). New Institutions were also evolving to enable the Nigerian agricultural sector respond to the imperatives of the emerging global economic order.

The new agricultural policy has a clear statement of objectives. The policy seeks to attain self sustaining growth in all the subsectors of agriculture and the structural transformation necessary for the overall socio-economic development of the country as well as the improvement in the quality of life of Nigerians. This objective reflects the current policy recognition of agriculture as a vital sector under the poverty reduction programme (FMARD, 2003).

The government also sought to pursue the following specific objectives:

1. Attainment of self-sufficiency in basic food commodities with particular reference to those which consume considerable shares of Nigeria's foreign exchange and for which the country has comparative advantage in local production.
2. Increase in local production of agricultural raw materials to meet the growth of an expanding industrial sector.

3. Increase in production and processing of exportable commodities with a view to increasing their foreign exchange earning capacity and further diversifying the country's export base and sources of foreign exchange earnings;
4. Modernization of agricultural production, processing, storage and distribution through the infusion of improved technologies and management so that agriculture can be more responsive to the demands of other sectors of the Nigerian economy.
5. Creation of more agricultural and rural employment opportunities to increase income of farmers and rural dwellers and productively absorb an increasing labour force in the nation

This phase witnessed a drastic reduction in food imports from 14.5% to 5% of total imports. Presidential initiatives on specific agricultural commodities (for example cassava, rice) in order to generate N3 billion annually from exports also featured during this period. Public private partnership in the development of agricultural marketing as well as the promotion of integrated rural development marked this phase.

The effects of these policy changes and programmes were reflected in the deficits recorded due to rising population and import restrictions on cereals and grains, supply shortages due to significant increase in land area under cultivation, and instability in input and output markets, among others. Annual deforestation rate remained at the rate of 76% per year due to higher demand for agricultural land, fuel wood and rapidly growing population (UNEP, 2006). Land degradation caused by soil erosion occurred at an alarming rate. However, Nigerian agriculture has shown good growth rates in the recent past with growth rates of 7.4, 7.2 and 6.5% in 2006, 2007 and 2008 respectively. Between 2003 and 2007 its average share of the national real GDP was 41.5% thus underscoring its importance in the livelihood of Nigerians (FGN, undated). Of the growth in the 2003 to 2007 period, the crop, livestock, fishery and fishery subsectors contributed 90, 6, 3 and 1% respectively. Major crops grown in Nigeria include yam, cassava, sorghum, millet, rice, maize, beans, dried cowpea, groundnut, cocoyam and sweet potato. These major crops which accounted for about 75% of total crop sales in 2004 increased from 81,276 thousand tones in 2004 to 95, 556 thousand tones in 2007 (Eyo, 2008).

Problems/challenges of the agricultural reforms, policies and programmes :- Evidence from Olayemi (1995), Olomola (1998), Garba (1998) have indicated minimal positive impact of these reforms/policies. The evidence stems from the decaying rural infrastructure, declining value of total credit to agriculture, and declining domestic and foreign investment in agriculture. The increasing withdrawal of manufacturing companies from their backward integrated agricultural ventures has reduced investments in the sector considerably. Input supply and distribution have been hap-hazard and inefficient and most agricultural institutions were ineffective prompting its scrapping in year 2000 of some of the institutions established for agricultural promotion.

A critical examination of the reforms/policies and their implementation over the years show that policy instability, policy inconsistency, lack of policy transparency, poor coordination of policies as well as poor implementation and mismanagement of policy instruments constitute major obstacles to the implementation and achievement of the goals and objectives of these policies.

Policy instability and lack of policy transparency are not unconnected with political instability and bad governance. For example, between 1979 and 1999 the country had five military/civilian regimes. At the federal and state levels, the then Ministers and Commissioners of Agriculture were changed several times on the average of one per two years. Several policy measures were initiated and changed without sufficiently waiting for policy effects or results. At one time or the other, agricultural production

passed through periods of protection and unbridled opening up for competition. Also, it passed through era of "no government" and "less These could all be attributed to poor coordination and faulty implementation of policies as well as mismanagement of policy instruments.

Agriculture contributed 42% of Nigeria's gross domestic product (GDP) in 2008 (National Bureau of Statistics). However, despite having grown at an annual rate of 6.8% from 2002 to 2006, 2.8% higher than the sectors annual growth between 1997 and 2001, food security remains a major concern due to the subsistence nature of the country's agriculture (Nwafor, 2008)

The main factors that influenced the effectiveness of policies on agriculture include high demand for agricultural produce, availability of improved technology, efficient dissemination of information by the ADPs and value added leading to improved income. On the other hand, the common factors responsible for the ineffectiveness of policies and regulations, especially on the downstream segment of agriculture, include instability of the political climate, insecurity of investment, non-standardized product quality, non-competitive nature of agricultural products from the country in the export market due to high cost of production and lack of adequate processing facilities (The New Nigerian Agriculture Policy, 2001).

CONCLUSIONS AND RECOMMENDATIONS :- In conclusion, the effects of economic reforms on the agricultural sector can be said to be unsatisfactory in view of its minimal contributions to the sector. In order to stem the aforementioned identified problems and weaknesses of these agricultural policies/reforms in the context of their contributions to the agricultural sector, genuine democracy and good governance should be allowed to thrive in Nigeria. This will guarantee poverty reduction, sustainable livelihood and enhanced food security which will lead to a comprehensive agricultural development as well as the attainment of the Millennium Development Goals (MDGs) in Nigeria.

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Organic Agriculture : A Key Strategy to Achieve the Sustainable Development An urgent need for developing environmentally sustainable organic agriculture

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Organic farming is the subject of extensive discussion among policy makers, planners, think tanks, academics and governments more particularly in developing countries like India. In recent years. A wide range of studies have revealed the beneficial aspects of this system in terms of ecosystem functioning, soil fertility conservation and economic impact. Indeed, demand for organic food and products has increasingly grown as environmental and health safety concerns ever more impact consumer demand. While agriculture is generally seen to be important in contributing especially to new set of global Sustainable Development Goals, or "SDGs", which will shape the next 15 years of policies, programmes and funding. SDG 2 and SDG 1, which are to end hunger, achieve food security and improved nutrition; and to end poverty in all its forms everywhere, organic agriculture contributes to almost all aspects of the SDGs There is no doubt that organic agriculture is in many ways more desirable pattern for developing environmentally sustainable agricultural development, especially in poor and developing countries like India. Organic agriculture can contribute to meaningful socio-economic and ecologically sustainable development in these developing countries. Reaching the SDG targets in these countries will not be thinkable without a durable and sustainable agricultural sector. This is equally true in case of North Eastern Region of India. The low input intensity of agriculture of the region makes it perfectly fit for organic agriculture. The paper provides an overview of the current state of organic agriculture in India with special reference to North East and also addressing organic agriculture and the food security dimension in the region The paper calls for an urgent need for developing environmentally sustainable organic agriculture in the region.

Key words :- Organic Agriculture, North East, Food Security

Introduction :- Organic farming is the subject of extensive discussion among policy makers, planners, think tanks, academics and governments more particularly in developing countries like India. In recent years, a wide range of studies have revealed the beneficial aspects of this system in terms of ecosystem functioning, soil fertility conservation and economic impact. Organic agriculture aims at achieving agro ecosystems, which are socially and ecologically sustainable. Organic agriculture can also be a part of the solution to other global problems – such as climate change and food security. Many people are now aware of the fact that it can contribute to eliminating food insecurity. Poverty is a major contributory factor to food insecurity, and organic farming has a positive impact on poverty. That organic farming can reduce poverty in an environmentally sustainable way.[1] Thus, the importance of organic farming is gradually increasing all over the globe. It is a well-documented that Global markets for organic agriculture have been growing rapidly over the past few decades. Indeed, demand for organic

[1]UNCTAD-UNEP, 2008; UNCTAD, 2008; Twarog, 2006; Gibbon and Balwig,2007.

food and products has increasingly grown as environmental and health safety concerns ever more impact consumer demand. While agriculture is generally seen to be important in contributing especially to new set of global Sustainable Development Goals, or "SDGs", which will shape the next 15 years of policies, programmes and funding. SDG 2 and SDG 1, which are to end hunger, achieve food security and improved nutrition; and to end poverty in all its forms everywhere, organic agriculture contributes to almost all aspects of the SDGs There is no doubt that organic agriculture is in many ways more desirable pattern for developing environmentally sustainable agricultural development, especially in poor and developing countries like India. Organic agriculture can contribute to meaningful socio-economic and ecologically sustainable development in these developing countries. Reaching the SDG targets in these countries will not be thinkable without a durable and sustainable agricultural sector. This is equally true in case of North Eastern Region of India. The low input intensity of agriculture of the region makes it perfectly fit for organic agriculture. The paper provides an overview of the current state of organic agriculture with special reference to North East and also addressing organic agriculture and the food security dimension in the region. The paper calls for an urgent need for developing environmentally sustainable organic agriculture in the region.

The Concepts of Organic Agriculture :- Organic farming is not new to farming community. Many definitions have been proposed for organic agriculture. North Bourne first used the term 'organic' in relation to farming in the book Look to the Land: 'the farm itself must have a biological completeness; it must be a living entity; it must be a unit which has within itself a balanced organic life'. Obviously, he was not merely mentioning to organic inputs such as compost, but rather to the concept of managing a farm as an integrated, whole system[2]. The international food standards, Codex Aliment Arius, state: 'Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system' [3]The Organic Farming Research Group of the United States Department of Agriculture (USDA) proposed the following description in 1980: 'Organic farming is a system of agricultural production, which prohibits or considerably limits input of compound synthetic fertilizers, pesticides, growth regulators, and food additives to animal feeds. This system is based, as much as possible, on crop rotation, utilization of plant residues, humus, composts, legumes, plant manures, organic production wastes, and mineral raw materials, minimum cultivation, and biological methods of pest control with the purpose of increasing fertility and improving the structure of soils, provision of valuable plant nutrition, and combating weeds and various pests'[4]. According to a definition proposed by the International Federation of Organic Agriculture Movements (IFOAM): 'organic agriculture unites all agricultural systems that maintain ecologically, socially and economically advisable agricultural production. These systems make use of the natural potential of plants, animals, and landscapes and are aimed at the agricultural practice's harmonization with the environment. Organic farming significantly reduces the input of external production factors (resources) by putting a limit to usage of the chemically-obtained fertilizers, pesticides, and pharmaceutical preparations. Instead, in order to increase the yield and protect crops, organic farming employs other agro technical methods and various natural factors. Organic agriculture abide by the principles that have been formulated by the particular local social, economic, climatic, historical, and cultural features'[5] These definitions describe organics as a sustainable agriculture, based on comprehensive farming practices that does not include synthetic chemicals. In fact,

[2] Lotter, D.W. (2003)

[3] FAO (1999).

[4] USDA, (1980)

[5] USDA.

organic agriculture is decent farming practice without using synthetic chemicals.

World of Organic Agriculture :- Almost all the countries in the world including India have started to practice and encourage organic farming. Several countries have a fully implemented regulation on organic farming or are in the process of drafting regulations. 178 countries of the world including India report organic farming activities. According to the 2018 edition of the study "The World of Organic Agriculture" (data per end of 2016) published by FiBL and IFOAM [6]– shows that 178 countries of the world including India report organic farming activities. The market research company Ecovia Intelligence[7] estimates that the global market for organic food reached 89.7 billion US dollars in 2016 (more than 72 billion euros). The United States is the leading market with 38.9 billion euros, followed by Germany (9.5 billion euros), France (6.7 billion euros), and China (5.9 billion euros). In 2016, most of the major markets continued to show double-digit growth rates, and the French organic market grew by 22 percent. The highest per capita spending was in Switzerland (274 Euros), and Denmark had the highest organic market share (9.7 percent of the total food market). Some 2.7 million farmers worldwide were identified as organic farmers in 2016 (up 13% year on year). India continues to be the country with the highest number of producers (835,200), followed by Uganda (210,352), and Mexico (210,000). Globally, a total of 57.8 million hectares were organically managed at the end of 2016, representing a growth of 7.5 million hectares over 2015, the largest growth ever recorded. Australia is the country with the largest organic agricultural area (27.2 million hectares), followed by Argentina (3 million hectares), and China (2.3 million hectares). Almost haft of the global organic agricultural land is in Oceania (27.3 million hectares), followed by Europe (23 percent; 13.5 million hectares), and Latin America (12 percent; 7.1 million hectares). The countries with the largest organic share of agricultural land of their total farmland are the Liechtenstein (37.7 percent), French Polynesia (31.3 percent), and Samoa (22.4 percent). In fifteen countries, 10 percent or more of all agricultural land is organic, a new record. Organic farming offers developing countries like India a wide range of economic, environment, social and cultural benefits. Organic farming in these countries builds on and keeps alive their rich tradition and customary practices. These their rich tradition strengthens communities and gives farmers motivation to keep farming in a more ecologically sustainable way. It is a well-known fact that those who practice organic farming are no longer exposed to hazardous agro-chemicals. On the ecological and environment front, organic farming causes less pollution, less soil erosion, builds soil fertility and enhances biodiversity on and around the farm. It is much more resilient to climatic stress, including drought and floods. This can be therefore a key to achieving agro ecosystems, which are socially and ecologically sustainable.

Organic Farming in India :- Traditionally, agriculture in India was largely organic. This indigenous knowledge is still applied today in many parts of India and acts as an aid for farmers converting to organic agriculture. Traditional agriculture based upon organic farming is still practice in many parts of North East. With growing awareness about benefits of organic farming and demands organic food products of aware consumers in India and abroad, many progressive farmers and institutions have started to promote organic farming in the country Organic Farming based upon sound agronomic practices, crop rotation, use of farm land manure for bio-fertilizers and bio-pesticides for enhancing soil productivity and use of natural methods and bio pesticides to control pests and weeds is an important way to avoid harmful impacts associated with chemical fertilizers and pesticides on agriculture and allied sectors in the country. [8] It also provides more rural employment

[6] FiBL and IFOAM, (2018.)
[7] Ecovia Intelligence(2017.)
[8] GOI (2016.)

opportunities because organic management is more labour intensive than conventional practices.

Increase use of chemical fertilizers and other inputs makes wasteful use of water, destroying soils and leaving the land unsuitable for sustainable agricultural production. In contrast, organic agriculture can combat desertification by decreasing erosion and improving water uptake and preservation. In addition, organic agriculture has proven to be an effective system that empowers farmers to restore and uphold food security. Indeed, in recent years, organic farming model is gaining importance in India in the farming community. More and more farmers in various parts of the country are now moving towards growing organic food. The demand for organic food is also on the rise. High disposable income and increased health consciousness are the key factors which have given rise to this heightened demand. With this scenario the domestic organic food market is projected to touch $1.36 billion mark by 2020. India organic food market, which currently sized at 6000 crores is anticipated to grow at a CAGR of over 25% during 2016-2021.According to the World of Organic Agriculture 2018 report.[9] India is home to 30 per cent of the total organic producers in the world. However it accounts for 2.59 per cent (1.5 million hectares) of the total organic cultivation area of 57.8 million hectares, Thus, amongst the regions with the largest areas of organically managed agricultural land, India ranks 9th.At the same time, most organic farmers are struggling due to poor policy measures, rising input costs and limited market, says a study by the Associated Chambers of Commerce and Industry of India (ASSOCHAM) and global consultancy firm Ernst & Young.[10] Thus, corrective policy measures are needed to address those issues so as to make the country “global organic hub”.

Organic Farming in North East India :- North East is one of the few bio-diversity hotspots in the world. The agricultural strength of the North Eastern Region of India includes abundance of water, fertile soils and vast biological diversity. The region is characterised by certain features which may be seen as major constraints to development, but which can be used to the advantage of the region in the Act East Policy. The low input intensity of agriculture of the region makes it perfectly suitable for organic cultivation. Organic matter in the soil in the NE region is considerably extraordinary as compared to other parts of the country. Nilabja Ghosh, professor at the Institute of Economic Growth, in New Delhi, who has studied the organic farming potential of the region, has correctly observed, “The potential is very high for the region to go organic. For farmers whose farms are located in remote areas, such farming practices can emerge as natural choice. This is mainly because of the high cost of chemical inputs. Moreover, organic matter in the soil in the NE region is significantly high as compared to other parts of the country,”[11] By exploiting the full potentials of the organic and eco-friendly nature of agricultural and allied produce of the region, significant gains may be achieved in the flourishing market for organic products. The farmers in the region often use organic manure as a source of nutrients. Thus, the region has incredible potential, mostly unexploited for a paradigm shift in organic agriculture. The benefits of the region for organic agriculture are listed by Aditya Kumar Singh and Lala I.P. Ray.[12]

1. North Eastern Region (NER) is home to some niche crops like Assam Lemon, Joha Rice, Medicinal Rice and Passion fruit which has high market demands.

2. NER accounts for 45 percent of total pineapple production in India and an Agri-Export Zone (AEZ) is already set up in Tripura.

3. Sikkim is the largest producer of large cardamom (54 percent share) in the world.

[9] ibid
[10] Down To Earth, 10 December 2018
[11] The Hindu Business Line,2018
[12] Singh Aditya Kumar, and Lala I.P. Ray

4. NER is the fourth largest producer of oranges in India.

5. Best quality ginger (low fiber content) is produced in this region and an Agri-Export Zone (AEZ) for ginger is established in Sikkim.

6. Extent of chemical consumption in farming is far less than the national average.

7. Approximately 18 lakhs ha (hectare) of land in NER can be classified as "Organic by Default".

8. Thin population density per square kilometer (13-340 compared to 324 at national level).

9. Dependence of mid and high altitude farmers on within farm renewable resources.

10. Time tested indigenous farming systems and use of indigenous technical knowledge in agriculture.

According to the estimates available with the Agricultural and Processed Food Products Export Development Authority[13], as of 2017-18, nearly 90,500 hectares of land in the NE region is already under organic cultivation. Sikkim is recognized as the country's first organic state in 2018.Sikkim has 74094-hectare area cultivated under organic farming. Other North Eastern States such as Assam, Nagaland and Meghalaya are three states in the North East that have also applied organic farming in a big way. As per the available statistics, another 77,600 hectares is the process of switching over to organic cultivation. The conversion process normally takes three years. Given the low usage of chemicals in farming in the whole of the region, the entire stares of the North East can be made a global organic agriculture hub. Since organic agriculture is a low-input farming system, it can provide farmers of the region with a premium return on investment. This means that farmers do not have to invest heavily in chemical fertilizers and pesticides. By increasing returns on invest in their farms and reducing the cost of inputs, organic agriculture can help to fight poverty. As organic agriculture is a sustainable route for family farms and smallholders of the region, it can also help in achieving food sovereignty, and therefore food security. We are of the strong view that the NE must be recognized formally as Organic Hub. Recognition of Sikkim as an organic state, for instance, has made it easier for entrepreneurs to venture into high-value organic product marketing.[14] The land of the region is almost virgin and the crops are grown virtually organic. Therefore, the region needs to develop a niche region for its agricultural produce. The growers must be made responsive of the value of their products and other positive effects organic farming has on food security, health, wellbeing and ecosystem. Developing right kind of infrastructure is key for the speedy development of organic farming in the Northeast. To ensure marketing of organic produce, connecting farmers with the domestic and global supply chain is particularly essential. There is a significant role to be played by the government for speedy development of right kind of infrastructure. We advocate for the inclusion of organic agriculture in regional policies on addressing sustainable agricultural development, ecology, environment, food security and poverty.

Table1; Land under organic cultivation; North East

(In hectares)

State	Area	In conversion
Sikkim	74,094	1,982
Meghalaya	2,580	37,756
Assam	9,883	18,129
Nagaland	3,526	5,314
Arunachal	51	6,129
Manipur	158	5,240
Tripura	204	2,048
Mizoram	0	999
Total	90,496	77,597

Source: APEDA

[13] Business line, September 26, 2018

[14] Dahal, Megh Nidhi,2018

Recently, the Agriculture Ministry launched a scheme called Mission Organic Value Chain Development for North Eastern Region (MOVCDNER) for implementation in the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura during 2015-16 to 2017-18. The scheme aims at development of certified organic production in a value chain mode to link growers with consumers and to support the development of entire value chain starting from inputs, seeds, certification and creation of facilities for collection, aggregation, processing, marketing and brand building initiative. The scheme was approved with an outlay of Rs.400 crore for three years.[15] The assistance is provided for cluster development, on/off farm input production, supply of seeds/planting materials, setting up of functional infrastructure, establishment of integrated processing unit, refrigerated transportation, pre-cooling/ cold stores chamber, branding, labelling and packaging, hiring of space, hand holdings, organic certification through third party, mobilization of farmers/processors etc.

The State-wise release of funds under MOVCDNER for 2018-19 is given as below:

(Rs. in lakh)

S. No.	States	Fund Released	Utilized Fund	Unspent balance	Budget Allocation	Amount Released	Amount released	Total Released
		2015-18			2018-19	Phase-I (Committed liability)	Phase II	2018-19
						(A)	(B)	(A+B)
1.	Assam	2439.30	1665.31	773.994	1762.61	-	-	-
2.	Manipur	3328.94	2419.99	908.95	2407.10	546.86	1203.55	1750.41
3.	Meghalaya	2696.98	2352.92	344.06	2857.79	218.07	1428.90	1646.97
4.	Nagaland	3800.46	2836.58	963.88	2096.13	649.78	1048.07	1697.85
5.	Mizoram	2174.15	2174.15	0	1019.12	0	75.83	75.83
6.	Arunachal Pradesh	2483.41	1857.31	626.1	1634.39	1053.36	817.20	1870.56
7.	Sikkim	4216.08	4185.81	30.27	883.85	1763.62		1763.62
8.	Tripura	1456.25	1210.31	245.94	1789.01	208.45	894.51	1102.96
	Total	**22595.57**	**18702.38**	**3893.194**	**14450.00**	**4440.14**	**5468.06**	**9908.2**
	Office Expenses	-	-	-	1550.00	-	15.00	15.00
	Grand Total				**16000.00**	**2676.52**	**5483.06**	**9923.20**

Source; Government of India 2018

[15] GOI 2018

Conclusion :- There is no doubt that organic agriculture is in many ways a preferable pattern for developing agriculture, especially in countries like India. Making agriculture sustainable economically & ecologically is the need of the hour. Organic agricultural strategies have the potential to improve local food security, especially in peripheral areas like north east. The urgently required task of the North Eastern Region is the will to work and a congenial environment for growth of organic movement in North East. An action plan for the organic sector should be developed in the region. The policy should focus on small scale-organic farming in addition to promote commercial agriculture. The state should device effective mechanism to regulate and control land use particularly for organic agriculture. The Organic Farming policy of the region should be mission-oriented and farmer-cantered. The paper calls for an urgent need for developing environmentally sustainable organic agriculture in the region.

NOTES :-

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Agricultural Growth Trajectory in Madhya Pradesh: Is It Sustainable

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Abstract :- Madhya Pradesh witnessed highest agricultural growth of 9.5 per cent a year during 2005-06 to 2014-15 among all Indian States. The last six years (2009-10 to 2014-15) were more spectacular for the state because agriculture grew at 15.4 per cent a year. It is interesting to know whether all districts of the state equally benefited and whether inter-district agricultural productivity is converging or diverging. In this paper, we have examined agricultural performance during different periods, tested inter-district convergence in growth and identified drivers of productivity variations in Madhya Pradesh. The study finds that due to appropriate development policies, agriculture sector witnessed structural change in its growth trajectory first in 2002-03 and again in 2009-10. It is also found that irrigation coverage, credit disbursement, NPK use and crop diversification were the major sources of inter-district productivity variations. The districts exhibited divergence rather than converging pattern of agricultural growth during the past decade. The findings suggest for special focus on the disadvantaged districts of the state for the inclusive and sustainable agricultural growth.

Key Words :- Agricultural Growth, Divergence, Structural change, Madhya Pradesh

Introduction :- Agriculture is the predominant source of livelihood in India. Although the contribution of agricultural sector in country's gross domestic product (GDP) has declined over years, still half of the population depends on this sector to sustain their livelihood. Sustaining growth in agriculture assumes priority to the government, policymakers and academicians due to high dependency of population on agriculture (Chand and Parappurathu, 2012; Ravallion and Datt, 1996; Datt and Ravallion, 1998; Virmani, 2008). The sector is directly linked with food and nutritional security, poverty and inclusive growth of the economy. Agricultural growth in the country has remained uneven across states. (Dreze et al., 2006; Singh and Kaur, 2018; Singh et. al., 2018). The states like Punjab, Haryana and western part of Utter Pradesh got early benefits of green revolution and grew at a faster rate. On the other hand, few states like Bihar, Madhya Pradesh, Uttar Pradesh (except western region) had lagged behind in realizing the benefits of green revolution. Farmers of these states are willing to adopt new technologies (Singh et al, 2013) but input availability, marketing infrastructure, yield risk, price risk and poor irrigation facilities often creates a barrier.

Madhya Pradesh, the second largest and ecologically highly diversified state, has witnessed remarkable agricultural growth during the past decade (DES, 2016). Notwithstanding, agriculture in Madhya Pradesh faces several problems; First, most parts of the state is infertile, stony and barren; Second, soil erosion and inadequate moisture are the challenges in other parts of the state; and Third, erratic and uneven distribution of

rainfall is the major constraint for achieving targeted level of production. Due to failure of rain, drought condition prevails almost every year in one or the other part of the state. In spite of such unfavorable circumstances, the state occupies a top position in producing pulses, oilseeds, garlic and coriander in India. The present study examines the growth trajectory of agriculture in Madhya Pradesh and identifies underlying factors of impressive growth achieved during the recent years. It also analyses the process of convergence/divergence in agricultural productivity among the districts during 2004-05 to 2013-14, and categorizes districts according to their performance.

Data and methodology :- The present study covers 42 undivided districts of the Madhya Pradesh. For examining long-run performance of the state, time series data on net state domestic product (NSDP) of different economic activities were collected for the period 1980-81 to 2014-15 from the Central Statistics Organization (CSO), Government of India. Further, district-wise fertilizer use, institutional agricultural credit, land use pattern, irrigated area and gross district domestic product (GDDP) of agriculture & allied activity were prepared for the period 2004-05 to 2013-14.

The growth rates in smoothened series (by taking two year moving average) of NSDP (at constant prices) from agriculture and non-agriculture were estimated by fitting semi-log trend regression equation. The trends in decadal growth rates were compared with the national average and with the agriculturally developed state Punjab to assess the relative performance of the state over time. Thereafter, the Bai-Perron test (Chand and Parappurathu, 2012; Bai and Perron, 1998 &2003) was applied to examine the occurrence of structural breaks in agriculture in the state during the period 1980-81 to 2014-15.

The performance of agriculture was further examined at district level by estimating land productivity as the ratio of gross district domestic product to the net sown area. The determinants of the agricultural productivity were identified by estimating a panel data regression between agricultural productivity and selected explanatory variables. It was hypothesized that overall agricultural productivity depends on access to credit, irrigation, fertilizer use, diversification, rainfall and cropping intensity. The appropriate model (random and fixed effects) was chosen based on Hausman test (Wooldridge, J. M., 2002; Yaffee, R., 2005). The functional form of the regression (fixed effect) is given below:

$$\begin{aligned}\mathrm{Ln(Prodty)} = {} & C_1 + C_2 * \mathrm{Ln(NPK)} + C_3 * \mathrm{Ln(CREDIT)} \\ & + C_4 * \mathrm{Ln(IRRI)} + C_5 * \mathrm{Ln(SDI)} \\ & + C_6 * \mathrm{Ln(RAIN\_ACTUAL)} + C_7 \\ & * \mathrm{Ln(CINTENSITY)} + [C_x = \mathrm{F}]\end{aligned}$$

where,

Ln(Prodty) = log of Agricultural productivity (Rs./Ha);

Ln(NPK) = log of NPK use (Kg/Ha);

Ln(CREDIT) = log of Credit disbursed (Rs./Ha);

Ln(IRRI) = log of Irrigation Coverage of NSA (Per cent);

Ln(SDI) = log of Simson diversification Index;

Ln(RAIN_ACTUAL)= log of Rainfall actual (mm);

Ln(CINTENSITY) = log of Percent Cropping Intensity and

$C_1, C_2, \ldots C_7$ are the coefficients to be estimated.

It is to be noted that agricultural productivity varies across different regions due to a variety of socio-economic, topographical, climatic and resources endowment constraints. In the present study, we examined whether the agricultural growth in the state was inclusive and narrowed down the inter-district variations in agricultural productivity? The convergence in agricultural productivity across the districts was tested by regressing agricultural productivity growth with the initial level of agricultural productivity. A significant negative value of estimated initial productivity coefficient would indicate convergence, and a positive value refers divergence.

Results and Discussion

Performance and Changing Status of Agriculture in Madhya Pradesh :- The analysis revealed that

Madhya Pradesh witnessed significantly higher growth (9.53 %) when compared to the national average (3.14%) during 2000-01 to 2014-15 (Figure 1). It is to be noted that agricultural growth in Madhya Pradesh was not only higher than other states of the country, but also surpassed non-agricultural growth in the state during this period. Due to higher growth in agriculture, the share of agriculture in total NSDP increased from 25.2 per cent in 2000-01 to 36.7 per cent in 2014-15 (Table 1). On the other hand, agriculture sector witnessed 5.5 percent decline in its share than the country's output during the same period. In terms of employment, agriculture engaged higher proportion of the workforce in the state than the country. These results show that agriculture is not only a predominant source of livelihood but also driving overall economic growth in the state. Nevertheless, similar to the country, the workforce engaged in agriculture witnessed declining trend in Madhya Pradesh.

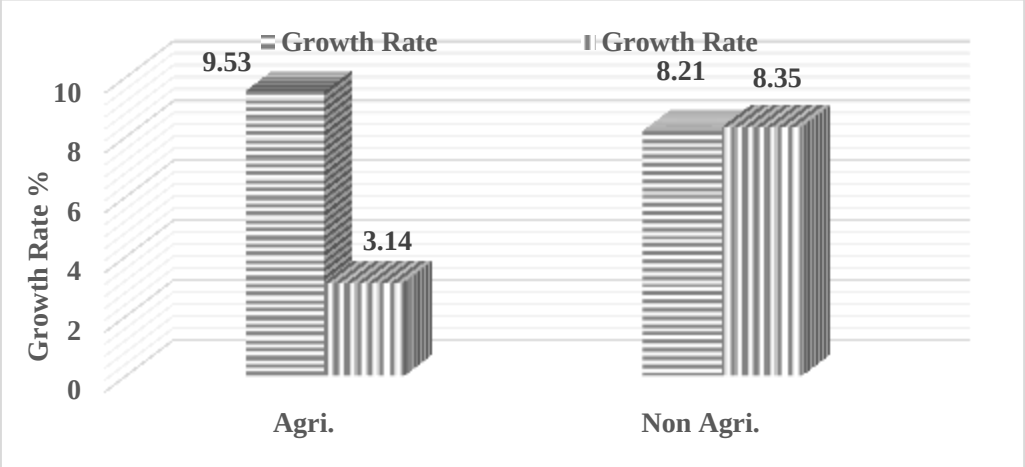

Figure 1: Growth rates agriculture & allied and non-agriculture (During 2005-06 to 2014-15) of Madhya Pradesh and India

The impressive performance of agriculture in Madhya Pradesh is clearly reflected through various indicators of agricultural development which are presented in table 1. The irrigation coverage in the state has increased significantly from 23.9 per cent in 2000-01 to 43.3 per cent in 2014-15. The direct impact of improved irrigation is reflected through the 35 percentage increase in cropping intensity in the state. Such developments were accompanied by improvement in infrastructure such as roads which had led to increased diversification towards fruits and vegetables. At the same time, fertilizer use and credit disbursement for the crop production witnessed 2.8 per cent and 5.1 per cent annual growth rate during 2000-01 to 2014-15, respectively. These above factors must have contributed a major share in 8.4 per cent growth in the state.

Table 1: Indicators of Agricultural development in Madhya Pradesh and India

Particulars	Madhya Pradesh			India		
	2000-01	2014-15	CGR#/ Change*	2000-01	2014-15	CGR#/ Change*
Agriculture share in GSDP	25.2	36.7	11.5*	23	17.5	-5.5*
% Agril. works in total workforce	71.5	69.8@	-1.7*	58.2	54.6@	-3.6*
% Cropping intensity	121	156	35*	131.1	142.3	11.2*
% Irrigation coverage (GIA/GCA)	23.9	43.3	19.4*	41.1	48.1	7.0*

% Area under fruits & vegetables	1.0	1.6	0.5*	4.4	4.9	0.4*
Agricultural NSDP per ha of NSA (Rs./ha) at 2004-05 prices	15076	46739	8.4#	35202	49828	2.5#
NPK use per ha (Kg/ ha)	54	79	2.8#	94	127	2.2#
Credit disbursed (Rs./ ha) at 2004-05 prices	3025	6105	5.1#	54169	141637	7.1#
Road density (Km/100 Sq. Km area)	52.7	93.7	4.2#	75.2	137	4.4#

Note: '@'- 2011 census data, '#'- Compound annual growth rate and '*' -change over period

The figure 2 shows that agricultural growth rate of India has remained almost stable and turning around 3 per cent rate after 1990-91 to 2014-15. On the other hand, growth rate of NSDP from agriculture in agriculturally advanced state like Punjab has declined steadily and had reached at lowest level of 1.16 per cent in 2014-15. In Madhya Pradesh, growth rate of agriculture sector registered a diminishing trend during 1994-95 to 2002-03, and reached to negative zone by the year 2002-03.

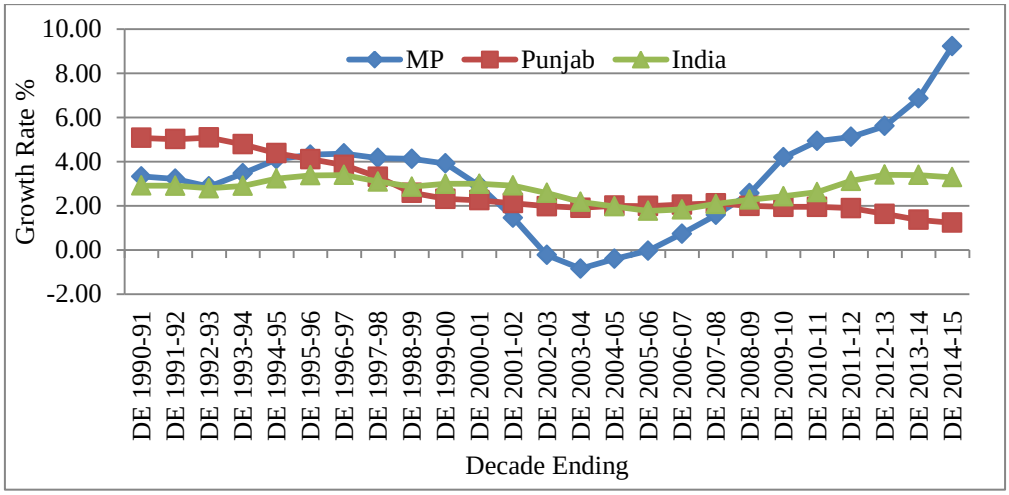

Figure 2: Trends of agriculture growth rates (Decade ending with 1990-91 to 2014-15) of Madhya Pradesh, Punjab and India

Thereafter agricultural growth turned upward and grew at a remarkable rate during 2004-05 to 2014-15. The results imply that main factors contributing to the agricultural growth in Madhya Pradesh are, (i) expanded irrigated area coverage; (ii) improvement in credit; (iii) assured and remunerative price for wheat by strengthening wheat procurement system (Krishnamurthy 2012) and (iv) diversification towards high value crops. Assured and remunerative price for wheat by strengthening wheat procurement system also helped farmers in realizing fair prices for their produce (Gulati et. al. 2017). In the recent period, the state government emphasized for realization of fair prices to farmers. For better prices realization to farmers, state agriculture joined e-NAM (electronic national agricultural marketing); amended and implement contract farming act and passed a separate land leasing act. Due to interventions in the implementation of marketing and other farmer friendly reforms, the state got fourth position in agro business farmer friendly index developed by NITI Aayog (Chand et. al. 2016).

Estimation of structural breaks in agricultural NSDP, in Madhya Pradesh :- The analysis above reveals broad pattern of growth, without identifying structural changes in growth path due to interventions in policies or technology.

Numbers of alternative methodologies are available in the time series literature to determine structural breaks. The conventional approach is to apply a "chow test" for a statistically significant difference in the parameters of linear time series regression fitted across two periods which have been segmented based on an exogenously identified break date.

Table 2: Results of the multiple break points estimation test (Bai and Perron Test)

Particulars	**Estimated number of breaks**		
Break point	**T=1**	**T=2**	**Time period**
	2002-03	2002-03	1990-91 to 2002-03
		2009-10	2002-03 to 2009-10
			2009-10 to 2014-15
F-statistic	89.82*	10.83*	
Critical Value	8.58	10.13	

Source: author's estimation based CSO data.
Note: * significant at 0.005 levels.

In the present study we applied Bai and Perron test to identify multiple structural breaks in the time series of growth rates. Results of test are presented in table 2. For selection of break point we used critical value of Bayesian information Criteria (BIG) (Bai and Perron, 1998 &2003 and Wang, 2006). The test suggested that two break points (2002-03 and 2009-10) in the series. On the base of Bai and Perron test, the series was divided in to three phases.

- Phase First (1990-91 to 2002-03): Period of decelerated growth;
- Phase second (2002-03 to 2009-10): Period of accelerated growth
- Phase third (2009-10 to 2014-15): High growth period

Table 3: Trend Growth rate of NSDP (2004-05 prices) of various sub sectors in Madhya Pradesh various periods of Growth

(Per cent)

Sector	Period of decelerated growth (1990-91 to 2002-03)	period of accelerated growth (2002-03 to 2009-10)	High growth period (2009-10 to 2014-15)
Agriculture and Allied Activities	0.73	5.31	15.41
Agriculture	0.70	5.82	16.73
Forestry and Logging	-0.93	0.56	0.94
Fishing	9.26	4.44	9.51
Non-agriculture	6.43	8.26	6.18
All Sector	4.49	7.43	8.66

Source: author's estimation based on CSO data.

Agriculture and allied sector registered 0.73 per cent, 5.31 per cent and 15.41 per cent growth during the periods 1990-91 to 2002-03, 2002-03 to 2009-10 and 2009-10 to 2014-15, respectively. Similar trend was observed in the sub-sectors (crop & livestock). Moreover, the growth trend of non-agricultural sector was 6.43 per cent, 8.26 per cent and 6.18 per cent during these phases. During the recent period, growth in agriculture sector remained at much higher level than in non-agriculture sector in the state.

Determinants of agricultural productivity in Madhya Pradesh :- To identify the factors

influencing inter-district agricultural productivity (GDDP Rs./ Ha), we fitted panel regression analysis. The agricultural productivity is influenced by number of factors. In the regression, per hector use of fertilizer (Kg/Ha), credit disbursed (Rs./Ha NSA), irrigation Coverage of NSA (Per cent), rainfall actual (mm), crop diversification Index (Simson's Crop diversification Index) and cropping intensity was used as explanatory variables for agricultural productivity.

Table 4: Results of Hausman test

Test	Null Hypothesis	Test statistics	Probability
Hausman	Cov ($\alpha_{i,}$ x_{it}) = 0	Chi-Sq 20.95 (6)	0.0019

Source: author's estimation

For choosing the appropriate model, numbers of alternative hypotheses were used. One of them is testing for appropriateness of fixed and random effects models. This was done by applying Hausman test. Null hypothesis is that the appropriate model is random effects and there is no correlation between the error terms and the independent variables in the model. The null hypothesis was rejected (Table 4), suggesting for fixed effects model.

Table 5: Estimated results of fixed effect model

Variable	Coefficient
Dependent variable: Agril. GDDP per ha of NSA	
Constant	5.011***
	(1.0731)
NPK use (Kg/Ha)	0.162***
	(0.0493)
Credit disbursed (Rs./Ha)	0.131***
	(0.0186)
Irrigation Coverage of NSA (Per cent)	0.288***
	(0.0762)
Simson diversification Index	0.240**
	(0.1140)
Rainfall actual (mm)	0.095***
	(0.0299)
Percent cropping Intensity	0.116
	(0.2343)
R^2	.8603
Cross section units	42
No. of observations	378
Durbin-Watson statistics	1.2974

Source: author's estimation

Note: ***, ** Significant at 1% and 5% level of significance, respectively.
Figures within parentheses are standard errors of the respective variables.

It is observed from the table 5 that NPK use, credit disbursed, irrigation coverage, diversification towards high value crops (Simpson's crop diversification index) and actual rainfall are positively and significantly, associated with per hectare GDDP. These independent variables

together explained around 86 per cent of variation in per hector agricultural GDDP. One per cent growth in NPK use increased per hector agriculture GDDP growth by 0.16 per cent. Similarly, one per cent increase in credit disbursed, irrigation coverage, diversification index and rainfall increased per hector agriculture GDDP growth by 0.13 per cent, 0.28 per cent, 0.24 per cent and 0.09 per cent, respectively.

Inter-district variation in performance of agricultural in Madhya Pradesh :- From the above discussions, it is well established that the growth in agriculture is very high and agriculture sector drives overall economic growth in the state. It will be interesting to know whether agricultural growth is uniform across all the districts. Further, whether inter district agricultural productivity is converging or diverging over the last decade? In this section districts are categorized into different categories based on growth rate (2004-05 to 2013-14) and level of agricultural productivity (2013-14) rupees per hector at current prices.

Table 6: District wise Agricultural productivity in 2013-14 and growth rate in productivity from 2004-05 to 2013-14

Particulars	Low Growth (<4%)	Medium Growth (>4% and <6%)	High Growth (>6% and <8%)	Very High Growth (>8%)
Low Productivity (<Rs. 50000 HA)	Katni, Damoh, Umaria, Chhatarpur and Dindori	Vidisha	Mandla	
Medium productivity (>Rs. 50000 and <Rs. 70000 HA)	Tikamgarh, Balaghat, Narsimhapur, Satna, Rewa and Panna	Sheopur, Sehore, Rajgarh, Shivpuri, Betul and Sagar	Datia, Seoni, Raisen and Bhind	West Nimar (Khargone)
High productivity (>Rs. 70000 and <Rs. 100000 HA)		Shahdol and Neemuch	Mandsaur, Gwalior, Dewas, Ratlam, Hoshangabad, Dhar, Ujjain and Morena	Chhindwara, Harda and Bhopal
Very high productivity (>Rs. 100000 HA)			East Nimar (Khandwa)	Jabalpur, Guna, Indore and Barwani

Source: author's estimation based on CSO data.

Table 6 reveals that both agriculture productivity and growth rate of agricultural productivity is very high in Barwani, Guna, Indore and Jabalpur districts. The Jabalpur and Guna districts witnessed very high agriculture productivity (Rs. 159333/ ha and Rs. 121090/ ha) with unexpected agricultural growth rates of 20.1 and 8.6 per cent, respectively. On the other hand, Chhatarpur, Damoh, Umaria, Dindori and Katni districts were at the bottom position in per hector GDDP (agriculture productivity) as well as in growth. Balaghat, Narsimhapur, Panna, Rewa and Tikamgarh districts are also lagging behind and growth performance lie in less than 4 percent per annum growth rate category. Vidisha and Mandla districts have low agriculture productivity (less Rs. 50000 per Ha of GDDP), nevertheless well performance in growth.

Convergence / divergence in agricultural productivity across districts :- The convergence / divergence in agricultural productivity is examined regressing growth rate with the initial land productivity. Agricultural growth and productivity are not uniform across all districts in the state. Growth rate as well as productivity of some districts is very high (Indor, Jabulpur, Guna, Harda etc.). On the other hand, some districts are not

performing well (Chattarpur, Dmaho, Katni etc.). The graphical exploration indicates diverging trends in agricultural productivity across districts.

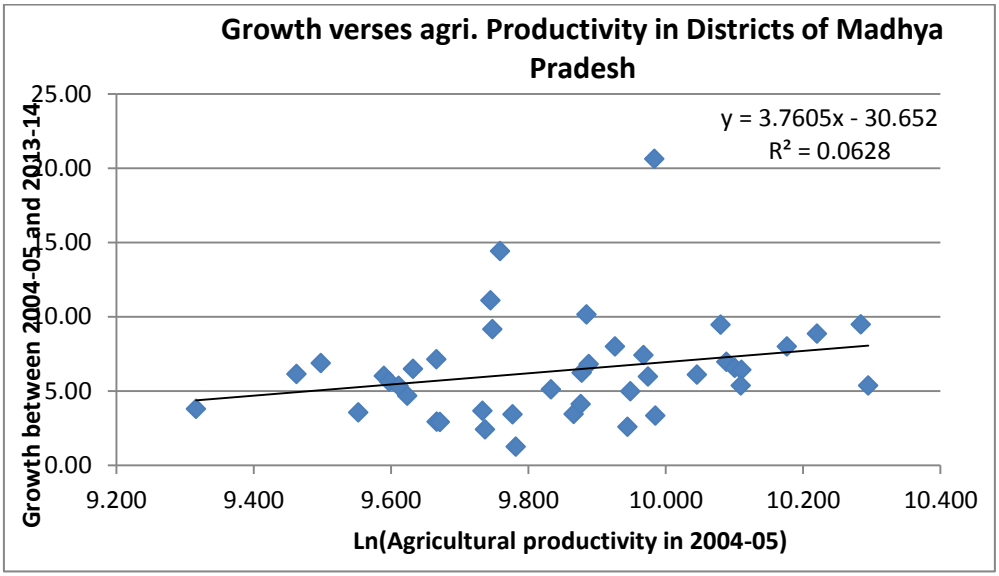

Figure:3 Growth verses initial level of agricultural Productivity

Therefore, to sustain the growth rate of the economy as well as agriculture sector in Madhya Pradesh, it is necessary to pay special attention on backward districts. These districts are unable to attain current growth rate. The districts like Chhatarpur, Damohand, Katni, Balaghat, Narsimhapur, Panna, Rewa and Tikamgarh requires immediate attention.

Conclusion and Policy implication :- About 69.8 per cent of the working population directly or indirectly depend agriculture in Madhya Pradesh. Hence, special attention on agriculture plays vital role for state development and will also help in solving number of problems like poverty, hunger and mall nutrition. During the last decade, state's agriculture had achieved significant growth rate. Due to the special attention of state and central government and rapid implementation appropriate of policies, growth trends of agricultural sector had changed significantly in 2003-04 and again in 2009-10. The implementation of National Food Security Mission and National Horticulture Mission has also emerged as a path of intervention which helps in agriculture diversification towards high value crops in the state. Area under fruits and vegetable had increased from 217.4 thousand hectors (0.91 per cent) in 1990-91 to 373 thousand hector (1.55 per cent) in 2013-14. Main causes of this growth are, a) share of net irrigated area in net sown area which increased from 22.1 per cent in 1990-91 to 61.3 per cent in 2013-14; b) improvement in procurement system (only 7.8 per cent of wheat total production was procured by govt. agencies in 2000-01, which reached at 49.7 per cent in 2013-14); c) Madhya Pradesh is the first state in India to make available interest-free credit to farmers by cooperatives. Total credit disbursed to agriculture had increased from Rs. 54,123 million in 2003-04 to Rs. 4,63,867million in 2014-15. With the contribution of these all factors, agriculture sector has grown at remarkable rate after 2002-03. It is also established that agriculture sector leads nonagricultural sector growth in recent phase.

Growth had not been equal across districts. Some of districts unable to properly adoption of new development strategy. Balaghat, Narsimhapur, Panna, Rewa and Tikamgarh districts have remained unchanged. These districts have lagged behind and recorded growth at very slow rate. There is a need for special development strategy for these disadvantages districts. There is also a need for appropriate strategy to remove the diverging pattern in inter district agricultural

productivity. Stability and future agricultural growth of the state will depend on implementation of accurate planning for these districts.

Disclaimer :- Views expressed in the paper are personal and do not represent the organizations with which the authors are associated.

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Capital Formation and Growth in Agriculture

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Abstract :- During 1991, the country initiated economic reforms aimed at far-reaching changes in regulations, fiscal economic activities and government controls and intervention in market, the agriculture sectors was not targeted directly by the reforms for a couple of years, but it was affected indirectly through changes in the reforms for a couple of years, but it was affected indirectly through changes in the exchange rate, export liberalization and terms of trade resulting from disprotectiion to industry, annual growth rate in total gross domestic product (GDP) has accelerated from below 6 per cern during the initial years of reforms to more than 8 per cent in the recent years. The approach paper to eleventh five year plan finds that 8.5 per cent growth in GDP is feasible during the next five years. As a matter of fact sectorial composition of growth is more challenging than the growth in total GDP, which is related to the well-being of a very large segment of population. Agriculture, which accounted for more than 30 per cent of total GDP in the beginning of reforms failed to maintain its ore-reform growth or keep pace with growth in the non-agricultural sectors on the contrary, it witnessed a sharp deceleration in growth after the mid- 1990s. This happened despite the fact that agriculture productivity in most of the states was

Keywords : GDP, growth, green revolution, agri-exports, food subsidy etc quite low and there was a lot of scope and potential for the growth of agricultural output.

Introduction : Agriculture is the best backbone of the Indian economy. Employing 60% of the population and their ultimate source of livelihood. However, contributors to less than 15% of overall GDP, and accelerating at a slow growth pace of 3%.

Indian agriculture has witnessed stagnancy and slowdown in the rate of rate of agriculture growth. There has been debate among academic and policy in the rate of agricultural growth from 1980s onwards, which in turn has led to decline in the rate of agriculture growth. There has been debate among academics and policy-making circles that what constitutes capital formation.

European union, USA, Brazil, China, Canada, Indonesia and Australia are the largest agri-exports rice (Basmati non-basmati), spice, cashew, oil cake/meals, tobacco, tea, coffee, marine products and meat products, Currently India's agri-exports constitute 12.8% of the total exports (ministry of commerce, Government of India), the following statistics clearly suggest that Indian agri-exports have always been a net foreign exchange earner.

It is evident that government expenditure in agriculture, rural development and related areas is very important for agriculture growth in India.

S.No.	Financial year	Plantation import	Plantation export	Agri & allied product imports	Agri & allied products exports
1	2010	458.3	1106.0	10696.0	12971.3
2	2011	749.9	1521.1	10755.9	17762.3
3	2012	1028.4	1894.6	14062.5	27881.1
4	2013	1038.4	1840.7	16774.5	32953.6
5	2014	1075.1	1625.1	13492.3	32953.6
6	2015	1034.1	1502.9	19004.1	30147.3
7	2016	895.8	1562.6	20763.6	24521.9
8	2017	841.2	1613.3	23208.5	24698.5

Source : APEDA 2017

Gandhi wanted India to stand on the strong footing of self-sufficient village republic energized with new ideas of life, truthfully behavioral pattern and a set goal of value up gradation with auxiliary activism with a purposeful life. Thus action of life well connected an united with goal of life.

He wanted to put India and its agriculture with its on farm and off-farm activities in coordination with the united goal of life.

He wanted India's economy be built up on its own footing having space for new ideas, innovation and research – all well connected with extension activities for the villages.

The first five year plan through agricultural development orientation with grow more food slogan are well-known to all of us, but the designs of agricultural development envisaged therein were completely based on band system of river valley project built on American design of development. The food subsidies proposed through the budget were directed towards grain producers, but the very fact of the situation was that through abolition of zamindari and Gandhi idea of land to the tillers where concaved and it was designed in such a way that there grew an intermediary interest between the tillers of the land the actual farmers and absentee farm owners dominated over it.

Ambedkar raised the point of doubt on giving food subsidy to producers in agriculture. C.D. deshmukh then finance minister of India advocated the govt. case in the rajya sabha on the issue of food subsidy to the producers in agriculture. Ambedkar leader of opposition in the rajya sabha raised fingers on it explaining theoretically the issue of subsidy and its relation with food supply and food stock placing the case of India then and advised the finance minister of India to follow the path of British finance minister then. The food subsidy should be given to the consumers in terms of relaxation to them on income tax and other fronts central excise and state excise duty extra.

Event in green revolution belt the high productivity growth helped the farmer for a very short period of five to ten years. In 80s the water table in Punjab started receding down and irrigation lost and energy cost of agriculture became very high. This was the common phenomena in all green revolution belts. The concentration on grow more food campaign because costly after 1980 and 90 onwards, it started showing signal of abysmal failure ultimately resulting high suicidal death toll of farmers in these regions due to high debt burden on their shoulder – as a result of scintillating agricultural input prices, from 2000 till date more than 3 lakh 10 thousand farmers have committed suited in these regions.

Agricultural policy regime and their fall out :- The agricultural policy of India during the course of its

planned are not well structured and they are therefore fragmented in nature and it is because of the lack of integrating mechanism in the policy regine the farmers are at lost and distress.

The only measure taken during the earlier years of reforms that had a direct impact on agriculture was decontrol of fertilizers and reduction in the fertilizer subsidy. The dis protection to industry in improvement in terms of trade for agriculture growth during the initial years of reform was a substantial hike in minimum support price given by the government, mainly to reduce the gap between domestic and international prices that resulted largely from devaluation of the overvalued exchange rate. The impact of these changes and various other factors was a small acceleration in the growth rate of agriculture during the first six years of reforms.

Growth rate of agriculture and growth of GDP of India :- It is well know that we have moved beyond 'Hindu rate of gandhi' at all India level in the last two and half decades. There is a debate on the turning point and structural breaks in economic growth in the country. A perusal of GSDP growth rates of various states reveals growth rate of GDP increased continuously from 1.8% in the 1960 to 2-8% in the 1970s and to 4-9% in the 1980 and to 5.2% in the 1990s and later on it picked up to 6.76 per cent in the last decade. However, the growth of GSDP in the last ten years (1994-95 to 2004-05) was lower at 5.8% as compared to 6.4% during the decade 1984-85 to 1993-94.

Table 1

Trend growth of overall GDP and that of agriculture, non-agriculture

S.No.	Year/Indicator	2000-01 to 2012-13	1990-91 to 2000-01	1980-81 to 1990-91	1970-71 to 1980-81	1960-61 to 1970-71	1950-51 to 1960-61
1	GDP	6.76%	5.24%	4.83%	2.36%	3.19%	3.20%
2	AGRICULTURE	3.05%	2.78%	3.08%	0.32%	1.49%	2.57%
3	NON-AGRICULTURE	7.43%	5.96%	5.51%	3.29%	4.17%	3.63%

Source : DBIE, RBI, statistics of national income

By and large, it can be surmised that the main causative factors for the slowdown and tardy growth of agriculture at national level post 1991 are as follows :

1. Decline in the area under cultivation, might be due to the result of urbanization and industrialization but recovered slowly then after :
2. Deterioration in the terms of trade for agriculture.
3. Stagnant crop intensity initially and picked up in later years.
4. Decline in supply of electricity to agriculture and.
5. Poor progress of irrigation and fertilizer use which have become a major contributing factors of growth of agriculture.
6. Slowdown in diversification towards high-value crops.

By and large form the aforesaid, it can be inferred that the regional disparities have widened in the agriculture sector in particular and in the states income levels in general irrigation in agriculture especially in the years of economic reforms is reaffirmed. There is thus a need to strengthen the irrigation projects to boost up investment in agriculture to facilitate growth in agriculture.

Economic reforms and agriculture growth in India with special reference to Andhra Pradesh :- Agriculture as an important engine of growth for the Indian economy is very well recognized. In order to keep this engine of growth at full blast and reap the benefits it is necessary to formulate policies that aim at improving the efficiency of agricultural production and marketing, raising the incomes of the farming community and ensuring food security, the agricultural policy should also take into consideration the changing conditions in the world economy. With the advent of WTO, like many other countries India also faces the challenges of removing domestic support in the form of subsides removing quantitative restrictions and other non-tariff and tariff barriers on imports and exports. Though several steps have been taken to implement the various clauses of WTO, the process has been very gradual and caution due to the government's concern for household food security, levels of poverty and regional disparities in development.

Indian agriculture accounts for about one-fourth of the gross domestic product (GDP) and is main source of livelihood of more than two-third of the population. Indian agriculture has been facing serious challenges and huge opportunities under WTO. During 1986-88 triennium base years of WTO, the international prices of most agro products were more than the domestic prices and then, India was expecting the international prices to remain stable due to reduction of subsidies by the developed countries under WTO commitments.

Cost returns of banana cultivation: A comparative study among the different categories of farmer :- Agriculture is an industry covering the organization of resources – such as land water, capital in a wide variety of forms and management and labor for the production and marketing of food and fiber. Agriculture and allies activities make the single largest contribution to the gross domestic product (GDP), accounting for almost 14 percent of total. Agriculture growth has direct impact on poverty eradication and also an important factor in containing inflating raising agriculture wages and for the employment generation. In the context of changing roles and functions of agriculture in the economy, it is increasingly being contemplated that indirect benefits of irrigation could be higher than that of direct benefited, but very few empirical case studies so far are conducted on this topic to illustrate these issue. All the literature on irrigation financing and cost recovery are very farmers centric and they take into account only of the direct benefits of irrigation.

Development of irrigation and water management are crucial for raising standard of living in rural areas. Around 40 percent of country's cultivated area is irrigated. The ultimate irrigation potential of the country has been assessed at around 140 million hectares, 58.56 million hectares from major and medium irrigation and 81.42 million hectors from minor irrigation, of which 64.09 million hectares is from ground water source. Irrigation helps small and medium farmers with adequate water supply for intensive methods increase the productivity of land. At the same time, suitable irrigation facilities reduce regional disparities, income inequalities, and improve purchasing power of rural community to maintain price stability.

Government policies :- The legislative and administrative policies of the government may also affect the cropping pattern. Food crops acts, land use acts; intensive schemes for paddy, for cotton and oilseeds, suns dies affect the cropping pattern. The real difficulty in adopting a better cropping pattern is that the farmer may not have the requisite capital to invest now or possess the know-how for better procurements

Issues in agricultural development :- Agriculture contributes a significant share to the national income but more importantly it is a major source of live hood for majority of work force in the countryside. However, the per hectare production of different principal crops in the country is relatively low. In some cases it is as low as $1/5^{th}$ to $1/5^{th}$ as compared to other countries due to traditional methods of cultivation, small farms

size, low investment, low input, poor health and lack of education among the farmers, lack of linkages between agriculture and industry, and poor condition of infrastructure. Limited availability of cultivable land and ever increasing population has left no alternative but to increase productivity and hunger in rural areas. Following issues are important for the development of agriculture in India.

Agriculture development has been analyzed by studying the cropping pattern, land utilization pattern, framework. Tribal regions are experiencing agriculture intensification changing cropping pattern and crop specialization as a result of ecological economic changes as a well as impact of public policy of technology transfer and resource use intensification. An attempt is made to study changes in land utilization pattern, to estimate growth rates of area. The positive growth rates were noticed in area, production and productivity of major crops. An analysis will help in launching different programmers for developing agriculture in the state. Result of study will help policy makers, administrators and research workers for development of agriculture in different fields to plan their strategies for overall development of state.

Vision 2023 – strategic indicatives in agriculture :- Tamilnadu envisages achieving 5.0 percent of annual average growth rate in agricultural sector. To achieve this, key initiatives to be taken under vision 2023 are :

1. Promote market driven agricultural produce
2. Accelerating innovation and extension mechanism
3. Functional consolidation of land holding
4. Emphasis on mechanization
5. Improving productivity
6. Assurance of timely irrigation
7. Creating a robust supply chain
8. Skill development in agriculture

Threats to Sustainability

Sustainability :- Sustainability in any sector is an issue of great concern for all the stake holders. The most widely accepted definition of sustainability is: “Development that meets the needs of the present without compromising the ability of future generation to meet their own needs” (unitednations, 1987). In relation to agriculture and fisheries, “sustainable development is the management and institution change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resource, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable” (FAQ, 1997).

From the above definition, it is clear that development should be economically viable, environmentally bearable and socially acceptable. After observation and analysis of the inputs from the farmers from the sample villages, it is understood that the following practices endanger sustainability in shrimp culture.

Farmers expectations for improving sustainability

- Cooperation among farmers through farmers groups.
- Knowledge extension through public agencies.
- Supply of quality seed. Regulation on input and output and markets.
- Introduction of crop insurance
- Support prices for the produce
- Input subsidies
- Institutional finance

Challenges to Sustainability :- In spite of efforts from the governments, there are certain challenges to sustainability some of which need war-footing measures to tackle and some cannot be controlled at all. They are:

- Supply of quality seed.
- Regulation on input and output markets.

- Introduction of crop insurance
- Support prices for the produce
- Input subsidies.
- Institutional finance

Challenges to Sustainability :- In spite of efforts from the governments, there are certain challenges to sustainability some of which need war-footing measures to tackle and some cannot be controlled at all. They are :

- Institutional finance
- Waste management
- Output price regulation in an export-driven market.
- Climate changes

Suggestions :- In view of the major findings the following suggestions can improve the economic efficiency of the shrimp farms in the study area.

- Compulsory drying of the pond after each harvest.
- Establishing diagnostic centers or labs, and providing technical guidance in time by public agencies.
- Seasonal gap for the crop, especially during rainy season
- Establishing waste disposal mechanism should be made compulsory at all farms.
- Bridging the gap between public agencies and shrimp farmers.
- Basic crop insurance and supporting prices.
- Government control on market rates of seed and feed
- Government entry marketing of shrimp.
- Development of infra facilities, particularly for storage of shrimp.

Accelerating agriculture Growth :- Agriculture has been the backbone of the Indian economy and it will continue to remain so far a long time. It has support almost 17% of world population from 2.3% of world geographical area and 4.2% of world water resources. In India around 56% of the population earns its livelihood from agriculture. It is an important source of raw material for many agro based industries. India's geographical condition is unique for agriculture because it provides many favorable conditions. There are plain areas. Fertile soil, long growing season and wide variation in climate condition etc. apart from unique geographical conditions, India has been consistently making innovation efforts by using science and technology to increase production.

In the last 50 years Indian agriculture has undergone a major transformation from dependence on food aid to becoming a consistent net food exporter. Over the past three decades the Indians economy has undergone a significant structural transformation away from agriculture and toward non agriculture sectors. The share of agriculture in the country gross domestic product (GDP) has consistently declined, from an average 33% in the 1980 to 26% in the 1990 and further to 18% in the following decade. There is a continuous steady decline in its contribution towards the GDP, and the agriculture sectors is losing its shine and anchor position agricultural scenario is burned in present times are many but this in no way undermines the importance of the sectors, and the role it can play in holistic and inclusive growth of the country. Agriculture is fundamental for sustenance of an economy as is food human being.

Since independence India has made much progress in agriculture. Indian agriculture, which grew at the rate of about 1% per annum during the fifty years before independence, has grown at the main source of growth in the period of fifties and sixties after that the contribution of increased land area under agricultural production has declined over time and increased land area under agricultural is its success in eradicating of its dependence on imported food grains. Indian agriculture has progressed not only in output and yield terms but the structural changes have also contributed. All these development in Indian agriculture are contributed by a series of steps initiated by Indian government. Land reforms, investment in research and extension service, provision of credit facilities and improving rural.

Globalization had a significant impact on Indian agriculture in many good and some bad

ways. Globalization enable greater access to technological advancement in agriculture, including high yield varieties, GM crops and micro-irrigation technique, foreign investment in agriculture in contract farming, cold storage and food processing have helped farmers. Access to foreign markets has greatly boosted Indian agricultural exports. Globalization helped improve food productivity and production and helped transform rural agrarian societies. It has empowered the farmers to understand reach out and competes in global markets. The new technologies, especially in irrigation, helped in addressing rural water stress and keeping agriculture viable. It has also helped change the agrarian society attitudes towards new technologies in farming.

Multinational companies (MNC) captured the Indian markets making farmers dependent on the expensive high yield seeds and fertilizers. Attraction of global market resulted in farmers shifting from traditional mixed cropping to unsustainable cropping practices. The competition from cheaper imports pushed down the prices like cotton, wheat etc. making agriculture unsustainable for many farmers. Unsustainable agriculture practice post global shed and the inability to compete against cheaper imports contributed to distress migration of rural farmers, destroying rural agrarian society and traditional family structures. The dependency of MNC seeds resulted in farmers losing touch with indigenous seeds and farming methods. Globalization caused change in food habits with increased consumption of proteins. Sugar and then waiving them off is surely advantageous for political parties.

Agriculture value chains are difficult to organize and stabilize in countries like India with a large number of small farm holdings. The production and aggregation parts of value chains have to be made efficient in order for the small farms to realize higher returns. Building the confidence of farmers to move away from subsistence farming to market oriented framing and a increasing their awareness on application of improved inputs and adoption of higher technology of cultivation are important interventions in creating a sustainable value chain. Aggregation of several small farms pose challenges in terms of highly dispersed collection of produce, transport, arrangements, and quality assurance mechanism at every level. The government decision to create national agriculture market (NAM) e-platform for formers will remove interstater barriers in moving farm produce and can be a game changer provided the prerequisites barriers in moving farm produce and can be a game changer provided the prerequisites are fulfilled by states. E-NAM has the potential to transform Indian agriculture from traditional to an entrepreneurial and a profit making venture. But this will only possible with supplementary additions in infrastructure easy credit disbursal and vigilant inspection and implementation.

The crop insurance scheme have been in operations in the country close to last two decades or so because of reports of crop losses due to erratic climates incidents and insufficient rainfall, the farmers have been facing an uncertain future, there have been reports about farmers suicide because of crop failures. So far, the coverage of crop insurance had been inadequate. Within a year of its launch by prime minister, the revamped crop insurance scheme titled Pradhan Mantri Fasal Bima Yojna (PMFBY) has management to provide millions of the farmers with coverage in case of crop failure. Pradhan mantra Fasal Bima Yojna (PMFBY) if implemented properly across the country would mitigate farm distress to large extent especially have been introduced in the scheme to make it more attractive to farmers such as application of one nominal premium rate for a season across the country, provision of features such as localized calamities, prevented sowing, post-harvest losses and going to village or panchayat level to assess crop losses or damages.

Situation of investment in agriculture :- Agriculture production, which is the principal means of subsistence for about 115 million farming families, grew at a meager average annual

rate of 2.3 percent during the tenth plan period against a desired level of 4 percent. A country with a large population has to be nearly self-sufficient in essential food items; otherwise supply constraints have emerged in some essential commodities such as wheat, pulses and edible oils. To mitigate the indebtedness of the farmers and the peasants, the annual budget has tried to increase the quantum of bank loan to the farming sector to the extent of Rs. 2,25,000 crore and bring an addition of 50 lakh new farmers under the credit net.

Concluding remarks :- Risk management in agriculture should address yield, price, credit, income or weather related uncertainties among others, improving water availability will facilitate diversification of cropping pattern, but this should go hand in hand with policies that increase non-farm employment. Improving agricultural extension that addresses deskilling because of technological changes and also facilitates appropriate technical know-how for alternative forms of cultivation such as organic farming will be help. Availability of affordable credit requires revitalization of the rural credited market. There is also a strong case for regulating private credit and input markets. A challenged for the technological and financial gurus is to provide innovative products that reduce costs while increasing returns. Organizing farmers through a federation of self-help groups (SHGs) with government, banks and other stakeholders playing a pro-active role would be welcome. Besides, public institutions, there is need for a greater enrolment from the civil society.

A new dimension of agro-fin challenge and solution for farmer's suicide in India :- The non-farm activities are becoming increasingly important but poor people are earning their living from agriculture as we realize that agriculture continues to be the mainstay of Indian economy, whose contribution to national gross domestic product (GDP) is 17.4%, embedded the capacity to provide 48.9% of the total employment in the nation. India's agricultural growth rate is realized to be 2.2%, twelfth five year plan (2012-2013 to 2016-2017) has envisaged a growth of 4% for agriculture and allied sectors which is necessary for the Indian economy to grow at over 8 percent.

The growing number of distress selling in India is increasing from time to time due to many causes. The farmers' suicide is growing rapidly due to many causes. But we segment this farmer's suicide into two times pattern first is the pre-yielding and second the post yielding in the nation.

The psychological analysis of the farmers' suicide INDIA :- According to the data available in the economic survey shows the psychology of the different farmer's suicide for different causes.

Table 1
The psychological analysis of the farmer's suicide

S.N.	Reason for farmers suicides	Percent (of suicides)
1	Failure of crops	16.84
2	Other reason (e.g. chit fund)	15.04
3	Family problems with spouse, other	13.27
4	Chronic illness	9.73
5	Marriage of daughters	5.31
6	Political affiliation	4.42
7	Property disputes	2.65
8	Debt burden	2.65

9	Price crash	2.65
10	Borrowing too much (e.g. for house construction)	2.65
11	Losses in non-farm activities	1.77
12	Failure of bore well	0.88

Source : NCRB

Farmers suicide due to the crop failure is more than any other form of reason, because this is bread and butter of the farmer for whole year.

In this sense we say that the markets failure is the main cause for the farmer's suicide in India. The table show that the 40% of the farmer suicide is due to the market failure and another 60% is due to the other problems in the market. The micro analysis for the suicide of the farm is that not only a better agricultural market rule is required, but a better multi situational finance and insurance is required for them. A good scheme for financial market is for the nation.

Data shows that most of the farmers' suicide is noticed in Madhya Pradesh, but it is less in Bihar. In this context we realize how amount of rules and regulation as well as physical policy required for those states to activate the ware house development and also the farmers financial simplicity in the in the nation.

Enhancement in labour productivity :- Urbanization has taken up a relatively tiny part of the land used for cultivating crops, but its demand for labour is significant. Higher wages in urban area would draw workers out of rural areas over 2006-14, rural wages rose in eight years on trot in real terms, thanks more to a construction boom across the land than to employment guarantee programmers higher wages would push up the cost of cultivation. Should farmers then receive still higher minimum support prices? Paged at 10 percent of all in cost of the reason for lower productivity of farm sector. Here labour productivity is the ratio of output per employed worker varies widely in the economies of the Asia-pacific moreover, it can differ significantly in the world.

Conclusion :- Cropping system research is a subset of farming system research that is confined to the farmers' crop production enterprise. With the objective to increase the benefits derived by crop production with the available physical, biological and so ciao-economic resource, research as carried out in variations in crops yields result mainly from two factors those which area considered as controllable and those which are considered as uncontrollable, among controllable factors is weather. Weather is a limiting factors is determining crop yield, particularly in India where nearly four-fifth of the cropped area depends on monsoon. Weather factors are important even in other countries where weather proofing devices have been evolved through the development of technology and extensive irrigation system.

Under-developed countries are basically characterized and dominated by small farmers and reasonable prices, crop, insurance, subsidies for inputs and lower taxes. Among these incentives, higher prices for the outputs and lower prices for the inputs play vital role in changing the cropping pattern, particularly in the initial years. Because in most of the under-developed countries, while prices of farm inputs have considerably increased on the other hand farm families are not only on the present cropping pattern, won't affect severally on the farm families. In such a situation, the best remedy for changing the cropping pattern is higher prices for agricultural goods and lower prices for the inputs. Coming to the tax as incentive, in the beginning years of the change in the cropping pattern, some tax incentive should be given, which induces changes in the cropping pattern.

On the conclusive part, we conclude that this policy is suitable for Indian farmer to doubling their income in India. The belated spreading of this

form of registration and the recommendation of the commercial bank in India, with negligence in the state is very painful. Market chain revolution means the dynamic spread of the market economy. Proper market economy is possible through taking physical steps and these physical steps revolutionize the concept on the beneficiaries mind. E-warehouse receipt and the main thing is that it required overall realization with lucid regulation in the markets are not integrated with warehousing or cold storage facilities. Though it is very advance institution oriented financing system to the farmer, it is very nice to implement not on the urban area, only reflect on the annual report of survey report to show the number or data, but also it required spreading itself to the remote rural area where the yielding is physically realized. It should be integrated and farmers oriented one for good financial system for better financial inclusion in India.

Shrimp farming is taken up on large scale in west Godavari. If the farmer's practices are streamlined and the government agencies play a more active role in reaching the farming of all scale, shrimp culture will be sustainable in the region. The board development vision of the state govt. envisaging the promotion on blue revolution through multipronged approach and introduction of alternate species will be realized.

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Impact of Climate Change on Livestock Productivity and Adaptation

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Introduction :- A huge increase in the demand of animal production is expected in the next decades. Food and water security will be one of the other priorities for humankind in the 21st century. Over the same period the World will experience a change in the global climate that will cause shifts in local climate that will impact on local and global agriculture. The key conclusions of Working Group I of the Intergovernmental Panel on Climate Change (IPCC), the Fourth Assessment Report (AR4) (IPCC, 2007) were: a) warming of the climatic system is unequivocal; b) anthropogenic warming will probably continue for centuries due to the timescales associated with climate processes and feedbacks; c) the surface air warming in the 21st century by best estimate will range from 1.1 to 2.9 °C for a "low scenario" and of 2.4 to 6.4 °C for a "high scenario". Moreover, the IPCC report estimates a confidence level N90% that there will be more frequent warm spells, heat waves and heavy rainfall and a confidence level N66% that there will be an increase in drought, tropical cyclones and extreme high tides. The magnitude of the events will vary depending on the geographic zones of the World.

Livestock play a major role in the agricultural sector in developing nations, and the livestock sector contributes 40% to the agricultural GDP. Global demand for foods of animal origin is growing and it is apparent that the livestock sector will need to expand (FAO, 2009). Livestock are adversely affected by the detrimental effects of extreme weather. Climatic extremes and seasonal fluctuations in herbage quantity and quality will affect the well-being of livestock, and will lead to declines in production and reproduction efficiency (Sejian, 2013). Climate change is a major threat to the sustainability of livestock systems globally. Consequently, adaptation to, and mitigation of the detrimental effects of extreme climates has played a major role in combating the climatic impact on livestock. The difficulty facing livestock is weather extremes, e.g. intense heat waves, floods and droughts. In addition to production losses, extreme events also result in livestock death. Animals can adapt to hot climates, however the response mechanisms that are helpful for survival may be detrimental to performance. In this article we make an attempt to project the adverse impact of climate change on livestock production. Direct effects of climate change on livestock. The most significant direct impact of climate change on livestock production comes from the heat stress. Heat stress results in a significant financial burden to livestock producers through decrease in milk component and milk production, meat production, reproductive efficiency and animal health.

Impact of climate change on animal health :- The effects of climate change on the health of farm animals have not been studied in depth. However, it can be assumed that as in the case of humans, climate change, in particular global warming, is likely to greatly affect the health of farm animals, both directly and indirectly. Direct effects include temperature-related illness and death, and the morbidity of animals during extreme weather events. Indirect impacts follow more intricate pathways and include those deriving from the attempt of animals to adapt to thermal environment or from the influence of climate on microbial populations, distribution of vector-borne diseases, host resistance to infectious agents, feed and water shortages, or food-borne diseases. Acclimation is a phenotypic response developed by the animal to an individual source of stress within the environment. The acclimation of the animals

to meet the thermal challenges results in the reduction of feed intake and alteration of many physiological functions that are linked with impaired health and the alteration of productive and reproductive efficiency. Acclimation to high environmental temperatures involves responses that lead to reduce heat load. The immediate responses are the reduction of feed intake, increase in respiration rate and water intake and changes in hormonal signals that affect target tissue responsiveness to environmental stimuli. The decrease in energy intake due to reduced feed intake, results in a negative energy balance (NEB), and partially explains why cows lose significant amounts of body weight and body score when subjected to heat stress. If exposure to high air temperature is prolonged, lower feed intake is followed by a decline in the secretion of calorigenic hormones (growth hormone, catecholamines and glucocorticoids in particular), in thermogenic processes of digestion and metabolism, and metabolic rate. All these events together (lower feed intake, change in endocrine status and lower metabolic rate)

Impact of climate change on livestock production :- Climate change, particularly global warming, may strongly affect production performances of farm animals and impact worldwide on livestock production. Heat stress is a major source of production loss in the dairy and beef industry and whereas new knowledge about animal responses to the environment continues to be developed, managing animals to reduce the impact of climate remains a challenge. A thermal environment is a major factor that can negatively affect milk production in dairy cows, especially in animals of high genetic merit. Johnson et al. (1962) showed a linear reduction of dry matter intake (DMI) and milk yield when THI exceeded 70. The reductions were −0.23 and −0.26 kg/day per unit of THI for DMI and milk yield, respectively. Our studies, carried out in climatic chambers, described a decrease in milk yield of 35% in mid-lactating dairy cows and of 14% in early lactating dairy cows kept under heat stress conditions. The extent of milk yield decline observed in heat-stressed cows is dependent on several factors that interact with high air temperature.

Animals exposed to heat stress reduce feed intake and increase water intake, and there are changes in the endocrine status which in turn increase the maintenance requirements leading to reduced performance Environmental stressors reduce body weight, average daily gain and body condition of livestock. Declines in the milk yield are pronounced and milk quality is affected: reduced fat content, lower-chain fatty acids, solid-non-fat, and lactose contents; and increased palmitic and stearic acid contents are observed. Generally the higher production animals are the most affected. Adaptation to prolonged stressors may be accompanied by production losses. Increasing or maintaining current production levels in an increasingly hostile environment is not a sustainable option. It may make better sense to look at using adapted animals, albeit with lower production levels (and also lower input costs) rather than try to infuse ‘stress tolerance’ genes into non-adapted breeds (Gaughan, 2015).

Impact of climate change on livestock reproduction :- High environment temperatures may compromise reproductive efficiency of farm animals in both sexes and hence negatively affect milk, meat and egg production and the results of animal selection. Wolfenson et al. (2000) reported that over 50% of the bovine population is located in the tropics and it has been estimated that heat stress may cause economic losses in about 60% of the dairy farms around the world. Heat stress compromises oocyte growth in cows by altering progesterone, the secretion of luteinizing hormone and follicle-stimulating hormone and dynamics during the oestrus cycle. Heat stress has also been associated with impairment of embryo development and increased embryo mortality in cattle (Wolfenson et al., 2000). Moreover, heat stress may reduce the fertility of dairy cows in

summer by poor expression of oestrus due to a reduced estradiol secretion from the dominant follicle developed in a low luteinizing hormone environment. A drop can occur in summer of about a 20–27% in conception rates or a decrease in 90-day non-return rate to the first service in lactating dairy cows. Heat stress during pregnancy slows down growth of the foetus and can increase foetal loss, although active mechanisms attenuate changes in foetal body temperature when mothers are thermally stressed.

Also, beef cows are negatively affected by heat stress. In a ten-year study of calving records, the effects of environmental conditions during breeding season on pregnancy rate and reported a reduction in pregnancy rate when the average daily minimum temperature and average daily THI were equal to or exceeded 16.7 °C and 72.9, respectively. Roy and Prakash (2007) reported a lower plasma progesterone and higher prolactin concentration during oestrus cycle in Murrah buffalo heifers. These authors concluded that prolactin and progesterone profiles during the summer and winter months are directly correlated with the reproductive performance of buffaloes, and that hyperprolactinaemia may cause acyclicity/infertility in buffaloes during the summer months due to severe heat stress.

Reproductive processes are affected by thermal stress. Conception rates of dairy cows may drop 20–27% in summer, and heat stressed cows often have poor expression of oestrus due to reduced oestradiol secretion from the dominant follicle developed in a low luteinizing hormone environment. Reproductive inefficiency due to heat stress involves changes in ovarian function and embryonic development by reducing the competence of oocyte to be fertilized and the resulting embryo (Naqvi et al., 2012). Heat stress compromises oocyte growth in cows by altering progesterone secretion, the secretion of luteinizing hormone, follicle-stimulating hormone and ovarian dynamics during the oestrus cycle. Heat stress has also been associated with impairment of embryo development and increase in embryonic mortality in cattle. Heat stress during pregnancy slows growth of the foetus and can increase foetal loss. Secretion of the hormones and enzymes regulating reproductive tract function may also be altered by heat stress. In males, heat stress adversely affects spermatogenesis perhaps by inhibiting the proliferation of spermatocytes.

Effect of climate change on livestock production systems :- Predictions of the impact of climate change on agriculture and livestock production systems are more reliable on a large-scale basis than at local levels. Principally the prediction is qualitative, rather than quantitative. Climate change and variability will affect land-use and land cover differently in different parts of the world, as a result of strong interactions between environmental and socioeconomic drivers of land-use, which define vulnerability and resilience of each productive system (Thornton et al., 2007). Even though future climate changes will be highly spatially variable, some model climate projections suggest that precipitation will increase at high latitudes, and will decrease in the tropical and subtropical land regions (IPCC, 2007).

Impact of climate change on livestock adaptation :- In order to maintain body temperature within physiological limits, heat stressed animals initiate compensatory and adaptive mechanisms to re-establish homeothermy and homeostasis, which are important for survival, but may result reduction in productive potential. The relative changes in the various physiological responses i.e. respiration rate, pulse rate and rectal temperature give an indication of stress imposed on livestock. The thermal stress affects the hypothalamic–pituitary–adrenal axis. Corticotropin releasing hormone stimulates somatostatin, possibly a key mechanism by which heat-stressed animals have reduced growth hormone and thyroxin levels. The animals thriving in the hot climate have acquired

some genes that protect cells from the increased environmental temperatures. Using functional genomics to identify genes that are up- or downregulated during a stressful event can lead to the identification of animals that are genetically superior for coping with stress.

Studies evaluating genes identified as participating in the cellular acclimation response from microarray analyses or genome-wide association studies have indicated that heat shock proteins are playing a major role in adaptation to thermal stress. Impact of climate change on livestock diseases Variations in temperature and rainfall are the most significant climatic variables affecting livestock disease outbreaks. Warmer and wetter weather (particularly warmer winters) will increase the risk and occurrence of animal diseases, because certain species that serve as disease vectors, such as biting flies and ticks, are more likely to survive year-round. The movement of disease vectors into new areas e.g. malaria and livestock tick borne diseases (babesiosis, theileriosis, anaplasmosis), Rift Valley fever and bluetongue disease in Europe has been documented. Certain existing parasitic diseases may also become more prevalent, or their geographical range may spread, if rainfall increases. This may contribute to an increase in disease spread for livestock such as ovine chlamydiosis, caprine arthritis (CAE), equine infectious anemia (EIA), equine influenza, Marek's disease (MD), and bovine viral diarrhea. There are many rapidly emerging diseases that continue to spread over large areas. Outbreaks of diseases such as foot and mouth disease or avian influenza affect very large numbers of animals and contribute to further degradation of the environment and surrounding communities' health and livelihood. Conclusion There is considerable research evidence showing substantial decline in animal performance inflicting heavy economic losses when subjected to heat stress. With the development of molecular biotechnologies, new opportunities are available to characterize gene expression and identify key cellular responses to heat stress.

These tools will enable improved accuracy and efficiency of selection for heat tolerance. Systematic information generated on the impact assessment of climate change on livestock production may prove very valuable in developing appropriate adaptation and mitigation strategies to sustain livestock production in the changing climate scenario. As livestock is an important source of livelihood, it is necessary to find suitable solutions not only to maintain this industry as an economically viable enterprise but also to enhance profitability and decrease environmental pollutants by reducing the ill-effects of climate change.

Conclusions :- Increase in temperatures cause severe damage to the physiology, the metabolism and to the healthiness of animals. Modification of existing regimes of precipitation and the increase of aridity will have repercussions on the availability of feedstuff for animals. The increased difficulty in livestock production in the world will correspond to the increasing needs in animal products. The answers of the livestock systems to these requisites will be diverse. The grazing and mixed rain-fed systems, which count on the availability of pastures and farm crops, will be the most damaged by climate change. The effort in selecting animals that up to now has been primarily oriented toward productive traits, from now on, must be oriented toward robustness, and above all adaptability to heat stress. In this way molecular biology could allow to directly achieve genotypes with the necessary phenotypic characteristics. Research must continue developing new techniques of cooling systems such as thermo-isolation, concentrating more than in the past on techniques requiring low energy expenditure. New indices that are more complete than THI to evaluate the climatic effects on each animal species must be developed and weather forecast

reports must also be developed with these indices, to inform the farmers in advance.

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GLOBALIZATION, SLOW DOWN IN AGRICULTURE AND FARMER'S SUICIDES IN INDIA

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Agriculture is a back bone of an Indian Economy as we know that about 70% of country depends upon Agriculture. Through Globalization was introduced but it was limited only to Punjab, Haryana and Western U.P. Other areas which are dependent on agriculture are still backward and monsoon dependent. So we can say that there are little advantages of Globalization on Indian Agriculture. But on the other hand Indian agriculture has suffered adverse from impact of Globalization the impacts are as follows :

- Agriculture land has been taken or encroached for development of Industries becauseof globalization the competition in agriculture sector has increased.
- US got many of India's high earning agricultural products patent from WHO, like Basmati rice, turmeric etc. and that's why you need to pay US government for their production.
- FDI was introduced in industrial and service sector but agricultural sector was kept protected and hence capital formation in agricultural is negligible.

SLOW DOWN IN AGRICULTURE :- As we all know that about this fact that production in agriculture is always an unpredictable and always far away from expectations. There are no targets about the production. There are many causes behind this, But here we can broadly divided into three factors:

A. **Human factors :-** Its further classified into two categories, namely Social atmosphere and Pressure of population on land.Social climate includes customs and traditions.Indian farmers are uneducated and has no knowledge for latest techniques of production. He believes in God for everything either good or bad. So, Social climate is not good for agriculture. On the other hand, Over Population is also another cause for decline agriculture production day by day in our country being as the second highest populated country in the world. In 1901, 16.30 crore people were dependent on agriculture. The number has gone up year by year. Heavy pressure has led to subdivision and fragmentation of land holdings.

B. Technical factors :- Definitely, Technical factors were equally responsible for the declination in agriculture production. It includes technique as well as methods of farming.

(i) Old Implements – like wooden ploughs, sickles and spades are commonly used. That why due to this agriculture is backward?
(ii) Problems of Soil- like soil erosion, water logging, nitrogen deficiency and swamps. These are the reasons for low productivity in agriculture.
(iii) Lacks of credit facilities –Credit facilities are inadequate in rural areas. Farmers can not be able to raise credit from rural banks easily. They have to depend on non-formal sources of finance. These money lenders charge heavy rate of interest. Farmers have to sell their produce at low price to these money

lenders. So farmers have low income and thus low productivity.

(iv) Improper Marketing – is a vital role for low productivity of agriculture. Farmers fail to get suitable price for their produce. Lack of warehousing facilities is also responsible for it.

So there are numerous factors which are responsible such as lack of HYV seeds, traditional methods of cultivation, Insufficient irrigation facilities, problems of pests and diseases of crops, feeble cattle etc.

FARMER SUICIDES AND HOW CAN WE PREVENT THEM? :- The main cause of farmer suicide not only involves the poor implementation of the policies of the government…. Yet the other causes include climatic change, social and economic condition and the community they live. All government policy can become viable only when there is basic climate condition handshake with the farmers. So I suggest, for farmers the government should adopt improved technological assistance to guide their farming and report constantly about the major climatic change.

As government was lacking in quick action regarding the disasters e.g. during okhi monsoon they didn't warned the coastal regions. So it swelled the lives of many people and livelihood. This should not be done for farmers… easy accessibility to the climatic change and pre warning must be done. Thus development in urban region should also be reflected in rural region also… many researches must be done regarding improvement in agriculture and satellite guiding for suitability of climate (for farming) should be lectured to farmers.

To understand this, one must analyze the agricultural set up in India.

- Agriculture has always been celebrated as the primary sector in India. India is an agrarian economy, which means, Agriculture is the pre-dominant sector of the Indian economy. True to this, even to this day, in spite of the Indian economy opening out to the world and globalization, close to 70% of the population still depends on agriculture for its livelihood. The secondary and tertiary sectors in India are growing at rapid rates, still a vast majority of Indians continue to depend on agriculture. Every plan for the growth of the Indian economy aims at agricultural development, which is justified because to achieve the growth rates that the economy aims at, it is important to first address the growth rate of the major sector of the economy. Since the first Five year plan, India's focus has been on agriculture and after 50 years of Five year plans, where does Indian agriculture stand?

- Does that mean everything is looking bright for Indian agriculture? A superficial analysis of the above points would tempt one to say yes, but the truth is far from it. Behind all the growth and development lies the reality that Indian farmers have to face - extreme poverty and financial crisis driving them to suicides. The year 1997 saw the first few cases of farmers committing suicides, these cases steadily increased over the next decade, peaking in 2001 and reports say that as many as 6000 farmers committed suicide in the last 5 years in the state of Andhra Pradesh alone. The worst cases of farmers committing suicides come from the states of Andhra Pradesh, Karnataka and Maharashtra. What are the grave adversities that drive the farmers to commit suicide, at a time when Indian economy is supposed to be gearing up to take on the world?

- Indian agriculture is predominantly dependant on nature. Irrigation facilities that are currently available do not cover the entire cultivable land. Any failure of nature, directly affects the fortunes of the farmers. Secondly, Indian agriculture is largely an unorganized

sector, there is no systematic planning in cultivation, farmers work on lands of uneconomical sizes, institutional finances are not available and minimum purchase prices of the government do not in reality reach the poorest farmer. Added to this, the cost of agricultural inputs have been steadily rising over the years, farmers' margins of profits have been narrowing because the price rise in inputs is not complemented by an increase in the purchase price of the agricultural produce. Even today, in several parts of the country, agriculture is a seasonal occupation. In many districts, farmers get only one crop per year and for the remaining part of the year, they find it difficult to make both ends meet.

- India has witnessed a spate of droughts over the last decade. The worst affected being the farmers of Rayalaseema districts in Andhra Pradesh; it is the cotton farmers in the state of Maharashtra. Nature has repeatedly failed the farmers of these states and owing to lack of facilities to save their crops; these farmers have no means to face the adversities of crop failures. If the farmers are at the mercy of monsoons for timely water for their crops, they are at the mercy of the government for alternative irrigation facilities. The Government cannot be trusted to always act in the interest of the farmers.

- Agriculture works out profitably where the size of the land is medium to large to benefit from the economies of large scale production. The fact is that majority of the farmers in India own as little as 2 acres of land, cultivation on such small sized lands is not feasible, in many cases, the farmers are not even the owners of the land, which makes profitable cultivation impossible because a significant portion of the earnings go towards the payment of lease for the land. At times, even the middle to large land owners are faced with the difficulties of the vast majority of farmers, however, they are able to at least realize their investment for each crop.

- Repeated crop failures, debt hassles, lack of alternative sources of income, absence of institutional finance have left the farmers with no other solution other than ending their lives. Another disturbing trend has been observed where farmers commit suicide in order to avail relief and benefits announced by the government to support the families of the farmers who have died. This is true in the case of several farmers in Andhra Pradesh who committed suicide so that their families could at least benefit from the Government's relief programmes.

HOW TO PEVENT THIS PROBLEM? :- What then needs to be done to prevent this sad state of affairs?

Giving monetary relief is not an effective solution :- The solutions should aim at the entire structure of agriculture. Here are some solutions that could help in improving the state of the farmers:

1. The dependency of agriculture on nature should be reduced. This calls for effective management of water during seasons of good monsoons. Prevention of crop failure should be the primary aim of the Government. In most cases, it is not the lack of water but the lack of proper management on the government's part that causes water shortage.

2. Water management should be made more effective through inter- state co-operation on water resources, where surplus water from perennial rivers can be diverted to those regions facing drought, as it is always seen in India, where in state there is severe drought, another state has to face worst floods, such regional imbalances can be managed by effective utilization of water resources throughout the country.

3. Making institutional finance available to every farmer is another important solution to save to the farmers from debt traps of money lenders. Where institutional finance is available, it should be made easily accessible to the poorest farmers. This calls for removing of elaborate formalities and procedures for obtaining the loans. A poor farmer would be unable to understand the complexities of procedures; he needs a simple solution for his financial needs. Effective monitoring of the disbursed funds is also required .In addition, monitoring is also needed to ensure that the farmers are using the funds for the right purposes.

4. Farmers need to be advised and guided on economical methods of cultivation which would save finances for them. The technological advancement in agriculture should be passed down to the small farmers.

5. The government could also explore the possibility of pooling of the lands of small farmers and making a bigger chunk of economically cultivable land. Through pooling of lands, the small farmers can avail the economies of cultivating on a larger scale.

6. Small farmers should be encouraged to develop alternative sources of income and the government should take up the responsibility of providing training to the farmers to acquire new skills. In drought affected areas, the Government could start alternative employment generation programmes to reduce the dependency on agriculture as the sole source of income.

7. Provision of relief facilities alone is not sufficient as it has been observed in the case of Andhra Pradesh where farmers committed suicides just to avail the benefits of relief packages. Relief packages should be given as a benefit to farmers to enable them to sustain their livelihood rather than as a relief to families of farmers who commit suicide.

8. The solution to the farmer's plight should be directed towards enabling the farmers to help themselves and sustain on their own. Temporary measures through monetary relief would not be the solution. The efforts should be targeted at improving the entire structure of the small farmers wherein the relief is not given on a drought to drought basis, rather they are taught to overcome their difficulties through their own skills and capabilities. The Government needs to come up with pro-active solutions and the nation has to realize that farmers' suicides are not minor issues happening in remote parts of a few states, it is a reflection of the true state of the basis of our economy.

"Give a man a fish, he will eat for a day but teach him how to fish, he will eat for the rest of his life", so goes the popular saying, the case of our Indian farmers is similar to this, what they need is a means to sustain throughout their lives without having the face the desperation that adversity drives them to. If India has to shine, it is these farmers that need to be empowered.

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AGRICULTURE IN MADHYA PRADESH : IMPACTS OF RURAL DEVELOPMENT CHALLENGES AND REMEDIES

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ABSTRACT :- Agriculture in important part of India's economy and at present it is among the top two farm producers in the world. In this research paper I tried to found that development of agriculture in Madhya Pradesh one of the major roles of rural development there is association between poverty across employment increase in agriculture as well as improvement in productivity and income. In future state government should make liberal policy regarding difference sector of agriculture as many more people canget employment directly or indirectly.

Keywords :- Agriculture sector, rural area.

INTRODUCTION :- Agriculture plays a vital role in the Indian economy over 70 percent of the rural household depend on agriculture. Agriculture is an important sector of Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over last few decades.

Madhya Pradesh in agriculture supports 70 percent of the rural population with 72 percent area under rainfed cultivation and predominance of small holders with low adaptive capacity.[16]

There has been steady progress in the agriculture sector in the last three decades and Madhya Pradesh has not been untouched by this modern education system and innovation, where agriculture has provided high-tech resources like modern tractors, seeds fertilizers and irrigation equipment has been an increase in rural opportunities in the agriculture sector.

Madhya Pradesh is the second largest state of India comprising of fifty districts spred across eleven agro-climatic zones. The rural areas of Madhya Pradesh are primarily dependent of climate sensitive sectors such as agriculture making them highly vulnerable to impacts of climate change. As of 2011, the total population of the state stands at 72.6 million with 72.3% being rural. The rural population heavily relies on primary sectors like agriculture, horticulture, fishery, livestock, poultry and forestry far livelihood.

Due to climate change, these natural resource based livelihood sources are expected to be impacted more than the other sectors.

2. RESEARCH OBJECTIVES OF THE STUDY :-

- To current status and to study the impact of rural development on agriculture sector.
- Agriculture in rural development and techniques.
- To provide a basis of monitoring and evalution.
- To know the possibility and to study the increase in productivity and income in agriculture through rural area.

CURRENT STATUS :- The directorate of economics and statistics, ministry of agriculture (Desmoa) is responsible for the collection :

- Weekly and daily wholesales prices,
- Retail prices of essential commodities,
- Farm harrest prices.

Through the first green revolution has bypassed Madhya Pradesh, the state has been witnessing very high growth in agriculture in recent years. During 2013-14, MP has recorded 25 percent growth in production.

3.1 SOME SALIENT FACTS ABOUT AGRICULTURAL SCENARIO

- Agriculture is the largest provider of livelihood in rural (M.P.)
- It is still dependent primarily of the monsoons.
- The rural Development in Agriculture production has been stagnant for the pas several years.

3.2 ROLE OF AGRICULTURE IN M.P. ECONOMY

- Share in state Income.
- Largest employment providing sector.
- Contribution to capital formation.
- Providing raw material to industries.
- Market for Industrial to Products.

3.3 IMPORTANCE IN INDIAN TRADE

- Share is state income.
- Source of employment.
- Provision of food grains.
- Supply of raw materials to industrial sector.
- Earner of Indian Exchange.
- Significance for trade and transport.
- Source of revenue for the government.
- Land Tenure.

4. INDIAN AGRICULTURE PROBLEM :

- Instability
- Cropping Pattern
- Land Ownership
- Sub – Division and fragmentation of Holding.
- Conditions of Agricultural Labourers.

5. OUTLINE OF IMPACTS ON AGRICULTURE :- In short term, the impacts on agriculture will be more due to rural development variability inter annual variation in change, erratic distribution over time and space, leading to frequent droughts and floods. Other extreme events like heat waves and cold waves which will have compounding effect on agricultural production warmer temperatures, in particullar will impact crop growth and reproduction significantly.

6. IMPACT OF DROUGHT IN RURAL INDIA

- **Impact on Agriculture :-** Indian agriculture depends heavily on the prevailing climate. A favourable southwest Monsoon is desirable for successful crop production in a season. However, the rainfall pattern is not consistent in some parts of India and leads to reduced yields of the crops or total crop failure in some years. This occurs mostly in drought-prone regions. It is worth mentioning here that the shortfall in agricultural production in may be the direct impact of meteorological droughts but the succeeding hydrological and agricultural droughts have a long range and for reaching impact on agriculture in the cropping patterns and impoverishment in cattle.
- **Social and Economics Impact :** Social and economics impact of a drought is more severe than the physical and agricultural impacts. A drought is almost invariably associated with famine which has its own social and economics consequences.
- **Problems of Village Life :** At present the condition of the life of the people living in villages is gloomy the problems of our villagers are many and varied. The villagers are poor ignorant and superstitious.

- Most of the villages have no basis amenities like good roads, schools and hospitals.
- The condition of village schools in not satisfactory moreover the villagers don't understand the importance of education.
- A large number of children are angaged in economics activities, mainly agriculture.
- The do not know the laws of health.

Solution for upliftment of village life for their solution same concrete programs should be taken by both the government and the local bodies.

- Mass education should be spread by establishing more primary and secondary schools it must be made both compulsory and free.
- Night school should be setup for the illiterate adults to teach them to read and write.
- Village should be electrified to remove the depressing darkness of rural night.
- Rural banking should be set up for financial assistance to the village people.

7. RESEARCH METHODOLOGY :- The research based on primary and secondary data collection methods and the research type is descriptive. A structured questionnaire will be designed to gather information for primary data and for secondary data-internet, books and websites previous dissertations/research papers/marketing journals/ magazines / text etc will be used.

8. HYPOTHESIS

- There is association between impact rural developments across unemployment increase in agriculture.
- There is no association between poverty across employment increase in agriculture.

9. RESEARCH CONTRIBUTION :- This research aims to provide a better understanding of the impact of rural area on growth in Madhya Pradesh. Understanding increase in employment canassist rural policy maker of the state in different forms. Furthermore, a theoretical model of impact rural development in M.P. in this study will help to provide a useful framework for future research regarding development of agriculture beyond rural development.

10. REVIEW OF LITERATURE :- Previous studies on impact of rural in agriculture field have identified modern policy of rural helpful to generate unemployment in aagro-field.

Suresh K. Sinha (2009) Studied that the green revolution, which is often characterized by the introduction of high-yielding variety of seeds and fertilisers, undoubtedly increased the productivity of land considerably, But the growth in the productivity has been stagnant in recent years, resulting in a significant decline in the income of farmers.

A.K. Makwana (2013) Founded that concerted efforts would be required to transform Indian agriculture rural system to make it more sensitive and responsive to the need of stake holders. ICAR is makng concerted efforts to improve the agriculture education. Indian agriculture education system will definitely achieve excellence and help the country to see second green revolution.

11. ANALYSIS AND DISCUSSION :- In the data analysis there is classification and frequency of different profile like as rural increase and productivity and income grow statement.

12. RESULTS AND FINDINGS

- Ranking of the factor for preference towards impact of rural develpment.
- There is association between rural development across unemployed increase in agriculture.
- There is association between poverty across unemployed increase in agriculture as well as improvement in productivity and in-come,

13. CONCLUSION :- Madhya Pradesh agriculture is showing robust growth in recent years, the state

should invest on research and development for evolving rural development ready.

- Change is happening in rural M.P. but ir has still a long way to go.
- Agriculture has benefiled from improved farming techniques but the growth is not equitable.
- Land use is changing in rural areas as farmers are getting good value for their holdings the effort should be to stop the migration to urban areas.

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Agriculture and Environment

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Introduction :- agriculture is the cultivation of land and breeding of animals and plants to provide food, fiber, medicinal plants and other products to sustain and enhance life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. The study of agriculture is known as agriculture science.

Agriculture provides a wide variety of environment amenities and dismantles. On the positive side, farms provide open space and scenery. On the negative side, agriculture is a major contribute to numerous environmental problems. Nitrate and pesticide runoff impair drinking water quality and degrade habitat for aquatic organisms including fish, affecting commercial fisheries and recreational uses of estuaries, lakes, and streams. Bacterial contamination from animal wastes impairs drinking water quality and contaminates shellfish. Odor from concentrated livestock facilities worsens the quality of life in nearby residential areas. Erosion – induced sedimentation of waterways increases drinking water treatment costs and accelerates the need for dredging to maintain navigability. Pesticide residues on foods may also threaten human health. Ecological damage from agriculture includes kills of fish, birds, animals, and invertebrates from pesticides and, most important, habitat loss from conversion of wetlands and grasslands. Heavy metals likes selenium and arsenic in drainage water have been implicated in wildlife kills and reproductive problems and can pose hazards to human health. Negative externalities also occur within agriculture. Stalinization of rivers by irrigation runoff damages crop production in downstream areas. Upslope irrigation may cause drainage problems in down slope areas. Pesticide drift kills been and thus impairs orchard pollination.

These problems have spawned a large, wide – ranging literature exploring efficient and equitable policy design. This chapter reviews some of the major developments in that literature, concentrating on the problems that address the major features distinguishing agriculture from other industries.

We begin by considering the size, scope and origins of environmental problems in agriculture. Agriculture involves extraction of renewable resource under naturally occurring conditions. Agricultural productivity has traditionally depended on the natural resourec base of agriculture, giving farmers economic incentives for conserving that resource base. Protection of environment quality has historically been a side effect of those conservation efforts. These economic incentives for resource conservation have traditionally been referred to as stewardship.

Agriculture, stewardship and the environment :- Farming is, at bottom, a resource extraction industry. Both crop and livestock production involve harvesting biota, that is, renewable natural resources produced by biological processes. Both utilize as intermidiate inputs a veriety of natural resources, such as soils, water, genetic material, non crop plant life and naturally occurring fauna that mitigate damege caused by pest species. These natural resources may simultaneously influence environment spillovers from agriculture

production like water pollution, pesticide poisonings, or scenic amenities.

The farm environment has also traditionally been an important source of direct consumption goods for farmers and their families. Hunting and fishing have historically provided significant shares of farmers diets. Ground water and the local streams can be major source of drinking water. Protecting wildlife habitat, water quality, and other aspects of environmental quality at the local level can thus be equivalent to potecting farmers standard of living.

Until recently, agriculture was considered a clean industry, largely because farmers well being depended on the resource base of agriculture and on local environment quality. Farmers were thought to be stewards of both in their own self interest. Even today, stewardship if often invoked as a solution to environment problems in agriculture, and attempts to populaize more environment friendly farming practices remain the major form of environment policy in agriculture, at least in development countries.

Environmental impact :-

Effects and costs :- Agriculture imposes multiple external costs upon society through effects such as pesticide damage to nature (especially herbicides and insecticides), nutrient runoff, excessive water usage, and loss of natural environment. A 2000 assessment of agriculture in the UK determined total external costs for 1990 of £2343 million, or £208 per hectare. A 2005 analysis of these costs in the US concluded that cropland imposses approximately $5 to $16 billion, while livestock production imposses $714 million. Both studies which focused solely on the fiscal impacts, concluded that more should be done to internalize external costs. Neither included subsidies in their analysis, but they noted that subsidies also influence the cost of agriculture to society.

Agriculture seeks to increase yield and to reduce costs. Yield increases with inputs such as fertilisers and removal of pathogens, predators, and competitors. Costs decrease with increasing scale of farm units, such as making fields larger, this means removing hefges, ditches and other areas of habitat. Pesticides kill insects, plants and fungi. These and other measure have cut biodiversity to very low levels on intensively farmed land.

In 2010, the international resource panel of the United Nations Environment Programme assessed the environmental impects of consumption and production. It found that agriculture and food consumption are two of the most important drivers of environmental pressures, particularly habitat change, climate change, water use and toxic emissions. Agriculture is the main source of toxins released into the environmenat, including insecticides, especially those used on cotton.

Livestock issues :- A senior UN official and co-author of a UN report detailing this problem, henning steinfeld, said livestock are one of the most significant contributors to today's most serious environmental problems. Livestock production occupies 70% of all land used for agriculture, 30% of the land surface of the planet. It is one of the largest sources of greenhouse gases, responsible for 18% of the world's greenhouse gas emissions as measured in co2 equivalents. By comparison, all transportation emits 13.5% of the co2. It produces 65% of human-related nitrous oxide and 37% of all human-inclued methane. It also generated 64% of the ammonia emission. Livestock expansion is citied as a key factor driving deforestation; in the Amazon basin 70% of previously forested area is now occupied by pastures and the remainder used for feedcrops. Through deforestation and land degradation, livestock is also driving reductions in biodiversity. Futhermore, the UNEP states that methane emissions from globle livestock are projected to

increase by 60 % by 2030 under current practices and consumption patterns.

Land and water issues :- Land transformation, the use of land to yield goods and services, is the most substanial way humans alter the earth's ecosystems, and is considered the driving force in the loss of biodiversity. Estimates of the amount of land transformed by humans vary from 39 to 50%. Land degradation, the long term decline in ecosystem fucntion and prouctivity, is estimated to be occurring on 24% of land worldwide, with cropland overrepersented. The UN-FAO report cites land management as the driving factor behind degradation and report that 1.5 billion people rely upon the degrading land. Degradation can be deforstation, desertification, soil srosion, mineral depletion, or chemical degradation.

Eutrophication, excessive nutrients in aquatic ecosystems resulting in algal blooms and anoxia, leads to fish kill, loss of biodiversity, and renders water unfit for drinking and manure application to cropland, as well as high livestock stocking densities cause nutrient runoff and leaching from agriculture land. These nutrients are major nonpoint pollutants contributing to eutrophication of aquatic ecosystems and pollution of groundwater, with harmfull effects on human populations. Fertilisers also reduce terrestrial biodiversity by increasing competition for light, favouring those species that are able to benefit from the added nutrients. Agriculture accounts for 70% of withdrawals of freshwater resources. Agriculture is a major draw on water from aquifers, and curently draws from those underground water sources at an unsustainable rate. It is long known that aquifers in areas as diverse as northern china, the upper ganges and the western US are being depleted, and new research extends these problems to aquifers in Iran, Mexico and Saudi Arabia. Increasing pressure is being palced on water resources by industry and urben areas, meaning that water scarcity is increasing and agriculture is facing the challenge of producting more food for the world's growing population with reduced water resources. Agriculture water usage cal also cause major environmental problems, including the destruction of natural wetlands, the spread of water-borne diseases and land degradation through salinization and waterlogging, when irrigation is performed incorrectly.

Pesticides :- Pesticide use has increased sice 1950 to 2.5 billion short tons annually worldwide, yet crop loss from pests has remained relatively constant. The world health organization estimated in 1992 that three million pesticide poisonings occur annually, causing 220,000 deaths. Pesticides select for pesticide resistance in the pest population, leading to a condition termed the pesticide treadmill in which pest resistance warrants the development of a new pesticide.

An alternative argumest is that the way to save the environment and prevent famine is by using pesticides and intensive high yield farming, a view exemlified by a quote heading the center for global food issues website. Growing more per acre leaves more land for nature. However, critics argue that a trade-off food is not inevitable, and that pesticides simply replace good agronomic practices such as crop rotation. The push-pull agricultural pest management technique involves intercropping, global warming using plant aromas to repel pests from crops and to lure them to a place from which they can then be removed.

Global warming :- Global warming and agriculture are interrelated on a global scale. Global warming affects agriculture through changes in average temperatures, rainfall, and weather extremes; changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations; changes in the nutritional quality of some foods; and changes in sea level. Global warming is already affecting agriculture, with effects unevenly distributed across the world. Future climate change will probably negatively affect crop production in low latitude countries, while effects in northen latitudes may be positive

or negative. Global warming will probably increase the risk of food insecurity for some vulnreable groups, such as the poor.

Animal husbandry is also responsible for greenhouse gas production of CO2 and a percentage of the world's methane, and future land infertility, and the displacement of wildlife. Agriculture contributes to climate change by anthropogenic emissions of greenhouse gases, and by the conversion for non-agricultural land such as forest for agricultural use. Agriculture, forestry and and land-use change cintributes around 20 to 25% to global annual emissions in 2010. A range of policies can reduce the risk of negative climate change impacts on agriculture, and greenhouse gas emission from the agriculture sector.

Sustainability :- Current farming methods have resulted in over-stretched water resources, high levels of srosion and reduced soil fertility. There is not enough water to continue farming using current practices; therefore how critical water, land and ecosystem resourecs are used to boost crop yields must be reconsidered. A solution would be to give value to ecosystems, recognizing environment and livelihood tradeoffs, and balancing the rights of a variety of users and interests. Inequities that result when such measures are adopted would need to be addressed, such as the reallocation of water from poor to rich, the clearing of land to make way for more productive farmland, or the presevvation of a wetland system that limits fishing rights.

Energy dependence :- Since the 1940 , agricultural productivity has inceased dramatically, due largely to the increased use of energy-intensive mechanization, fertilizers and pesticides. The vast majority of this energy input comes from fossil fuel sources. Between the 1960s and the 1980s, the green revolution tarnsformed agriculture around the globe, with world grain production increasing significantly as world population doubled. Heavy relianceon petrochemicals has raised concerns that oil shortages could increas costs and reduce agricultural output.

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Spending pattern of women employees in banking sector : 'Rural areas'

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ABSTRACT :- Agricultural and rural developments are directly proportionate to each other, where women are one of the recognized figure. The paper examines the participation of women in agriculture and rural development with the basic contribution of banking sector and women in banking sector. India is well known for its agricultural land and its agro products. For the developing countries like India agriculture can be considered as an important engine of rural development. Agriculture and women are inseparable faces of a coin. Women have been playing a vital role in agriculture and its development. Women's are the foundation of the rural and national development. Women comprised 43% of the world's labour force. A few time use surveys show that in general weeding and harvesting were predominantly female activities. Though the contribution of women to agriculture and food production is significant then also it is impossible to verify the share produced by women. A huge mass of women is engaged in agriculture globally are a heterogeneous group with vast difference realities opportunities and challenges.

Women farmers have also being playing an indispensable role in improvement of rural life. If we view the ancient period of agriculture, we find that it was only women who was managing domestic internal and external affairs. They were working in the fields with men. They are now educated making their families to educate, develop and mechanize. It is well said "to educate a women is to educate a society". Today's women's are educated and aware, they know different rural development programs and participate in these programs with full enthusiasm. They are also giving viable suggestions and taking remarkable decisions which are required for reorientation of the actual agriculture and rural development programs. Indian banking sector is also working very hard for agricultural and rural development with the contribution of women. Many financial schemes for the purpose of agriculture basically for women are running and feeding women, agriculture and rural areas.

Introduction :- Women and agriculture are indispensable component to each other. In India agriculture is not a profession, it is introduced hereby as their tradition social relations and gender roles. Female represents in agriculture sector as a momentous demographic group. Agriculture is a compound of issues like economic independence, decision making, access to education and health services which affect the issues like poverty, marginalisation and compounded issue of gender in equality. Agricultural and rural development are directly proportional to each other, where women are one of the recognised figure. This paper examines the participation of women in agriculture and rural development. With the basic contribution of banking sector which influenced their spending pattern to improve their living standards.

Objectives of the study :-

1. To study the issue and challenge of rural livelihood and sustainable agriculture.
2. To study the impact of women in agriculture and economic growth and development.
3. To identify the key factor that encourage the growth of the agriculture sector.
4. To identify the areas that could achieve sustainable agriculture and development.

5. To study the role of women in agriculture and rural development.
6. To study the role of women working in banking sector and the spending pattern.
7. To find the future prospects and solution for India.

Majority of Indian population lives in village in remote areas. When the mechanical world was stepping to its heights at the same time Indian rural communities were far away from modern facilities like education, electricity, drinking water facility, health care, transportation, etc. lack of education in rural India acted as breeding ground for social evils and paved the way to anti-social, and anti-national activities. With the entrance of 20th century the word sustainable development start flouring in the fields of scientists, agriculturalist, and environmentalist and so on. It was conference in RIO ON EARTHS SUMMIT in the year 2012, had initiated the light of worry to the world of pollution. They wanted to awaken the world to save earth or save its life or survival. There were many conference held to solve the problems of food security, agriculture, development. The few popular ones are held in Surakarta, Indonesia (2013), Konya turkey (2015), Warsaw Poland (2016).

Rural livelihood : issues and challenges :- Sustainable agriculture directly influence rural livelihood. Sustainable agriculture is the ladder to reach rural development. So, lets learn first of all what is rural and livelihood. Rural is that area which doesn't have modern facilities and the lower population than cities; livelihood refers to the types of jobs and lifestyles that people lead to earn a living. There are mainly five types of rural livelihoods in India namely- agriculture labourer, farmers, farmers with other sources of income, rich farmers and other land owner and other service providers like barbers, village teacher, nurses, etc. also some are employed under government schools and hospitals Rural and remote India can only be developed by developing agriculture sector. Agricultural sector contributes major part to the Indian Economy around which deprivation and social economic privilege revolve and any change in this structure have direct impact on existing pattern of social activity. So agriculture is the issue to be handled technically. There are many unavoidable challenges such as management of global food crisis, adaption to climate change, conservation, enhancement of ecological foundation including land water diversity and marine resources, appropriate land use policy to stop the conversion of agriculture land to non-agriculture uses development in small farm management in all the sectors that is crops animal husbandry, fisheries. To provide the power of mass production to production done by small farmers, institutional mechanism to:

- Decentralization of production for increasing the quality of seeds
- Delivering improved technology to farmers
- Collection of production to improve market access which should target 'and to and' or 'farm to plate' covering all the functions of marketing.

There is one more challenge which is equally important to the above mentioned challenges is to make this occupation professionally rewarding intellectually satisfying to attract the youth to farming, shifting the concept to increase in production to increase in farm income. It is necessary to control the increasing rural-urban disparity. For this the priority should be given to linking farmers to market.

Rural development :- Development in rural livelihood can be clearly understood by the term "rural development" it is continuous activity of improving the quality of life and economic wellbeing of people. Traditionally rural development was surrounded by exploitation of land intensive, natural resources as agriculture and forestry. But the character of rural areas has brought change in global products and increased urbanisation. Resources extraction and agriculture

have replaced to increase in tourism niche manufacturers and recreation. In developing rural region, education, entrepreneurship, physical infrastructure and social infrastructure play an important role.

Development policies and programs :- To face these challenges to reach sustainable agriculture many policy areas are needed to be paid attention. Likewise marketing reformation development in the area of competitive international market, contract farming is to be encouraged. Companies engaged in production activity and cooperatives, introduction of scientific seeds farming, integrated food law should be developed. Rural infrastructure and rural extensive services should be developed, development of agro based processing and cold chain, modernisation of credit market. To reduce the risk factor some additional policy measures should also be compasses through adaption of new technology, insurance and organic farming. Some of the government policies to develop agricultural sector were as national dairy board announced 42 dairy projects to boost milk output, river water of Godavari and Krishna will be lifted under a project for a purpose of proper irrigation facility.

Sustainable agriculture :- Now this is the time to really think of sustainable agriculture. I would like to introduce you agriculture with the word sustainable: - it is a type of agriculture which focuses on the production of long term crops and livestock with minimal effects on the environment. This agriculture also tries to find a balance between the need of food production and the preservation of ecological system with in the environment. The goal of sustainable agriculture associates other goals too including conservation of water, minimizing the use of fertilisers and pesticides, promotion of biodiversity in crops grown and the ecosystem. It is also working on maintaining economic stability of firms and helping farmers to improve technique and quality of life. Sustainable agriculture brought revolution in the field of global agriculture with the goal to meet society's textile and food needs in the present without compromising the availability of future generation to meet their own needs. People practising sustainable agriculture seek to integrate 3 main objectives:- economic profitability, social and economic equity, and healthy environment. They adopt methods to promote minimisation of water use, improving soil health and to lower down pollution levels in the farms. Sustainable agriculture for developing countries like India is primary source of livelihood and sustainability in agriculture sector here means mount the rural livelihood system, where livelihood refers to adequate stock and flow of cash and food to meet individuals basic needs and livelihood security refers to secured ownership of, excess to, economic earning activity and resources including reserves and assets. Development in agriculture continued- land and water management system were also developed. Fusion of women and agriculture in context of Indian agriculture history is not forget full. Contribution of women is quite appreciable but most of the time have been overloaded. Change is the demand of nature and women are becoming more prevalent on farm today.

Rural Development and women :- Involvement of Indian rural women brought many social and economic changes in India. She played in and outside of the home. In the world we live is in the changing scenario since women have been occupying transforming positions in our routine. According to 2011 edition of "the state of food and agriculture world" presented by FAO (FOOD AND AGRICULTURE ORGANISATION). The rural workforce include 43% women participation in developing countries. According to FAO, estimated that when women access to the required financial resources and technology has improved. Women could increase a plantation yields by 20% to 30% and this would reduce the number of under nourished people up to 70% (150 million people) recent studies shows that particularly education

and development in developing countries goes together but out of these two education plays a leading role in rural development. Women empowerment, entrepreneur development programs, education as a main tool brought growth in Indian women in rural areas. Education make possible to open the gates to improve women opportunity in various fields of business tendency. It is clear now that education is the only path to achieve the target of sustainable agriculture and development of rural areas. Now rural India is aware of the need of agricultural development for their and countries growth, so to improve the agriculture many inputs are needed like irrigation facility (water availability) technique to improve soil fertility, HVY seeds over and above finance. Finance or money investment on agricultural land for its development lies at the top most requirement. This requirement of farmers is very clearly understood by RBI and Government of India. Since pre independence era banking sector is spraying its important role in rural development. We can see in 1904 co-operative banking structure appeared and in 1935 reserve bank but with ALL INDIA RURAL CREDIT SURVEY (1954) real efforts of banking started. AIRCS also introduced social banking for commercial banks 1969 followed by bank nationalisation. For the purpose of production and consumption in rural areas, the demand for credit has increased. Credit demand worked as a magnetic force for commercial bank in rural India. RBI recognised that the demand for credit has increased in the rural India then many schemes were introduced to facilitate agriculturalist such as Kisan credit card scheme (KCC).

Role of Banking sector and women :- With the introduction of banking sector in the rural areas it not only brought development in agriculture, rural area, but also in women in rural areas. Bank conduct various awareness programs in such areas which dropped positive impact on specially women. So female is one who manages all sorts of family affairs though she lives in man dominating family. So she is the one who has to manage the savings of the family to overcome the unforeseen expenses and demands. Mann Deshi Mahila Sahakari Bank was setup in 1996 in the drought prone area of Mhaswad, in Maharashtra state came in lime light as boon to women for the savings. In this way women's involvement in banking sector increased and started taking much interest in transaction too. These aware women as a result they educated their children and as a consequences of this 20% of the rural female are now employed in financial institutions such as banking sector (public & private).

Women employee in banking sector and their spending pattern :- Banking sector is paying a pivotal role in developing Indian economy. Creative and constructive minded Indian women brought productive change in banking sector rural and urban, private and public. There was a time when women was working as pawn in family her ideas were never given any priority but literacy and women empowerment schemes which removed gender disparity that transformed the role of male played in a family to female. The hold of finance and related issues are now being handled by women. They decide family budget etc. The spending area and interest of women working in banking sector is quite different from female working in education sector, agriculture sector, sole proprietorship, cottage industry, co-operative sector. Women in banking sector is found quite efficient in increasing savings, interested in investing in land, gold and on shaping the future of their children. They are career oriented. They spend on career oriented activities inspite of spending on their own presentations by wearing heavy sarees, jewellery, organizing kitty parties, etc. they are interested to spend for social welfare and for maintaining their social status and standard.

Conclusion :- It is crystal clear now that the practise of sustainable agriculture is quite important for the developing countries like India.

To accelerate employment, productivity, efficiency and provide guidance to reduce the practices which degrade the fertility of soil, water resource and other natural resources. Sustainable agriculture basically aims at not only supporting specialization and adopting environment friendly tools to protect and preserve the environment but also to increase the level of production without damaging environment. In the last few years it has been observed that the performance of agriculture sector of India has been increased in a significant manner, despite many challenges, such as poverty, scarcity of water, urbanisation and literacy, gender discrimination, etc. to face these challenges contribution of government sector, active NGOs is really appreciable by providing them education awareness, banking financial assistance, schemes to improve agriculture production, to eradicate gender discrimination and empowered women- which covers the major working power on field by literacy and awareness programs. All these collectively enhanced agriculture production in India, helped in solving major problems like unemployment, helped in improving living standard, helped in checking migration towards urban areas, improved pattern of land use. Influenced women to work in banking sector who really knows problems related to rural agriculture that helped in launching many schemes and programs to develop sustainable agriculture. The ideal spending pattern of the women working in banking sector brought much development in their families and society. Their contribution cannot be neglected in economic development because they geared up value of education in their families which is the foundation of all sorts of developments in a country especially in India.

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The Scenario of Water Conservation in India : Some Initiatives for the Sustainability of Water Resources

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Abstract :- It is a well-known fact that water is a natural resource and free gift of nature provided to all human beings. But in spite of its valuable utility, we are polluting our water resources and we do not understand that water is an essential element of human life. If we are not careful about its use, then it is possible that water resources may come under scarcity for future generations. Therefore, water resources require to be conserved to prolong and sustain human life on this planet. Nevertheless, the process of rapid industrialization has raised the problem of water pollution and degraded the quality of water which has caused many diseases. That is way; the issues of water conservation and research management has become a key issue for debate and we need to give a overlook towards this natural resources for the better future of human race on this planet.

Key-Words :- Sustainable Development, Industrialization, Natural Resources, Water Conservation, Environmental Degradation, Blue Revaluation.

Introduction :- We know that in ancient days water was not considered to be a subject matter of property or property right and all people had their customary right to use water as a natural resource. But water resources in British India were initially managed and maintained by the village community. The government initiated many programs to make the people conscious about the use of water resources. After the freedom of India, the issues related to water resources received a due importance and our government made many efforts to manage the water resources for the better use of these resources. However, water is a state subject, but central government can modify or overrule the state's decisions regarding the water lows and there are many laws regarding the use and distribution of water among all segments of human society.

Research Methodology :- This paper is based on data collected from secondary sources due reputed books, journals and magazines. For this purpose, data has been supported by the observational facts by the researcher. Moreover, an analytical and historical approach has been used to accelerate the pace of the study.

Objectives of the study :-

- To reveal the importance of water resources for human race.
- To identify the techniques for water conservation.
- To know about the need of blue revaluation.

Review of Literature :- There is a plethora of literature related to the use and availability of natural resources. Reviews of the following literary works have been cited here under:

Tushar Shah in his article, entiled "Sustainable Development of Groundwater Resources" has stated that the rate of recharge is less than the rate of discharge it would take long time to restore the previous situation of water resources. In such condition a threat to sustainable development can

be observed. Otherwise, we would be guilty of our coming generations.

D.M. more and P.R. Deshpande in their article "Surface Water Resources Development in Deficit Basins" have revealed the fact that water is one of the key resources for development of a brain or region. The quantum of available water in the basin determines the manner in which planning or management is to be accomplished. The economy of a particular region is dependent on the sum total of these resources in various hydrological sub-basins of which it is composed. The concept of water resource management is gaining ground all over the India and river basins serve as ecological unit in better management. It is also required to plan for reuse or recycle of water and water saving techniques may be impacted by the government and N.G.O's. It would enhance the sustainability of water resource. For this purpose, the Government of India should frame new laws.

K.V.Raju in his article, entitled "Legal Framework for participatory irrigation management" has pointed out the fact that water is a natural resource which comes under state's jurisdiction. The states have legal right to regulate the water resources available for this purpose. That is way; most of the state governments have framed water laws to manage the proper distribution of water among all segments of the society for various purposes. It assures the sustainability of this resource on the planet.

Jai Prakash in his article, "Water for Sustainable Growth" has lighted the fact that life without water is difficult to imagine. It is vital for drinking, sanitation, industry, agriculture etc. it covers 70% of the globe, but most of that is salt water filling the oceans Less than 3% of it for daily use. Only about 10% freshwater is easily accessible. Surface water is primarily found in lakes, rivers, ponds and in the shallow underground. There is a great potential for better conservation of water resources to prolong the sustainability of water resources.

Blue Revolution :- Water is now a scarce material. We are totally responsible for this situation. For centuries, rivers were known as a convenient place to dump wastes. It causes water pollution. The large industrial cities in India produce a huge amount of swage causing many problems for human health as well as for eco-system. All the thirteen great river system India are endangered. Adequate sewage systems in India is lacking. The excessive pollution of water resources is a great threat to life and their sustainable environment. That is why; there is an urgent need to change our attitudes towards use of water resources. Harvesting rainwater is urgently required for sustainability of water resources in India. For this purpose we need a 'Blue Revolution'. It is expected to manage the present scenario of water scarcity and some effective techniques could be implemented for the conservation of water resources.

Suggestion :- To conserve water resource – The fact is that most of the water in India is used for irrigation. But our traditional pattern to use water for this purpose is responsible for the excessive waste of water. Therefore, here it is required to adopt efficient techniques for water conservation. Drip irrigation, sprinkler irrigation system and spray irrigation systems are a few such techniques which may be used to save water. Water to the crops from drop tubes is known as an effective technique for the water conservation. It is used in Rajasthan and South Haryana. Furthermore, conserving water for personal use in cities requires managing both the supply and demand. In industrial sector, water resource management requires reusing and recycling process of water of polluted water.

Moreover, consumers need to adopt good practices while using water and pipes and curtail its waste. Treated waste water can be used for flushing toilets, washing vehicles, cleansing floors, gardening and agricultural purposes. To achieve the target of water conservation, water resources management practices should be adopted in a big

way. Check dams can be built to store monsoon flows. The rain water can also be stored in wells as well as in ponds. Rainwater harvesting can be used for water resource conservation and management in the country. Techniques for water conservation-

We know that, groundwater resource is depleting at a faster speed in many parts of the country. Therefore, water resource management requires to be taken some effective measure for this purpose. These measures may be:

- Check dams should be built to store rain water.
- Drop irrigation system should be used to save water.
- Rainwater harvesting should be promoted.
- Public water supply system should be improved.
- Public awareness programs for water conservation should be introduced and people participation in water resource management should be given priority.
- There should be a comprehensive ground water policy for all regions.
- Blue Revolution is urgently required NGO's should play an active role to achieve this goal.
- Waste water should be reused and recycles.
- The states and central governments should frame effective policies for water conservation.
- The misuse of water resources should be stopped.

Conclusion :- Now on the basis of above discussion, we can conclude that we need to frame a comprehensive water conservation policy. The wasteful monsoon run-off rain water, which remains unfiltered, may be arrested by constructed stream barriers and penetrating wells, up to sustainable understand structures. These wells, ponds and pits can conserve a huge amount of rainy water. This water can be used during drying days. However, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra have promoted the schemes for water harvesting during monsoon season. This increased storage of water is used for domestic, agricultural and industrial requirements. The process of water conservation and water resources management has conserved the eco-system of many regions. Nevertheless, in spite of many good practices, population growth, urbanization and industrialization are polluting and depleting the freshwater resources in India. However Modi Government has shown keep interest to protect the sustainability of water resources including the Ganga basin. A huge amount of founds has been allotted for this purpose but still we need to move very fast in this direction for the betterment of human race.

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Edible wild vegetables of Korku and Gond tribe in Timarni tehsils of Harda (M. P.), India: a prospective fortification to food security

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Abstract :- Harda district is located in south part of Madhya Pradesh. It has highly rich floristic biodiversity of plant. It has some hilly tracks covered with luxuriant vegetation along with the forest area is represented by mixed deciduous forest. Edible fruiting plants diversity of higher plants was undertaken during 2011-2016. It is home to diverse group of tribal people coming from different roots of origin. These people have rich traditional and cultural background. Among them Korku and Gond is one of the primitive tribes. This paper primarily deals with the recording of their traditional knowledge about the edible wild vegetables and analyzing various preparations. As per the latest Nagoya Protocol, open ended questionnaires were used to obtain information from the resource persons with prior written permissions. Rhizomes / tubers (14), Leaves and tender shoots (20), Flowers (9) species are used for vegetable in the study area. In total 150 informants were interviewed that yielded the names of 40 vegetable plants. The database of such plants can help in solving problems of food securities by utilizing traditional knowledge of Korku and Gond people or in larger perspective any other tribes.

Key Word :- Harda, Korku and Gond, Narmada River, floristic biodiversity, nutritious food, flora.

Introduction :- Considering present situation of food scarcity in the world, traditional knowledge of this kind can be an important aid to establish better food security (Yongabi & DeLuca 2015). Using and exploiting this knowledge base of wild edible vegetables of Korku and Gond, tribe can be boon in reducing hunger. As the Indian population has already crossed the 1.3 billion mark, limited agricultural system finds it difficult to produce more food for this rapidly growing mass. Focusing on using non-exploited resources judiciously should be the right approach. Most of the people consume already grown food or grow food themselves; however, in developing countries like India, the buying capacity of majority of people is very weak. Knowing about such food can come from the knowledge base of indigenous people.

Study area :- Harda district is situated in the eastern part of Madhya Pradesh. It lies in 21˚ 53` to 22˚36` longitude and 76˚47` to 77˚20`latitude. Total area of the district is 2644.32 Sq. Km. of which forest covers 780.92 Sq. Km. Southern part of the district is covered by Satpura and extension of Malwa plateau. The total population of the district is 570465 (2011 census). The area is dominated by Korku and Gond. The study area is mainly drained by Narmada River and its tributaries are Ganjal, Anjal, Sukni, Midkul, Dedra Machak, Syani, and Kalimachak rivers. The normal rainfall of Harda district is 1124.2 mm. The normal annual mean maximum temperature 32.8˚C and minimum temperature is 19.8˚C.

Methodology :- Open-ended questionnaire developed based on the initial understandings with the local respondents, was used to collect the information regarding the wild vegetable plants and their preparations. Village heads, resource persons and locals were elaborately interviewed for more information. Since this work was primarily based on the knowledge-base of local,

Korku and Gond tribe therefore the data was collected as per the guidelines of Nagoya protocol (2011) by Participatory Rural Appraisal (PRA) method in order to ensure active involvement of the locals (Mukherjee 1993; Campbell 2001). Prior published works on edible plants and , Korku and Gond of this region were substantiated as secondary information (Sainkhediya &, Ray 2014) which were corroborated with locals for validation. For plant collection and preservation of voucher specimens standard methodology has been followed (Jain and Rao, 1977). Voucher specimen were identified in the laboratory with the help of flora (Hooker, 1892-1897; Cook,1903; Gamble et al., 1915; Verma et.al.,1994; Mudgal et. al., 1997; Singh et.al., 2001) and other available literature and deposited at Herbarium, Department of Botany, PMB Gujarati science college Indore, Madhya Pradesh.

Results and discussion :- In total 150 informants were interviewed which yielded the names of 43 vegetable plants. Rhizomes / tubers: 14 Leaves and tender shoots: 20 Flowers: 9 species is used for vegetable in the study area. In almost all cases, tender shoots or leaves were cooked and consumed. Some of these species also has reported medicinal values and are often eaten as part of traditional system of treatment for different ailments. The database of such plants can help in solving problems of food securities by utilizing traditional knowledge of Korku and Gond people or in larger perspective any other tribes. Fallowing species are used as Vegetables.

a. Rhizomes / tubers: Amorphophallus bulbifer (Roxb.) Blume, (Dennst.), Amorphophallus cochinchinensis, Cheilocostus speciosus (J.Koenig) C.D.Specht,Chlorophytum arundinaceum Baker, Chlorophytum tuberosum (Roxb.) Baker, Curculigo orchioides Gaertn., Curcuma angustifolia Roxb., Curcuma decipiens Dalzell, Dioscorea bulbifera L., Dioscorea hispida Dennst., Drimia indica (Roxb.) Jessop, Eleocharis dulcis (Burm.f.) Trin. ex Hensch., Gloriosa superba L., Tacca leontopetaloides (L.) Kuntze.

b. Leaves and tender shoots: Amaranthus cruentus L., Amaranthus spinosus L., Amaranthus tricolor L., Amaranthus viridis L., Cocculus hirsutus (L.) Theob., Dendrocalamus strictus (Roxb.)Nees, Ipomoea aquatica Forssk., Melochia corchorifolia L.,, Nymphoides indica (L.) Kuntze,Ottelia alismoides (L.) Pers., Oxalis corniculata L., Oxystelma esculentum (L. f.) Sm., Pergularia daemia (Forssk.) Chiov., Phyla nodiflora (L.) Greene, Persicaria glabra (Willd.) M. Gomez,Polygonum plebeium R.Br,, Portulaca oleraceae L., Portulaca quadrifida L., Senna tora (L.)Roxb.and Sesbania sesban (L.) Merr. etc.

c. Flowers: Bauhinia purpurea L., Bauhinia racemosa Lam., Celastrus paniculatus Willd., Indigofera cassioides DC., Madhuca longifolia var. latifolia (Roxb.) A. Chev., Nelumbo nucifera Gaertn., Pergularia daemia (Forssk.) Chiov., Semecarpus anacardium L.f., and Woodfordia fruticosa (L.) Kurz.

Conclusion :- Millions of people in many developing countries do not have enough food to meet their daily requirements and many having staple food suffer from nutritional deficiency. Rural communities in many regions depend on wild resources including wild edible plants to meet their food needs in periods of food crisis. The diversity in wild species adds variety to family diet and contributes to household food security. Wild vegetables together with their products can be preserved easily to ensure food security during the period of scarcity.

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Effect of Ascorbic Acid Supplementation on mRNA Expression of HSP70 Gene, Corticosterone level and Production Parameters of White Leghorn Exposed to Heat Stress

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ABSTRACT :- Heat stress is one of the most challenging environmental conditions that affect commercial poultry farming. Thermal stress not only reduces production but also causes higher mortality in poultry thus, inflict considerable economic losses. In the present research investigation a possibility was explored to investigate the effect of ascorbic acid on expression of heat shock protein (HSP70) gene, corticosterone and production parameters during heat stress in White Leghorn birds.

A total of 96 White Leghorn birds were randomly divided and maintained in comfort (26±1.0°C) and heat stressed (40±5.0°C) conditions. Layers were divided into 4 groups and each group consisting of 12 birds in 2 replicates. G1 group was kept as control. G2, G3 and G4 group was supplemented with 100, 200 and 300 mg ascorbic acid (AA) respectively.

RT-PCR expression revealed that mRNA expression level of HSP70 on day 42, in the liver sample of egg type grower was significantly ($p<0.01$) down-regulated in all the treatment groups as compared to control group in both comfort and heat stressed condition. The overall mean concentration of plasma HSP70 concentration showed non-significant difference between comfort and heat stressed birds. The overall mean concentration of corticosterone between comfort and heat stressed condition in egg type grower showed significant difference ($p<0.01$) in G1, G2 and G3 groups. In egg type growers, feed efficiency ratio and performance index were significantly higher ($p<0.05$) in G3 group. In layers maximum hen housed egg production (%) was observed in G3 group. The overall mean egg weight (g) of layers in G2 group showed significant ($p<0.05$) difference in comfort condition as compared to heat stressed layers. In the present investigation, on supplementation of ascorbic acid the expression patterns of HSP70 gene provide an indication that AA may be useful in combating rigors of heat stress in layers.

INTRODUCTION :- The center of poultry industry is shifting to subtropical countries and this trend is likely to continue. Nearly one third of world-wide broiler and layer stock placement is in Asian countries such as India and China and these countries are emerging as important locations for the production and trade of poultry product. India has distinctly different seasons with variable temperature and humidity. Meteorological factors such as high ambient temperature and high relative humidity exert adverse effects on poultry production (Chen et al., 2013). They also cause heat stress in poultry during the hot dry season (Ayo et al., 2014). Heat stress results in poor performance in growth, feed efficiency, egg production and meat yield as well as higher mortality. Thus, acute exposure of chickens to extreme conditions results in major economic losses.

Heat stress is one of the most challenging environmental conditions that affect commercial poultry farming. All living organisms possess surveillance and homeostatic mechanisms to adjust the demand of growth, differentiation and environmental stress. However, under certain circumstances, these mechanisms fail to adequately respond to imbalance and results in

the accumulation of the mis-folded proteins inside the cell. To adapt to these environmental challenges and survive different types of injuries, cells have evolved networks of different responses which detect and control diverse form of stress. One of these responses, known as the heat shock responses (HSR) has attracted a great deal of attention as a universal fundamental mechanism necessary for cell survival under a variety of unfavorable conditions. The heat shock response is transient and lasts only a few hours (Lindquist, 1992). This phenomenon of HSR is a very well conserved regulatory network across all eukaryotes and is triggered by the synthesis of a group of proteins (Amrutkar et al., 2014). In prokaryotic and eukaryotic cells, the synthesis of specific stress proteins increases under a wide variety of stress conditions. The most extensively investigated stressors is heat stress in which, a sudden increase in temperature induces the synthesis of heat shock proteins (HSPs).

Heat shock can induce the expression of specific stress-related genes, including heat shock protein genes that are translated into HSP to provide protection against the subsequent cellular injuries to cells and tissues (Hightower, 1991). During heat stress, the most vital hormonal response is an increase in blood level of corticosterone, the primary glucocorticoid hormone produced by the adrenal gland. Ascorbic acid supplementation improved performance of heat challenged broiler chickens and has been associated with a lower plasma level of corticosterone (Mckee and Harrison, 1995). The inhibitory action of ascorbic acid on adrenal steroidogenesis is mediated via modulation of steroid hydroxylating enzymes in the adrenal gland (Kitabchi, 1967).

Substantial attention has been paid to the role of nutritional additives to minimize the effects of heat stress. The withholding of feed as well as the manipulation of dietary protein content, energy density, calcium, use of carbonated water and usage of vitamin C and E are believed to alleviate the effects of heat stress (Lee, 1992). The most significant increase in ascorbic acid demand take place during acute environmental stress such as excessive hot or cold weather and stress conditions increases the metabolic need for this vitamin or that decrease the innate capacity of biosynthesis. Under such conditions, supplementing the poultry diet with vitamin C may have a beneficial effect on performance (Yigit et al., 2002).

Hence, in view of the above, the present research work was undertaken to investigate the effect of ascorbic acid on expression of heat shock protein (HSP70) gene, some hormonal and production parameters during heat stress in White Leghorn (WLH).

MATERIALS AND METHODS :- The research was carried out in the Department of Veterinary Physiology and Biochemistry, College of Veterinary Science and Animal Husbandry, N.D.V.S.U., Jabalpur (M.P.). A total of 96 WLH egg type growers of 10 weeks age were randomly divided into eight groups in the experiment. Four group of birds was maintained in natural summer conditions (May to June) maintained in heat stress (40±5.0°C) ambience, whereas other four group of birds was maintained in controlled conditions at 26±1.0°C (comfort temperature) using an air conditioner. Temperature and humidity of the experimental poultry unit was recorded using a digital temperature and humidity recorder. G1 group was taken as control, whereas, G2, G3 and G4 groups were supplemented with 100 mg, 200 mg and 300 mg AA in feed respectively in both comfort and heat stressed condition. Diets were formulated as per NRC specifications.

1. **HSP70 expression analysis studies :-** Total RNA was isolated from the liver following standard TRIzol method. The purity of RNA was checked before the preparation of first- strand cDNA. Prepared cDNA was stored frozen at -20°C and was used for HSP70 gene expression studies. Expression of HSP70 gene was quantified using gene specific primer pairs using Real–Time PCR.

Glyceraldehyde 3 phosphate dehydrogenase (GAPDH) was used as a reference gene.

Primers :- Primers for heat shock protein 70 gene (HSP70) and Glyceraldehyde-3-phosphate dehydrogenase gene (GAPDH; used as housekeeping gene) were adopted from Sun et al. (2007) and Jimian and Endong (2008). Sequence of gene specific primers for HSP70 and GAPDH are as follows:

S. No	Gene	Primers	Annealing Temperature	Product Size (bp)
1	HSP70	F- AGCGTAACAC CACCA TTCC R- TGGCTCCCAC CCTAT CTC	58 ºC	372
2	GAPDH	F- TGAAAGTCGG AGTCA ACGGAT R- ACGCTCCTGG AAGAT AGTGAT	58 ºC	230

Relative quantification :- Comparative CT method (Livak and Schmittgen, 2001) was used for relative expression of target gene in the test sample (treatment) relative to that of control sample (calibrator). The relative expression of target genes was estimated in term of fold change in mRNA expression, using the following formula:

Fold change in expression of target gene = $2^{-\Delta\Delta CT}$
where,
ΔΔ CT = Δ CT test - ΔCT control/calibrator
Δ CT test = CT target gene - CT reference gene (In test / treatment group)
ΔCT control/calibrator = CT target gene - CT reference gene (In control/calibrator group)
where,
CT target gene = mean of the cycle threshold (CT) values of the gene being tested
CT reference gene = mean of the CT value of the housekeeping gene GAPDH

2. **Metabolic / hormonal parameters :-** Blood sampling was done from wing vein on 27th, 34th and 41st day of age. In the laboratory, all the blood samples were centrifuged at 3000 rpm for 30 min and plasma was separated. Plasma obtained was kept in the labeled storage vials of 2 ml capacity and stored at -20°C till analysis for chicken HSP70, chicken corticosterone. Both parameters were analyzed by competitive inhibition enzyme immunoassay technique.

3. Production performance parameters

3.1 Body weight :- The body weight was taken individually at the end of experiment i.e. 30 weeks to know their body weight gain. Weight gain in different groups of layers was calculated considering their body weights.

3.2 Egg production :- The egg production was recorded from 18 weeks of age of the birds up to 30 weeks of age. Hen housed egg production (HHEP) was calculated using the following formula as per North (1984).

$$\text{HHEP (\%)} = \frac{\text{Total number of eggs laid during the period}}{\text{Total number of hens housed at the beginning of laying period}}$$

3.3 Egg weight :- The egg weights were recorded on weekly basis starting from 18 weeks of age of the birds up to 30 weeks of age.

3.4 Mortality :- Mortality was recorded on daily basis and the mortality rate was calculated for the period from 10 to 30 weeks.

Statistical Analysis of the Data :- The recorded data was statistically analyzed using Completely Randomized Design. Various conditions and treatment groups were compared by using Duncan Multiple Range test (DMRT).

RESULTS AND DISCUSSION

1. **HSP70 expression analysis studies :-** The mRNA expression levels of HSP70 gene on day 42, in the liver samples of egg type grower birds supplemented with varying concentration of ascorbic acid has been presented in terms of fold change in expression in Table 01. The mRNA expression level of HSP70 on day 42, in the liver sample of egg type growers was significantly ($p<0.01$) down-regulated in all the treatment groups as compared to control group in both comfort and heat stressed condition. Similar reports were enunciated by Mahmoud et al. (2003), who reported lower expression of HSP70, indicated less of a stress response in the AA-fed chickens. As per present findings, maximum down-regulation was found in group supplemented with 200 mg AA. In comfort condition, maximum down-regulation (0.32 fold) was found in G3 group, supplemented with 200 mg AA, followed by G4 group (0.43 fold) supplemented with 300 mg AA. G2 group (0.72 fold) supplemented with 100 mg AA showed minimum down-regulation compared to control group. In heat stressed condition, between the treatment groups, at 200 mg AA concentration the expression level of HSP70 gene was significantly ($p<0.01$) lower in comparison to group supplemented with 100 mg and 300 mg AA.

Similarly, in heat stressed condition, maximum down-regulation (0.31 fold) was found in G3 group, supplemented with 200 mg AA, followed by G4 group (0.56 fold) supplemented with 300 mg AA. G2 group (0.79 fold) which was supplemented with 100 mg AA showed minimum down-regulation in comparison to control group. Moreover, between the treatment groups, at 200 mg AA concentration the expression level of HSP70 gene was significantly ($p<0.01$) lower in comparison to group supplemented with 100 mg and 300 mg AA. This observation has been interpreted to mean that the development of tolerance to a stressor requires a greater stimulus to elicit a stress response in a greater magnitude (Wang and Edens, 1994). Thus, AA-fed chickens appear to be better prepared for heat stress by having a higher threshold for HSP70 induction.

Table 01: mRNA expression of HSP70 gene in egg type grower birds

Birds	Condition	G1		G2		G3		G4	
		Δ Ct	**$2^{-\Delta\Delta Ct}$**	**Δ Ct**	**$2^{-\Delta\Delta Ct}$**	**Δ Ct**	**$2^{-\Delta\Delta Ct}$**	**Δ Ct**	**$2^{-\Delta\Delta Ct}$**
Egg type grower	Comfort	06.35^{D} ± 0.03	1	06.83^{C} ±0.04	0.72	08.00^{A} ±0.08	0.32	07.57^{B} ±0.04	0.43
	Heat	06.43^{D} ±0.02	1	06.77^{C} ±0.01	0.79	08.14^{A} ±0.02	0.31	07.28^{B} ±0.04	0.56

Means bearing different superscripts (^{ABCD}) within same row differ significantly ($p<0.01$).
Comfort (26±1° C), Heat (40±5° C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

2. Metabolic / hormonal parameters

2.1 Plasma HSP70 of egg type of growers :- The mean plasma HSP70 concentration of egg type growers has been presented in Table 02. The overall mean concentration of HSP70 showed non-significant difference between comfort and heat stressed birds in all the groups. However, in comfort condition, non-significant difference was observed between all the groups. A significantly ($p<0.01$) higher concentration of HSP70 (1.33±0.33 ng/ml) was observed in heat stressed control group as compared to other heat stressed treatment groups with varying concentrations of ascorbic acid supplementation.

In the present investigation exposure of control group of chickens to heat stress lead to significant increase in the concentration of HSP70, which was reduced subsequently after supplementation of varying concentration of AA. This might be the fact that HSP70 functions are energy dependent. The HSP70 functions protect newly synthesized proteins during and after heat stress. When HSP70 are induced as a result of cellular exposure to a stressor, the cell will decrease normal protein production and divert its energy resources toward mechanisms of survival (HSP70 induction). Present findings are in agreement with findings of Maak et al. (2003). They reported that moderate heat stress caused significantly increase in HSP70 levels as compared with the control groups in laying hens. Sahin et al. (2009) reported that heat stress increased the level of HSP70 in brain and ovary of Japanese quails kept in control conditions, which was further reduced on supplementation of AA in different treatment groups. Present findings are in agreement to reports of Sahin et al. (2009).

Table 02: Mean plasma HSP70 concentration (ng/ml) of egg type growers at different intervals

Period	Condition	G1	G2	G3	G4
27th day	Comfort	0.93^{a} ± 0.29 (12)	0.56^{ab} ± 0.14 (12)	0.42^{b} ± 0.17 (12)	0.57^{ab} ±0.13 (12)
	Heat	1.10^{a} ± 0.86 (12)	0.39^{b} ± 0.13 (12)	0.26^{b} ± 0.02 (12)	0.36^{b} ±0.072 (12)
34th day	Comfort	1.02^{a} ± 0.45 (12)	0.85^{b} ± 0.02 (12)	0.63^{b} ± 0.26 (12)	0.71^{b} ± 0.45 (12)
	Heat	1.43^{A} ± 0.44 (12)	0.75^{B} ± 0.01 (12)	0.56^{B} ± 0.05 (12)	0.58^{B} ± 0.33 (12)
41st day	Comfort	0.91^{a} ± 0.70 (12)	0.63^{b} ± 0.14 (12)	0.47^{b} ± 0.22 (12)	0.66^{b} ± 0.42 (12)
	Heat	1.36^{A} ± 0.50 (12)	0.57^{B} ± 0.20 (12)	0.41^{B} ± 0.19 (12)	0.56^{B} ± 0.03 (12)
Overall mean	Comfort	0.97 ± 0.23 (36)	0.62 ± 0.09 (36)	0.55 ± 0.15 (36)	0.67 ± 0.17 (36)
	Heat	1.33^{A} ± 0.33 (36)	0.54^{B} ± 0.10 (36)	0.41^{B} ± 0.09 (36)	0.38^{B} ± 0.05 (36)

Means bearing different superscripts within same row differ significantly (^{AB}; $p<0.01$, ^{ab}; $p<0.05$).
Comfort (26±1° C), Heat (40±5° C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

2.2 Plasma corticosterone (CORT) of egg type growers :- The mean plasma corticosterone concentration of egg type growers has been presented in Table 03. The overall mean

concentration of CORT between comfort and heat stressed condition showed significant difference ($p<0.01$) in G1, G2 and G3 groups. In heat stressed birds, all the groups showed higher concentration of CORT as compared to those maintained in comfort condition. Significantly higher concentration of CORT was observed in birds maintained in heat stressed condition as compared to birds maintained in comfort condition. The present findings are in agreement with Sahin et al. (2003) they, reported that at temperatures above or below thermoneutral zone, corticosteroid secretion increases as a response to stress. Supplementing the diet with AA before and during heat stress might elevate the adrenal stores and prevent or delay CORT depletion into the circulatory system (Wilbur and Walker, 1978). By decreasing synthesis and secretion of corticosteroids, vitamin C alleviates the negative effects of stress (Lara and Rostagno, 2013).

Table 03: Mean plasma corticosterone concentration (ng/ml) of egg type growers at different intervals

Period	Condition	G1	G2	G3	G4
27th day	Comfort	$5.07^{AQ} \pm 0.18$ (12)	$4.21^{BQ} \pm 0.16$ (12)	$2.26^{Dq} \pm 0.28$ (12)	$3.10^{Cq} \pm 0.16$ (12)
	Heat	$7.97^{AP} \pm 0.11$ (12)	$5.90^{BP} \pm 0.10$ (12)	$3.17^{Dp} \pm 0.18$ (12)	$3.92^{Cp} \pm 0.24$ (12)
34th day	Comfort	$6.61^{Aq} \pm 0.08$ (12)	$5.40^{B} \pm 0.22$ (12)	$3.38^{C} \pm 0.39$ (12)	$4.04^{C} \pm 0.11$ (12)
	Heat	$9.40^{Ap} \pm 0.43$ (12)	$6.87^{B} \pm 0.36$ (12)	$4.57^{C} \pm 0.06$ (12)	$5.37^{BC} \pm 0.37$ (12)
41st day	Comfort	$5.98^{Aq} \pm 0.21$ (12)	$4.56^{Bq} \pm 0.32$ (12)	$2.80^{C} \pm 0.43$ (12)	$3.84^{BC} \pm 0.15$ (12)
	Heat	$8.22^{Ap} \pm 0.28$ (12)	$6.13^{Bp} \pm 0.18$ (12)	$4.31^{C} \pm 0.46$ (12)	$4.43^{C} \pm 0.30$ (12)
Overall mean	Comfort	$5.56^{AQ} \pm 0.24$ (36)	$4.52^{BQ} \pm 0.17$ (36)	$2.59^{DQ} \pm 0.24$ (36)	$3.44^{Cq} \pm 0.16$ (36)
	Heat	$8.18^{AP} \pm 0.15$ (36)	$6.08^{BP} \pm 0.13$ (36)	$3.56^{DP} \pm 0.22$ (36)	$4.21^{Cp} \pm 0.23$ (36)

Means bearing different superscripts (^{ABCD}) within same row differ significantly ($p<0.01$).
Means bearing different superscripts within same column differ significantly (^{PQ}; $p<0.01$, ^{pq}; $p<0.05$).
Comfort (26±1°C), Heat (40±5°C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

3. Production performance parameters

3.1 Body weight of layers :- The mean body weight (g) of layers at 20 and 30 weeks of age has been presented in Table 04. Non-significant difference in mean body weight (g) was observed between comfort and heat stressed condition in all the groups. Puthpongsiriporn et al. (2001) reported that vitamin C had no significant effect on body weight during heat stress in WLH layers, which is similar to present findings. In comfort condition, at 30 weeks of age, the maximum body weight (1343.66±38.40g) was attained in G3, supplemented with 200 mg AA and minimum body weight (1212.91±23.88 g) was attained in control group. In heat stressed condition, the maximum body weight (1328.41±28.04 g) was attained in G3, supplemented with 200 mg AA and minimum body weight (1180.91±26.35 g) was found in control group.

Table 04: Mean body weight (g) of layers at 20 and 30 weeks of age

Week	Condition	G1	G2	G3	G4
20	Comfort	1146.75±21.07	1177.33±18.09	1270.75±34.72	1201.83±19.80
	Heat	1121.00±23.08	1184.66±21.34	1245.75±23.23	1201.58±29.23
30	Comfort	1212.91±23.88	1244.40±20.79	1343.66±38.40	1268.08±23.39
	Heat	1180.91±26.35	1255.17±23.99	1328.41±28.04	1272.16±33.02

Comfort (26±1°C), Heat (40±5°C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

3.2 Egg production of layers :- The Hen housed egg production (HHEP) of birds has been presented in Table 05. Hen housed egg production (%) showed non-significant difference between comfort and heat stressed condition in all the groups during entire experimental duration. Kassim and Norziha (1995) reported that egg production was slightly increased, though not significantly, when the layers received AA supplementation in the feed. However, in comfort condition maximum HHEP (92.25) was found in G3 group, supplemented with 200 mg AA and minimum HHEP (82.61) was found in G1 group. In heat stressed condition, maximum HHEP (89.27) was found in G3 group, supplemented with 200 mg AA and minimum HHEP (79.90) was found in control group.

Table 05: **Hen housed egg production and mortality (%) of layers up to 30 weeks age**

Parameter	Condition	G1	G2	G3	G4
Hen housed egg production (%)	Comfort	82.61	85.60	92.25	91.38
	Heat	79.90	83.45	89.27	88.64
Mortality rate (%)	Comfort	09.09	00.00	00.00	00.00
	Heat	18.18	00.00	00.00	00.00

Comfort (26±1°C), Heat (40±5°C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

3.3 Egg weight :- The mean egg weight (g) of layers has been presented in Table 06. The overall mean egg weight (g) of layers in G2 group showed significant ($p<0.05$) difference in comfort condition as compared to heat stressed layers. However, non-significant difference was observed between comfort and heat stressed layers in G1, G3 and G4 groups. In comfort condition, G1 showed significant ($p<0.05$) difference from G3 and G4, whereas, non-significant difference was noted between G1, G2; G2, G4 and G3, G4 groups. The maximum egg weight (53.32±0.72 g) was found in

G3 group which was supplemented with 200 mg AA and minimum (49.92±0.20 g) egg weight was found in G1 group which was kept as control group. In heat stressed condition, G1 and G2 showed significant ($p<0.01$) difference from G3 and G4, whereas, non-significant difference was found between G1, G2 and G3, G4 groups. The maximum egg weight (53.51±0.42 g) was found in G4 group which was supplemented with 300 mg AA and minimum egg weight (49.22±0.26 g) was found in G1 group which was kept as control group. Khan and Sardar (2005) reported that the mean egg weight and egg number in layers supplemented with vitamin C was higher ($p<0.05$) than non-supplemented groups whereas, non-significant difference in egg production was also reported. This indicates that vitamin C was effective in improving egg weight consistently in layers during summer. These results are in accordance with the present findings.

Table 06: Egg weight (g) of layers during experimental period

Week	Condition	G1	G2	G3	G4
18-20	Comfort	50.02 ± 0.80	50.76 ± 0.95	50.77 ± 2.27	49.48^{q} ± 0.52
	Heat	48.19 ± 0.37	50.57 ± 0.48	50.54 ± 1.39	52.40^{p} ± 0.08
21-23	Comfort	50.12^{b} ± 0.22	51.86^{ab} ± 1.17	53.69^{a} ± 0.31	54.07^{a} ± 0.65
	Heat	49.60^{B} ± 0.41	50.28^{B} ± 0.19	54.03^{A} ± 0.11	53.76^{A} ± 1.05
24-26	Comfort	49.83^{B} ± 0.58	51.38^{B} ± 0.78	54.45^{A} ± 0.20	54.08^{A} ± 0.18
	Heat	49.33^{B} ± 0.33	50.26^{B} ± 0.53	54.13^{A} ± 0.18	54.00^{A} ± 1.05
27-30	Comfort	49.70^{B} ± 0.31	51.41^{B} ± 0.72	54.41^{A} ± 0.59	54.27^{A} ± 0.07
	Heat	49.76^{B} ± 0.20	50.02^{B} ± 0.02	54.37^{A} ± 0.16	53.89^{A} ± 1.07
Overall mean	Comfort	49.92^{c} ± 0.20	51.35^{bcp} ± 0.38	53.32^{a} ± 0.72	52.97^{ab} ± 0.77
	Heat	49.22^{B} ± 0.26	50.27^{Bq} ± 0.16	53.26^{A} ± 0.65	53.51^{A} ± 0.42

Means bearing different superscripts within same row differ significantly (^{AB}; $p<0.01$, ^{ab}; $p<0.05$).
Means bearing different superscripts within same column differ significantly (^{pq}; $p<0.05$).
Comfort (26±1°C), Heat (40±5°C)
G1 (Control), G2 (100 mg AA), G3 (200 mg AA), G4 (300 mg AA)

3.4 Mortality :- The mortality (%) of layers has been presented in Table 05. On perusal of data, it was observed that highest mortality in layers was found in heat stressed control group. In comfort condition, only G1 group (control group without any supplementation) showed mortality (09.09%), as compared to other treatment groups. However, in heat stressed condition, the highest mortality (18.18 %) of layers was found in G1 group (heat stressed control group without any supplementation) whereas; no mortality was observed in G2, G3 and G4 groups. Ciftci et al. (2005) reported that mortality was significantly decreased in AA supplemented birds as compared to the controls ($p<0.05$), which is similar to present findings. It is speculated that levels of serum corticosteroids increase as the result of the increased activity of the adrenal gland due to stress, which then causes suppression of cell proliferation factor or interleukin-2 (Siegel, 1995). The effect of the environmental temperature

depends on the degree of habituation of the bird as well.

CONCLUSIONS :- In the present study, Relative mRNA expression (fold chain) of HSP70 gene in the liver samples of egg type growers enunciates that maximum down regulation is observed by feeding of 200 mg ascorbic acid, followed by 300 mg ascorbic acid supplemented group. This indicates reduction in cellular stress at gene level by ascorbic acid. Plasma HSP70 and corticosterone status of egg type growers reveals that 200 mg ascorbic acid supplementation in feed is most effective in combating the rigors of heat stress, followed by 300 mg ascorbic acid supplementation. Improved production performance of chickens indicates beneficial effects of ascorbic acid during heat stress. No mortality was reported in groups supplemented with 200 mg and 300 mg ascorbic acid in both comfort and heat stressed chickens. However, control group recorded 18.18 % mortality in heat stressed layers.

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PRESENT DEVELOPMENTAL SCHEMES IN MANAGING AGRICULTURE SECTOR IN INDIA: AN INTRODUCTORY APPRAISAL

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Abstract :- The main source of livelihood of maximum number of people is agriculture in our nation. Approximately 70% of the people directly rely on agriculture as a means of living. This is high percentage of people in agriculture as a result of none development of non-agricultural activities to absorb the fast growing population. It is the main source of national income for most developing countries, like India. Since agriculture employees many people it contributes to economic development. The fast rate of development in agriculture sector offers progressive outlook as well as increased motivation for development. As of the above importance presently, Governments of the country as well as states have launched so many developmental schemes for managing agriculture sector in India. The present research paper is just an attempt to enlighten such types of developmental schemes which are running in India with special reference to agriculture sector.

Key Words :- Agriculture Sector, Developmental Schemes, GDP etc.

Introduction :- India is a agriculture based country purely and India's maximum population engaged in agricultural production, process, preservation and marketing. In 5000 BC, Sumerian started an organized agriculture in India and 2300 BC Harappan - Chalcolithic culture, cultivation of wheat, barley, grams and peas in Indus Valley. Aryans came in North India. They bring wheeled rathas drawn by horses and cultivated pulses at Navdatoli, Madhya Pradesh. As per the times, new inventions and developments were found in the field of agriculture time to time. Reason being the awareness of agricultural development, the people awaits the development of agricultural education in the present world.

In the year 1947, India becomes independent. At that time, India faced a lot of problems like food and grain security, population and poverty etc. regarding agriculture sector. The Government of India gave first priority to develop the agriculture sector and agricultural education with research and extension. In 1947, the government of India has changed the name of council was from Imperial Council of Agricultural Research to Indian Council of Agricultural Research, it is bitterly known as ICAR. The ICAR has established a planning for agricultural education, research and extension with a start up of some research institute in India.

Due to the development of agricultural education and research, agriculture concept was totally changed. Then the farmers used latest research information and technology and hybrid seeds in their farms in India and other states. As a part of results, agriculture production was increased after 1960s decade. It was called 'Green Revolution' in all over India. The rise of agricultural production, the share of agriculture in GDP rate was 51.9% in 1950-51. Due to the industrial revolution and urban development the agricultural land was reduced. So the share of agriculture in GDP rate was decreased by 13.7% and increased the share of industry in GDP rate was 26.7% in 2012-13. In the 1950 century, more than almost 50% of the total labor force engaged in agriculture sector but labor force ration was reduced 41% in

2012-13. So the crisis of food and grain security, agricultural production must be increased and its one of the solutions to use information technology and resource for agricultural research and provide the experiment to the farmers on their lands.

In the last few decades, agricultural information system is required to increase the agricultural production and remove the crisis of food and grain security. It only can be possible through a good agricultural research, education and extension system in the nation and states.

Agricultural Census is the largest countrywide statistical quinquennial operation undertaken by Ministry of Agriculture, Govt. of India. Primary and secondary data on structure of Indian agriculture are collected under this operation using the machinery of the State governments. The first Agricultural Census in the country was conducted with reference year 1970-71. So far seven Agricultural Censuses have been completed at five yearly intervals and the eighth one is in operation in the country. Agriculture provides livelihood to majority of population and thus remains linchpin of Indian economy. Though agriculture sector's contribution to national GDP has declined to 13.9% in the year 2011-12 due to relatively higher growth experienced in industries and services sectors, agriculture remains the principal source of livelihood for more than 58% of country's population directly. Indian economy is growing and to sustain this growth agriculture sector has to perform well. How to produce more of agriculture produce with limited natural resources in sustainable manner for ensuring food and nutritional security and increasing income of farmers, are major challenges before the Nation.

Government Initiatives :- Given the importance of the agriculture sector, the Government of India, in its Budget 2017–18, planned several steps for the sustainable development of agriculture. The government has already taken steps to address two major factors (soil and water) critical to improve agriculture production. Steps have been taken to improve soil fertility on a sustainable basis through the soil health card scheme and to support the organic farming scheme 'Paramparagat Krishi Vikas Yojana'. Other steps include improved access to irrigation through 'Pradhanmantri Gram Sinchai Yojana'; enhanced water efficiency through `Per Drop More Crop'; continued support to Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the creation of a unified national agriculture market to boost the incomes of farmers.

Objectives of the Study :-

1. To highlight the current development schemes in managing agriculture sector in India.
2. To highlight the agriculture products in India mainly focus on poverty.

Major Discussion :- These are the following major developmental schemes of gcentral and state governments in managing agriculture sector of the nation as follows:

1. Dairy Hubs : The overall aim of Dairy Hubs is to secure a long-term supply of locally produced quality milk without increasing the cost of collection and, at the same time, to help smallholder farmer's move from subsistence farming to running milk production as a profitable business. The concept is based on linking farmers in a specific area – covering a certain number of villages, smallholder farmers and cows – to a dedicated dairy processor. The processor sets up milk collection stations with cooling tanks where farmers deliver milk twice a day. Farmers benefit from the transfer of knowledge and expertise – which leads to healthier animals and increased productivity and profit – as well as access to proper infrastructure and guaranteed twice-daily milk collections all year round.

2. Fertilizer deep placement : The global population is expected to increase from more than 7 billion today to 9.6 billion by 2050, creating

enormous challenges as the world's farmer's work to provide adequate quantities of nutritious food. Farmers in a number of developing countries are using fertilizer deep placement (FDP) technology to increase crop yields and incomes, reduce the amount of fertilizer used and lessen environmental damage to the atmosphere and water.

3. **Mobile applications :** Mobile Agriculture (also shortened to M-Agri) supports actors along the agriculture value chain through the use of mobile technology. Mobile technology covers a broad range of devices and the sub-categories include voice, data, and network and connectivity technologies. M-Agri is a subset of e-agriculture. The introduction of mobile technology and portable, wireless devices has led to the creation of innovative services and applications that are used within the agricultural value chain in developed and developing countries.[1] In developed markets where mechanization is more advanced and the agricultural labor force is significantly smaller than that of many developing countries, mobile agriculture applications tend to be implemented further up the value chain, for example with processors or consumers. In developing countries where a large proportion of the workforce is employed in agriculture, mobile technology is more commonly used to deliver services for producers and traders.

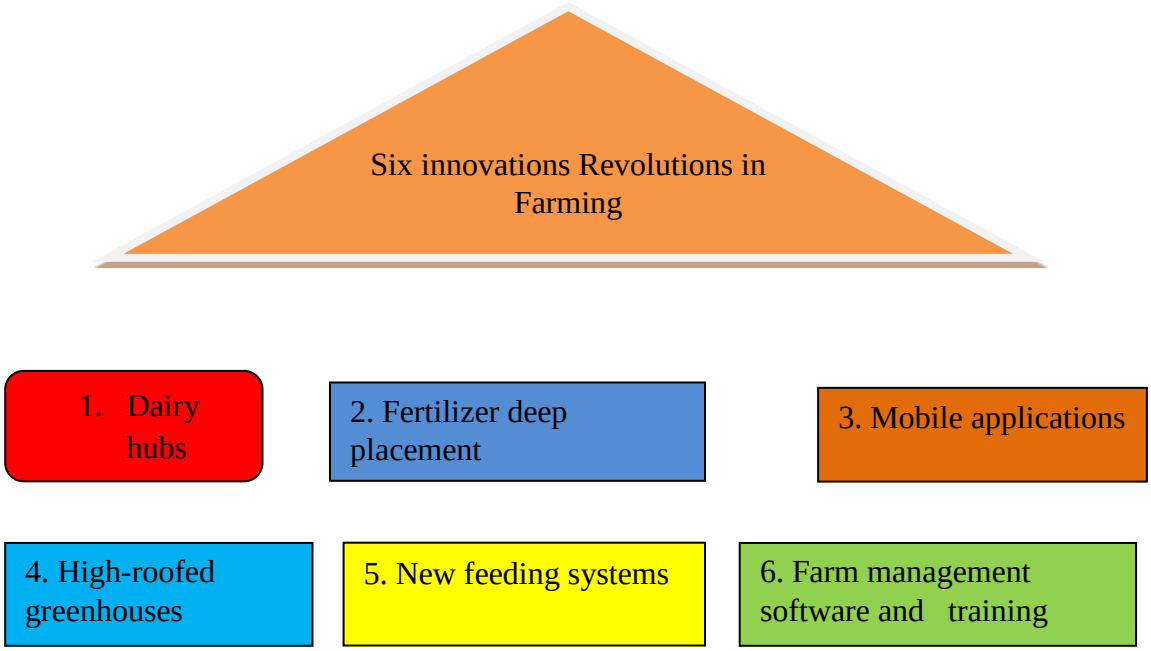
4. **High-roofed greenhouses :-** A greenhouse (also called a glasshouse, or, if with sufficient heating, a hothouse) is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated climatic conditions are grown. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is known as a cold frame. The interior of a greenhouse exposed to sunlight becomes significantly warmer than the external ambient temperature, protecting its contents in cold weather. Many commercial glass greenhouses or hothouses are high tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipment including screening installations, heating, cooling, lighting, and may be controlled by a computer to optimize conditions for plant growth.

5. **New feeding systems :** Animal feeding is the first step in the production of milk and affects the rest of the production chain. External factors also influence dairy feeding systems and several indicators are available to characterize milk production systems in relation to the feeding of animals. They may be more or less pertinent depending on the questions asked or problems encountered. Generally, it is first and foremost a matter of correctly defining the indicators in order to use them in an appropriate manner and interpret them correctly. The use of simple indicators should therefore make it possible to understand better the feeding systems throughout the world by comparing them. This approach makes it possible, using a global survey, to present the diversity of the feeding systems within and among countries, with common criteria for comparison.

6. **Farm management software and training :** Farm management, making and implementing of the decisions involved in organizing and operating a farm for maximum production and profit. Farm management draws on agricultural economics for information on prices, markets, agricultural policy, and economic institutions such as leasing and credit. It also draws on plant and animal sciences for information on soils, seed, and fertilizer, on control of weeds, insects, and disease, and on rations and breeding; on agricultural engineering for information on farm buildings, machinery, irrigation, crop drying, drainage, and erosion control systems; and on psychology and sociology for information on human behavior. In making his decisions, a farm manager thus integrates information from the biological, physical, and social sciences. Because farms differ widely, the significant concern in farm management is the specific individual farm; the plan most satisfactory

for one farm may be most unsatisfactory for another. Farm management problems range from those of the small, near-subsistence and family-operated farms to those of large-scale commercial farms where trained managers use the latest technological advances, and from farms administered by single proprietors to farms managed by the state.

Structure of Six innovations Revolutions in Farming :



Source: Developed by the authors for suggestive

measures :- Due to the revolution of industrial and service sector, agricultural land is continuously reducing day by day, so maximum people are shifting to urban area from rural. After 1990 era, the share of agriculture in Indian GDP rate and workforce on agriculture was reduced. When India is progressing towards information and knowledge based society and tries to occupy centralized power in modern world agriculture sector plays a pivotal role. So it is necessary to develop an agricultural development system with extension system in India for increasing the agricultural production and development of agricultural sector.

Conclusion :- The critical issues in Indian agriculture are related to knowledge and infrastructure. Although there isn't a lack of initiatives and institutions to tackle these issues, we have to become better at managing big systems to achieve success in our endeavors. At the same time, we should look into new approaches like private sector participation and harnessing of indigenous knowledge to improve performance. Small farmers who are especially vulnerable to the monsoons should be focused upon and services like credit and crop insurance should be made more accessible. This will ensure that agricultural sector remains viable and caters to the country's needs. Problems related to irrigation infrastructure, market infrastructure and transport infrastructure add significant cost to farmers' operations. Another issue is lack of delivery mechanisms.

There are a number of schemes aimed towards developing agriculture. There is an immediate need for a new thrust to the green

revolution to meet the legitimate needs of the food-insecure, both at the national and at the household level. Growing population pressure in many countries adds to the urgency. The main objective is to assist farmers in developing countries to narrow, and hopefully close, the current yield gap between experimentally proven yields and those which farmers actually obtain. There is an urgent need to increase investment in agricultural research, both from national funds and in the international donor community. The realization of the green revolution needs to happen in the context of sustainable development. Politicians must strive towards more equity within and between human generations, including their food security, as this is the foundation for the implementation of this technological change.

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Role of agriculture in rural development in India

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Abstract :- In countries like India, strengthening of agriculture is critical for facing the challenges of rural poverty, food insecurity, unemployment and sustainability of natural resources. But, there is a need to redefine agriculture as the science and practice of activities relating to production, processing, marketing, distribution, utilization and trade of agricultural products which implies that agricultural development strategy must address not only farmers but also those in marketing, trade, processing and agri-business. In this context, efficient marketing and rural credit systems assume added importance. Agricultural Marketing is a process which starts with a decision to produce a saleable farm product and involves all aspects of market structure or system, both functional and institutional, based on technical and economic consideration. Though agricultural marketing is a State subject, the Government of India has an important role to play in laying down general policy framework, framing of quality standards, conducting survey and research studies and in providing guidance, technical and financial support to the State Governments. Rural credit system assumes importance because for most of the Indian rural families, savings are inadequate to finance farming and other economic activities. To achieve the objectives of production and productivity, the stance of policy towards rural credit was to ensure provision of sufficient and timely credit at reasonable rates of interest to as large a segment of the rural population as possible.

1. Introduction :- Rural development is an important challenge .It involves people and natural resources with the focus on people. Rural area is the area where the techniques are unlikely used and resources are put to their maximum use "Rural area is an area that depends socially, culturally and economically on natural resources, Land, water, timber, minerals, mountains. In this sector development implies change within a community determined through a determined process.

As we all know India's 72 percent of total population belongs to rural area consisting of (80 crores) of its population living in more than five lac villages. Agriculture is the main occupation or livelihood of rural people, rural population consists of small and marginal farmers, Agricultural labours, artisans, schedule castes and schedule tribes. A large population more than 200 million is still living in below poverty line and is the focus of rural development programmes.

Rural area is the place away from cities and towns. Such areas are distinct from more intensively settled urban and sub urban areas and also from unsettled areas. People live in villages on farms and in other isolated houses .Life styles in rural areas are different from those of urban areas mainly because of limited sources that are available there. They have no facilities like law enforcement, schools, fire departments and libraries. Utilities like water, sewage, street lights and garbage collection may not be present there and also lack of transport facilities sometimes people use their own conveyance if available or they simply ride on animals or cover distance on feet to reach their destinations.

Rural development (RD) is a process which aims at improving the wellbeing and economic conditions of rural stock. Rural development is that process of change by which the efforts of the

people themselves go in changing the lot of people. The concern government only acts as a stimulant and therefore the main agency of change is the people themselves. The efforts applied by common mass helps in bringing about a change in rural community.

1.1. Purpose of the study :-

1. This paper will highlight whether government polices related to agriculture played its part in rural development.
2. Attempt will be made to bring forth government policies related to agriculture are benefiting farmer.
3. The study will explore further what sort of problems they face in agriculture

1.2. Rural Problems :- As we know the rural society includes the problems of rural life – socio-economic, political and cultural problems. These problems are studied in isolation as well as in relation to each other. In the former sense each problem analyzed separately and efforts is made to arrive at some conclusions for its remedy for the second point all the rural problems are taken as different aspects of one single problem. Sometimes the view point leads to confusion since the problem gets entangled into each other. Some problems can be solved unless studied separately such as the rural problems of poverty, illiteracy, diseases, low standard of life, inadequate housing, lack of recreation, traditionalism, religious superstitions etc. Probably the most glaring and also depressing feature of village is the poverty and illiteracy of the people. They are generally poor with low income. They use to take coarse food and wear shabby clothes.

1.3. Rural development and Agriculture :- Rural development is not merely agricultural development but, also rural transformation. It seeks to improve the quality of life in rural areas in terms of per capita income, gainful employment, education, , health, hygienic environment, housing, latrines, family and gender equality on the one hand and agricultural development along with allied sectors like handicrafts, cotton weaving, sericulture, horticulture on the other hand. The objective is to bring poor families above the poverty line by introducing some schemes and skillful training for their upliftment. Thus rural development is expected to improve the level of living conditions including employment, proper health facilities, housing and various social services in order to reduce rural-urban disparities. It involves systematic, scientific and integrated use of natural resources and as a part of this process, enabling every person to engage herself/himself in a productive and socially useful occupation.

Rural India is real India. Actually our father of nation M, K, Gandhi told that soul of India lives in rural India, We try our best to see the various types of approaches , theories adopted by our policy makers for improving of rural society , If we see the history earlier focus was on poverty, economic growth , modernization and the development and growth through social mobilization. The history of rural development started with after independence in 1950 we started very embassies program it is known as community program .Community development program called for a comprehensive social and economic modernization economic and social backwardness while largely caused by several indigenous and it was a precious circle so population , growth, poverty, lack of opportunity all these are interlinked. So initially in the previous five year plans pocus was given on economic growth.

1.4. Need and importance of Rural Development :- Rural development is necessary and has considerable importance in India because of the following reasons:-

1. To develop rural area as whole in terms of culture, society, economy, technology and health.

2. To develop living standard of rural masses.

3. To develop rural youths, children and women.

4. To develop and empower human resources of rural area in terms of their psychology, skill, knowledge, attitude and other abilities.

5. To develop infrastructure facilities of rural area.

6. To provide minimum facilities of rural mass in terms of drinking water, education, transport, electricity and communication.

7. To develop rural institutions like panchayats, cooperatives, post, banking and credit.

8. To provide financial assist to develop the artisans in the rural area, farmers and agrarian entrepreneurs to improve their economy.

9. To develop rural crafts, cottage industries and other related economic operations in rural sector.

10. To develop agricultural, animal husbandry and other agricultural related areas.

11. To develop entertainment and recreational facility for rural mass.

12. To improve rural marketing facilities.

13. To minimize gap between the urban and rural in terms of facilities availed.

14. To improve rural peoples participation in the development of state and nation as whole.

15. To improve scopes of employment of rural mass.

16. To eliminate rural poverty.

17. To solve the problems faced by the rural mass for their development.

1.5. Problems of rural development :-

1. People related

(a) Traditional and primitive understanding.

(b) Low level of education to understand development efforts and new technology.
(c) Deprived psychology and scientific orientation.
(d) Lack of confidence.
(e) Poor awareness
(f) Low level of education.
(g) Existence of unfelt needs.
(h) Personal ego.

2. Agricultural related problems :-

(a) Lack of expected awareness, knowledge, skill and attitude.
(b) Non-availability of inputs.
(c) Poor marketing facility.
(d) Insufficient extension staff and service.
(e) Small size of land holding.
(f) Division of land

1.6. Agriculture related schemes :

1. **National Food Security Mission (NFSM) :** To increase the production of rice, wheat and pulses. The mission is being continued during 12th plan with new target of additional production of 25 million tons of food grains comprising 10 million tons of rice, 8 million tons of wheat and 4 million tons of pulses and 3 million tons of coarse cereals.

2. **National Food Security Mission-Commercial Crops :** For crop development programme on cotton, jute and sugarcane for enhancing productivity.

3. **Mission for Integrated Development of Horticulture (MIDH) :** It covers wide horticulture base, which includes fruits, vegetables, tuber crops, mushrooms, spices and aromatic plants flowers and foliage and plantation crops like coconut, areca nut, cashew nut, cocoa and bamboo.

4. **National Mission on Oilseeds and Oil Palm :** envisages increase in production of vegetable oils sourced from oilseeds, oil palm and tree borne oilseeds.

5. **National Mission for Sustainable Agriculture :** aims at making agriculture more productive, sustainable and remunerative and climate resilient by promoting location specific integrated/composite farming systems; soil and moisture conservation measures; comprehensive soil health management; efficient water management practices and mainstreaming rain fed technologies.

6. **National Mission on Agricultural Extension and Technology :** Its aim is to restructure and strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to the farmers consist.

7. **Initiative of increasing flow of credit :-** In order to ensure that all eligible farmers are provided with hassle free and timely credit for their agricultural operation, **Kisan Credit Card** (KCC) Scheme was introduced in 1998-99. The main objectives of the scheme are to meet the short term credit requirements for cultivation of crops, post harvest expenses, produce marketing loan, consumption requirements of farmer household, working capital for maintenance of farm assets and activities allied to agriculture like dairy animals, inland fishery, etc., investment credit requirement for agriculture and allied activities like pump sets, sprayers, dairy animals, etc.

8. **Pradhan mantri bhima fasal yojna :-**

• Under the new scheme, the farmers' premium has been kept at a maximum of 2 per cent for food grains and oilseeds, and up to 5 per cent for horticulture and cotton crops.

• There is no upper limit on Government subsidy. Even if balance premium is 90%, it will be borne by the Government. Earlier, there was a provision of capping the premium rate which resulted in low claims being paid to farmers. This capping was done to limit Government outgo on the premium subsidy. This capping has now been removed and farmers will get claim.

• The use of technology will be encouraged to a great extent resulting in operational efficiency. Smart phones will be used to capture and upload data of crop cutting to reduce the delays in claim payment to farmers. Remote sensing will be used to reduce the number of crop cutting experiments.

9. **Mera Gavoun Mera Garav :-**

• This scheme is being launched involving agricultural experts of agricultural universities and ICAR institutes for effective and deeper reach of scientific farming to the villages.
• A group of experts will be associated with one particular village to create awareness and adoption of new technologies including farm investment, loans, availability of inputs and marketing.
• All the scientists from ICAR and agricultural universities will participate in this initiative.

Conclusion :- Most of the Indian population predominantly lived in rural areas and more than 75% of the population is depending on agriculture. Thus we came to conclusion that development of rural population depends manifestly on agriculture. So, successive government since the dawn of independence threat barely focused on agriculture, which is evident by the fact that in the first five year plan priority was given to agriculture and so on many schemes have been launched by successive regimes in order to improve the lot of rural mass up to present times. This paper highlighted various schemes and they played their part in the form of giving hybrid cereals, training awareness programmes were launched, new irrigational facilities even KCC loans were given to farmers. Finally all these policies significantly helped in the development of rural people.

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Agriculture growth and role of Public Distribution in Food Security in Madhya Pradesh

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Abstract :- Food production seems to have improved remarkably in Madhya Pradesh. However, a nutritionally balanced diet is still a far cry for millions of poor families, as their present income levels are too low to register their demands on the agricultural sector and to induce that sector which still has tremendous s untapped potential. The role of food subsidies and public distribution system assumes crucial importance in such scenario to address the issue of food insecurity. The paper analyzes the role of the PDS system in the state in ensuring food security. With high levels of poverty and also high levels of corruption in PDS system at lower levels of distribution in the state, the challenge of ensuring that PDS is used effectively as a tool to distribute essential food items to the needy are quite severe. The paper argues for the need of a very vigilant monitoring of PDS as well as other welfare system by the government, which is largely lacking presently.

Key words :- Food Security, Public Distribution, Agricultural Growth, Madhya Pradesh

Introduction :- The challenge of food insecurity is undoubtedly very severe in the state of Madhya Pradesh today, which has a population of 7.2 crore people at present, and is also positioned among the ten poorest states of India with nearly one-third of population as being poor, which is much higher than the all India level. It's very low position in terms of per capita cereal consumption is also starkly underlined by some recent studies. Hence, even after high growth in production of food grains has been attained by the state, production is not automatically translating into adequate consumption for its vast range of poor population. So, in order to address the food insecurity problem by ensuring targeted distribution of food-grains and essential commodities at subsidized rates to vulnerable households, the role of food security programmes like public distribution system (PDS) and other welfare schemes assume critical significance in the state. In this context, a closer review of the functioning of PDS as a safety net to improve access to food and nutrition becomes very imperative in order to understand the food security scenario in the state and the subsistence pattern of the destitute persons.

Food security has a three pillar phenomena named firstAvailability of food; second accessibility of food; and third distribution system. Out of these three availability is associated with production of food grains in the state as well as at the country level. Accessibility of food related with the purchasing power of the consumer and third and important one is the public distribution system of foodgrains by the government of the state or the country. This research paper attempts to review the status of food availability and the current role of PDS, and constraints to its effectiveness functioning in Madhya Pradesh.

Certainly, food security is a serious challenge to the developing countries, and is a similar critical issue in the case of India. A number of programmes have been introduced but the problems remain unaddressed. A review of extant studies highlights the seriousness of the problem in India, especially in the case of Madhya Pradesh. Where some studies have found PDS to be more effective in addressing food insecurity in urban areas, few others have advocated for alternative approaches to improve the effectiveness of food targeting for the poor. The main focuses of the paper is to understand the states of food grain availability in the state. Furthermore the study also explore the food procurement system of the state

and the finally we analyse the coverage of public distribution system in the state of Madhya Pradesh.

Data and Methodology :- The presented study is based on secondary data published by various govt. agencies and organizations such as NSSO, CSO, Ministry of Agriculture and directorate of economics and statistics. To compile usable data, number of secondary data source, used for relevant data and information provided named IFPRI, Global Hunger Index, FCI and other sources like Newspapers, Books, Economic journals and various web sources. The data collected from various recourses were transformed to make them comparative by the use of descriptive statistics.

Growth Rate Analysis :- The compound growth rate of different indicators has been calculated with the fitting of following exponential model when data in time series form. But some of the data in penal form like consumption expenditure survey data collected by national sample survey organisation, in such type of case fit next function.

$$Y = ab^t$$

Log Y = log a + t log b

CGR = (Antilog b-1) x 100

Where,

t = time period in year

Y = VOP/Net value add/Net income etc.

a& b = Regression parameters and

CGR = Compound growth rate

Status of food production in the Madhya Pradesh state :- The agriculture growth in Madhya Pradesh during the decade long period of 2005-06 to 2014-15 was around 9.7 per cent per annum, which is the highest growth rate registered in agriculture by any major state of India over a ten year period. The last five years have been even more spectacular when the agricultural GDP grew at 14.2 per cent per annum. An overview of the production of some significant items of food grains in last 16 years is presented in Table 3, which clearly shows that the total s production comprising cereals, rice, wheat and pulses has roughly tripled over the period, where remarkable increase has been registered for the cereal category. The growth rate of food grain production has been of two digit rate is most part of last decade, with negative growth rates also registered in few years. Overall, between 2000-01 and 2010-11, the growth rate in food production has been 47 per cent and for cereals has been 46 per cent, which is quite remarkable. The average yearly growth rate of food production has been 9.3 per cent over 2001-01 and 2015-16, and 5.9 per cent over 2000-01 to 2010-11 period, which is much lower than the growth rate of population in the state which is about 20 per cent over 2000-01 to 2010-11.

Table 1: Status of Foodgrains Production in Madhya Pradesh
(In '000 tonnes)

Year	Foodgrains (A+ B)	Cereals (A)	Rice	Wheat	Coarse cereals	Pulses (B)	Arhar	Gram	Other pulses
2000-01	10185	7910	982	4869	2059	2275	210	1620	445
2001-02	13607	10382	1693	6001	2689	3225	251	2408	566
2002-03	10749	8373	1032	4923	2418	2376	188	1713	474
2003-04	15957	12469	1750	7365	3354	3488	256	2585	647
2004-05	14105	10676	1169	7177	2330	3429	257	2549	623
2005-06	13195	9962	1656	5958	2348	3233	238	2371	623
2006-07	13747	10544	1368	7326	1850	3203	220	2413	570
2007-08	12071	9617	1462	6033	2123	2454	218	1735	501
2008-09	13915	10232	1560	6522	2150	3683	258	2786	638

2009-10	16016	11712	1261	8410	2041	4305	308	3304	693
2010-11	14952	11566	1772	7627	2167	3386	165	2687	535
2011-12	20395	16233	2227	11539	2467	4162	334	3290	537
2012-13	23690	18525	2775	13133	2616	5166	351	3812	1003
2013-14	22978	18334	2845	12937	2552	4644	332	3299	1013
2014-15	28687	23859	3625	17104	3130	4828	511	2964	1353
2015-16	30387	25084	3547	17689	3849	5303	625	3364	1313

Source : www.madhyapradeshstat.com /agriculture/2/foodgrains

In order to meet the food requirement of the state, substantial amount of essential food grains have been released from the central pool under PDS system. In 2016-17, the current procurement value of food grains from the central pool under Public Distribution System in MP stands at 19 lakh metric tonnes of paddy, 40 lakh metric tonne of wheat and 2.3 lakh metric tonne of Maize. This shows the overall food grain availability at present in the state under PDS.

Table2: Growth rate of Food grains production from 2000-01 to 2014-15 in Madhya Pradesh (Per cent)

Crop	Growth Rate
Foodgrains (A+B)	6.34
Cereals (A)	6.74
Rice	7.49
Wheat	8.24
Coarse cereals Total	1.48
Pulses (B)	4.78
Arhar	5.42
Gram	4.23
Other pulses Total	5.89

Source: estimated based on Production data, collected from DES, Madhya Pradesh.

Growth rate of foodgrains production is considerable in the past one decade (table 2). Cereals production in the state of Madhya Pradesh is grows at 6.74 per cent per rate during 2000-01 to 2015-16. It is clear from the table that growth rate of coarse cereals are very lower level (1.48 per cent) during the same time duration. In case of pulses growth rate of Pulses (total), Arhar, Gram and other pulses is 4.78 per cent, 5.42 per cent, 4.23 per cent and 5.89 per cent respectively over the same time duration in the state of Madhya Parades. So it is well establish that in the recent past decade the state had achieved remarkable growth in food productions, which is a good sine in terms for achieving food sufficiency by the state.

Table 3: Status and progress of Procurement of Foodgrains in Madhya Pradesh (In Thousand MT)

Year	Paddy	Wheat	Jowar	Bajra	Maize
2003-04	148.6	348.7	0.8	0.1	20.2
2004-05	40.3	348.7	NA	0.3	1.3
2005-06	129.6	484.4	0.2	0.0	2.8
2006-07	104.4	NA	NA	NA	NA

2007-08	100.1	57.4	0.0	0.0	0.8
2008-09	223.8	2409.6	1.3	5.4	53.2
2009-10	153.6	1963.4	0.0	0.0	0.3
2010-11	390.9	3537.6	0.0	0.0	8.9
2011-12	797.0	4965.0	NA	NA	16.9
2012-13	698.7	850.1	5.7	NA	2.3
2013-14	1564.5	6351.5	NA	NA	86.6
2014-15	1194.0	7201.0	NA	NA	304.5
2015-16	1265.3	7310.0	NA	NA	23.0
2016-17	1961.3	3991.7	4.3	NA	235.2

Source: Madhya Pradesh Warehousing & Logistic Corporation; Statistics, Govt. of Madhya Pradesh.

The volume of food grains procured by Madhya Pradesh over past decade is indicated in Table 3. The data shows spectacular rise in procurement values for some essential food grains, especially rice and wheat. 148.6 thousand tonns of Paddy procured by the state in the year of 2003-04 and it will increased over the time and reached at 1961.3 thousand tonnes in the year of 2016-17. On the other hand in case of wheat it is very different picture, procurement of wheat is very volatile like in 4965 thousand tonn in 2011-12 and it will sharply decrease in next year. In case of other coarse grains very little amount of these commodities are procured and also very volatile manner. So in the crop year 2016-17 in Madhya Pradesh about 6192.5 thousand tonns of food grain is procured.

Distribution of foodgrains under PDS in Madhya Pradesh :- The Public Distribution System (PDS) has evolved as a structured system for the efficient distribution of essential foodgrains at prices which are affordable and for managing certain emergency situation. In essence, the term PDS has become quite synonymous with the term 'food security' and has become a significant tool of government policy for managing the food economy of the country. PDS was a general entitlement scheme for all consumers till 1992, however, it became Targeted PDS (TPDS) in 1997 that aimed to reach out directly to the most food deprived and suffering population through establishing fair price shops for the distribution of foodgrains at subsidized rates. With the passing of the National Food Security Act (NFSA 2013) in parliament that recognizes the essentiality of 'right to food', the significance of PDS grew in two matters, related to procurement and distribution of foodgrains.The various important aspects of distribution of food grains through PDS in MP is highlighted in following sections.

Outreach of Public distribution system in Madhya Pradesh :- The state government is required to identify the eligible households in each state, which are poor and vulnerable, and the ration cards are issued to Below Poverty Line households (BPL) and Antyodaya Anna Yojana (AAY) households which are the poorest among the BPL families. Also, a number of unique category families are also eligible as beneficiary under PDS system. The identification of these priority households is done by the state governments, and the responsibility of distribution of food grains is shared between centre and state governments. FCI is responsible to transport grains to state depots, while the onus of distribution to a poor eligible household is carried out by state governments.

Table 4: Coverage of Families and Persons under Below Poverty Line and Antyodaya Anna Yojana in Madhya Pradesh (Status as on May 2018).

Card Type	Total Families	Total Members
Below Poverty line households (BPL Card Holder)	6427704	30397933
Antyoday Anna Yojana Household (AAY card holder)	1509515	5844767
BPL (AAY) card holder	136213	1255291
Total	8073432	37497991

Source: Directorate of Civil Supplies and Consumer Protection, Madhya Pradesh.

Table 4 presents the BPL / AAY count in recent period, May 2018 in Madhya Pradesh, and shows that a very number of families, i.e. about 80 lakhs are currently having the BPL/AAY cards in MP. The families having both cards are nearly 1.3 lakhs, with about 12 lakh members. Overall, about 8o lakh families and about 3.7 crore people are covered under the PDS system via the BPL/AAY cards issued in MP.

Table 5: Coverage of Families and Number of Persons under unique in Madhya Pradesh (Status as on May 2018).

Unique Categories	Total Families	Total Members
SC/ST to be verified	1564378	7087528
Scheduled tribe	104216	574582
Scheduled Caste	67372	337849
Children residing in orphanage	102	103
Keshshilpi Card holder	14512	66885
Registered Professional Vehicle Drivers / Conductors	5653	29565
Immunity agreement	812	3301
Families of labourers of closed mills	8755	43673
Weavers & craftsmen	9133	42564
Bidi Labourer	64784	304848
Landless Kotwar	3368	14916
Bhavan evam anya Sannirman Karmakar Mandal	927377	4544576
Registered Fishermen card holder	1169	5745
'Majdoor Suraksha Yojana' card holder	386754	1792263
Multi disabled and menatlly retarded	37394	175568
Railway registered porters	753	3372
Residing in old-age homes	29	500
Forest rights patta holders	19794	101038
Registered cycle ricksha riders, go-cart vendors	32485	161396
Registered Female domestic workers urban	88215	434443
Registered beneficiaries of Social Security Pension	324387	1222983
License holder Hammals and Tulavati	16615	83605
Registered hawkers	27151	131895
Total	**3705208**	**17163198**

Source: Directorate of Civil Supplies and Consumer Protection, Madhya Pradesh.

An overview of the unique category people covering people having vulnerability to poverty and being also eligible to benefit under PDS system is given in Table 5. A total of about 37 lakh families and 1.7 crore people are identified as unique category beneficiary currently in May 2018, and represent the population being particularly vulnerable to food deprivation due to caste identity, age, employment and land ownership aspects.

Table 6: Distribution of Cardholders Among Poor and Non -Poor

	% of poor with no ration card	% poor with bpl/aaycards	% non-poor with bpl/aay cards
Madhya Pradesh	30.0	41.9	22.2
All India	19.1	36.0	20.7

Source: Planning Commission, Eleventh Five Year Plan, Volume II, 2008; PRS. Notes: AAY refers to the Antyodaya Anna Yojana category, the poorest 10 percent of the BPL category.

The overall comparison of distribution of card holders among poor and non-poor in MP and India in 2008 is shown in Table 6. The planning commission estimates show that the per cent of poor people with no ration card is much higher for MP than India, and per cent of non-poor with BPL/AAY cards are slightly higher for MP than India. This highlights that the distribution of card holders is not very fair , and the eligibility needs to be defined and the very poor need to be identified more carefully in India, especially so in the case of Madhya Pradesh.

Usage of PDS and Leakages :- Publish distribution system absolutely very effective to provide food for poor's in the nation. However, outreach, effectiveness, and leakage of the system are also paintable at the same time. The second aspect of the importance of PDS system is related to the process of making available food grains to poor at prices lower than the price at private shops. The central government allocates the food grains to the state pool from the state governments at uniform Central Issue Price (CIP) for distribution via PDS.

A closer look at the quantity of per capita rice and wheat consumption under PDS in 2011-12 in MP in Table 7 shows that per capita rice consumption under PDS has been much lower in MP than national average, where the consumption in rural areas has been dismal. Also, the share of consumption of rice via PDS has been much lower in MP compared to shares for India. The per capita consumption via PDS of wheat has been also dismal in MP, but it was slightly higher than India level. The share of wheat consumed via PDS in total wheat consumption has also been low in MP, similar to Indian shares.

Table 7: Quantity of Rice & Wheat consumed per capita per month in 2011-12 (in Kg)

Particulars	Madhya Pradesh		All - India	
	Rural	Urban	Rural	Urban
Rice PDS	0.468	0.229	1.67	0.882
Rice - Other Sources	1.726	1.647	4.306	3.605
PDS Share	21.3	12.2	27.9	19.7
Wheat PDS	1.506	1.118	0.744	0.406

Wheat -Other Sources	6.978	6.732	3.544	3.605
PDS Share	17.8	14.2	17.4	10.1
Rice & Wheat Consumption from PDS (in %)	16.2		19.73	
Rice & Wheat Consumption from Other Sources (in %)	83.8		80.26	

Source: Household consumption of various goods and services in India, NSSO, 68th round, 2011-12 (report No. 558), Madhya Pradesh.

Hence, it can be observed that the overall effectiveness of PDS in MP has been very low and discouraging, and much of the rice and wheat demand is being met in the state MP from other sources, which are far more high priced for the poor and the vulnerable.

Table 8: Categories of state as per leakage of food grains.

Low Leakage (less than 25 percent)	Andhra Pradesh, Kerala, Orissa, Tamil Nadu, West Bengal
High Leakage (25- 50 percent)	Assam, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Rajasthan
Very High Leakage (50- 75 percent)	Haryana, Madhya Pradesh, Uttar Pradesh
Abnormal Leakage (more than 75 percent)	Bihar, Punjab

Source: "Performance Evaluation of Targeted Public Distribution System", Planning Commission, 2005

In a more recent study by Ashok Gulati and Shweta Saini in 2015, the leakage in rice and wheat allocation under PDS was estimated at state level by measuring the gap between the actual offtake under PDS and the total consumption of rice and wheat under PDS as indicated in NSSO 68th round report. The results of the report are indicated in Table 8, which estimates the leakage of foodgrain under TPDS to be about 47 per cent at all India level, and it is slightly higher in Madhya Pradesh at 49.03 per cent. So, about half of food grain offtake have suffered leakage in MP, as recent estimate shows. The share of MP in total leakage at India level is 5.8 per cent. This is an alarming scenario, given that MP houses 8.68 per cent of Indian poor population. The study also indicated that the five states housing 60 per cent share of India's poor population accounted for about half of total grain leakage in India in the year 2011-12, and the five states were UP, MP, West Bengal, Bihar and Maharashtra.

Conclusion :- The above analysis clearly shows that the challenges of ensuring food security in Madhya Pradesh is quite severe currently, with the growth rate in food production being much lower than the growth rate of population over last decade. The per capita availability of food grains and cereals in MP is extremely low at 2.05 quintals and 1.59 quintals in 2010-11. It is obvious that the demand for food in Madhya Pradesh, which is one of the poorest states of India, cannot be only met by the increasing levels of agricultural production. The role of PDS as a food security tool becomes all the more crucial in supplementing the gap in food requirement in MP in the current scenario through government procurement of food gains. Hence, the PDS system in this state needs to be strengthened and continued with appropriate monitoring and increasing levels of food supply by the Government, in alliance with several other food security welfare schemes.

However, in order to address the hunger situation for the vast poor population in the state, the identification of poor and vulnerable households is important for ensuring food security to them, and this noble objective also needs a very efficient and effective public distribution system that capably addresses the food and nutrient requirements of the most vulnerable and destitute lot of people.

However, the delivery system of food grains and essential commodities under PDS system has not been very encouraging as this

study indicates, and there are several constraints to its proper and effective functioning. The issues leading to such low delivery to poor, leakages, corruption and lower usage under PDS need urgent policy attention if food insecurity issues are to be addressed in Madhya Pradesh in future. With high levels of poverty in the state and also high levels of corruption in PDS system at lower levels of distribution, the challenge of ensuring that PDS is used effectively as a tool to distribute essential food items to the needy in future are quite severe, especially in the case of Madhya Pradesh where the growth rate in population is substantial. This shall require very vigilant monitoring of PDS as well as other welfare system by the government, which is largely lacking presently.

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NABARD and Finance Inclusion

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Abstract :- This paper examines the study on financial inclusion among the small and marginal land farmers in India. It covers trends in agricultural growth, cultivation patterns, participation, productivity, performance of small holders. Furthermore it addresses issue of employment generation, differential policies, and institutional support for small and marginal land holders, challenges and future options for small and marginal holding agriculture including information needs. It also provides lessons from the experience of India on small and marginal farmers holding agriculture for other countries. India's economic growth has failed to make significant improvement in its poverty figures Government of India with its concern started various poverty alleviation programs but they have failed to deliver the objectives to the level which is desired. The reasons may be many such as failure to reach the target group, loopholes in the system, developing a robust mechanism to name a few. Many countries including India experimented with subsidized credit which only led to increase in the NPAs.

Keywords :- Financial inclusion, Comprehensive Inclusion, Growth , NABARD

Introduction :- Financial inclusion can play a key role in facilitating inclusive economic growth particularly in a developing economy. An inclusive finance must provide better banking services to all sections of society, especially low-income and weaker sections. The uniqueness of having a bank account is that it not only provides basic banking facility but also finance for investment/production purposes which opens opportunities for enhanced employment.

Since 2005, concerted efforts have been made by the Reserve Bank India (RBI) and National Bank for Agriculture and Rural Development (NABARD) to extend financial inclusion across India, especially to weaker sections of society, as they remained excluded from services offered by financial institutions. In 2003, a study revealed that only 27 per cent of total households had accessed credit from institutional sources including banks and cooperative institutions. In 2012, just about 40 per cent of adult population had bank accounts.

Under this scheme RBI has adopted a policy of providing credit through multiple channels and simplifying procedure for small and marginal farmers. However there is some progress in this regard after active erode played by NABARD and formation of SHGs groups .A number of NGOs and MFIs have also probed into the business. This study is an attempt to assess the role of financial institutions in financial inclusion with special reference to micro financing. The study presents the conceptual framework of financial inclusion and micro finance. Promote sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institutiondevelopment and other innovative initives

Objective :-

- Promote sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institution development and other innovative initiatives.
- To assess the socio economic conditions of sample cultivators.

Methodology :- Scientific methods are followed in the process of research, Samples, data collection and analysis are done with the help of scientific method as applicable to economic analysis .

Review of Literature :- A review of literature suggests that there is no universally accepted definition of financial inclusion. The definitional emphasis of financial inclusion varies across countries and Geographies, depending on the level of social, economic and financial development; the structure of stake holding in the financial sector; socio-economic characteristics of the financially excluded segments; and also the extent of the recognition of the problem by authorities or governments. Broadly, financial exclusion is construed as the inability to access necessary financial services in an appropriate from due to problems associated with access, conditions, prices, marketing or self-exclusion in response to discouraging experiences or perceptions of individuals/ entities.

The poor need financial services mainly for three purposes, all of which call for equal attention (Rutherford,2001) :-

- Firstly, to defray expenses related to education, house-building, invariably go in for loans.
- Secondly, there are emergencies such as serious illnesses, death in the family, and property loss due to accident.
- Thirdly, there are investment needs to buy or build income-earning assets.

Over the years, several definitions of financial inclusion/exclusion have evolved. The working or operational definitions of financial exclusion generally focus on ownership or access to particular financial products and services. The focus narrows down mainly to the products and services provided by the mainstream financial service providers. Such financial products may include money transmission, home insurance, short and long-term credit and savings. The review of literature suggests that the most operational definitions are context-specific, originating from country-specific problems of financial exclusion and socio-economic conditions. The operational definition of financial inclusion, based on the access to financial products or services, also underscores the role of financial institutions or service providers involved in the process (Rabha, 2012).

The scope of financial inclusion (Rabha, 2012) can be expanded in two ways-

(a) Through state driven intervention by way of statutory enactments, and
(b) Through voluntary effort by the banking community it for evolving various strategies to bring within the ambit of the banking sector the large strata of society. When banks do not give desired attention to certain areas, the regulators have to step into remedy the situation. This is the reason why the Reserve Bank of India (RBI) is placing a lot of emphasis on financial inclusion.

Primarily work on agriculture finance :-

Policy and Regulatory Interventions – Agriculture Finance
Policy (and Insurance Product Development) Advisory
Strengthening of Relevant Institutions
Developing Innovative Products

Major on-going Activities supported from Financial Inclusion Fund

Creating Financial Awareness

- Financial Literacy Awareness Camps
- Financial Literacy Awareness through Street Plays
- Demo Vans for Financial Literacy

Strengthening BC Network

- Three days Training / One day Refresher Courses for BC/BF
- Exam Fees for BC/BF
- Bank Sakhi – SHG members as BCAs
- Support to RRBs for BC in NER

Capacity Building of Other Stakeholders

- FLCs of Rural Coop Banks / RRBs

- Centres for Financial Literacy - Pilot
- Support for RUDSETIs/RSETIs
- Capacity Building of Stakeholders at BIRD & other training agencies

Support for increasing Banking Touchpoints

- Support for acquiring micro ATMs
- micro ATM integration with CBS
- Support for PoS /mPoS in Tier 5 & 6 centres
- Dual Authentication at BC point

Supporting Payment and Acceptance Infrastructure

- EMC chip based RuPay Kisan Cards
- PACS data migration
- ATM on-boarding support
- Interchange Charge
- BHIM UPI App

Improving Connectivity for Banking transactions

- V-SATs for SSAs in Dark & Grey Areas
- V-SATs for Coop Banks of NER & Andaman & Nicobar
- V-SATs for opening branches in LWE districts
- Signal Boosters in Grey Areas

Onboarding for Statutory requirements

- On-boarding to C-KYC Registry
- AUA/KUA membership of UIDAI
- Onboarding to Public Financial management System

Financial Inclusion :- In majority of the developing countries, access to finance (Khan, 2012) is now being perceived as a public good, which is as important and basic as access, say, to safe water or primary education. A question that arises is whether financial inclusion can be interpreted as a public good. A good is considered a public good if it meets the conditions of (a) 'non rival ness' in consumption and (b) non-excludability. Financial inclusion meets these two criteria. One of the important effects of financial inclusion is that the entire national financial system benefits by greater inclusion, especially when promoted in the wider context of economic inclusion.

Financial Inclusion: India's position compared with other countries :- The extent of financial exclusion in India is (Khan, 2012) found to be higher as compared with many developed and some of the major emerging economies. The wide extent of financial exclusion in India is visible in the form of high population per bank branch and low proportion of the population having access to basic financial services like savings accounts, credit facilities.

Challenges and Strategies in Financial Challenges :- There are several challenges and strategies to achieve the target of complete financial inclusion; however, for restricting to the theme of the paper and space constraints, challenges have been dealt with.

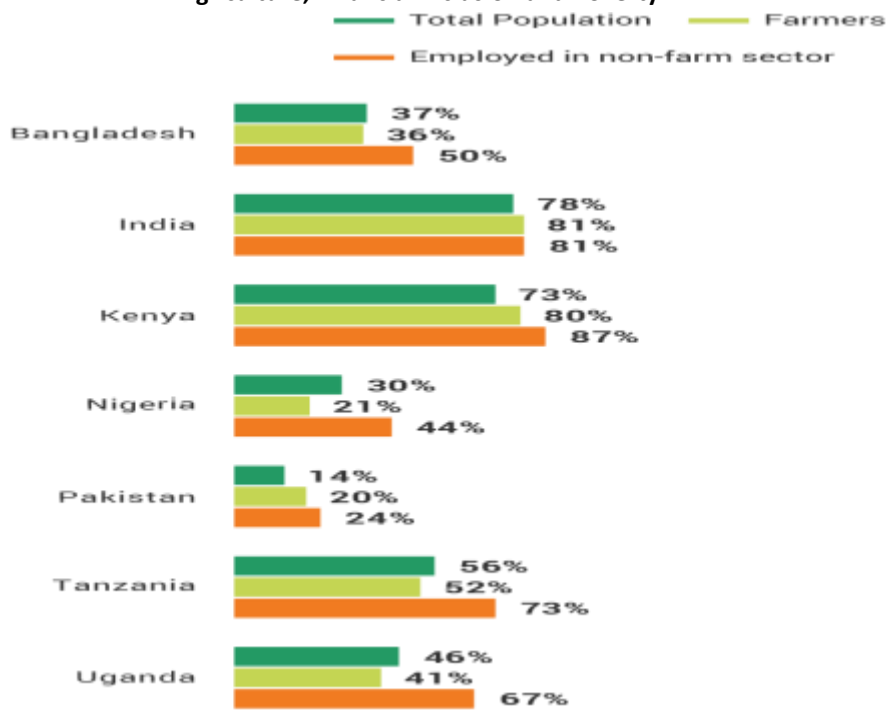
- Change in the approach of Banks: Only access to credit or banking is not the financial inclusion: Achieving complete Financial Inclusion: It is often noticed that mere opening a bank account is taken or claimed as achieving the target of financial-inclusion.
- Many empirical studies and Usage Analysis reveal that after opening such bank accounts, hardly there are any transactions take place in such bank accounts. Banks must genuinely strive to provide the directed services under the category or scheme of financial inclusion to the rural population, since they are the main pillars for the desired success.
- On this backdrop, the claims of policy-makers, banks, etc., the illusions created and mythical success stories spread must be tested on the basis of parameters enumerated on the background of the RBI's norms and expectations, NABARD the financial inclusion is meant to include all the sections of the society, who are mainly out of the net of the financial institutions, yet, financial inclusion does not mean merely opening of saving bank account but signifies creation of awareness

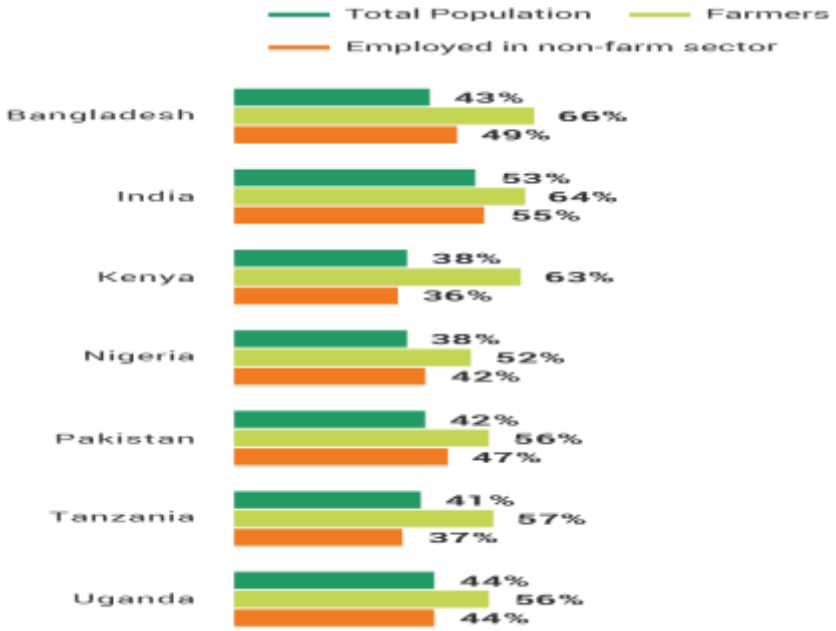
about the financial products, education and advice on money management, offering debt counseling, etc. by banks.

- Every society should ensure easy access to public goods, Therefore, banking service being a public good should also be aimed at providing service to the entire population.
- Microfinance Institutions (MFIs): The MFIs have served the underserved/unnerved populace in the last few years and improved access to credit though there have been quite a few debatable issues on the style of corporate governance and ethics of conducting business on part of some of the MFIs.
- However, it has been often realized that the MFIs do help in financial deepening and can remain an important segment of the Indian financial market keeping in view the present level of penetration of the banking system. The conceptual framework underlying MFIs requires a change. MFIs will have to revisit the mission and business strategy and reinvent the sector to remain relevant in the system.
- A new category of 'Non Banking Financial Company-Micro Finance Institutions' (NBFC-MFIs) prescribed by the Malegam Committee(2011), created in December 2011 by RBI, is also facing difficulties primarily into micro financing.
- The NBFC-MFIs has got some relief from the RBI, which issued revised 'Directions cum Modifications' in August 2012, (RBI, 2012). On this background, these institutions have to revisit their business models to support the income earning ability of the borrowers and, at the same time, they remain economically viable.
- NBFC-MFIs will have to work hard in pursuit of transparency and responsible finance, shaking off the perception that their motto is profiteering at the cost of the poor but not profitability for sustainable and viable growth on one hand and take initiatives to retool the product redesign for garnering new customers and acquiring more share of the market on the other

Financially Included

Agriculture, Financial Inclusion and Poverty





The other policy initiatives taken by NABARD for financial inclusion include the following:

- IBA and NABARD have advised scheduled commercial banks and RRBs to achieve the target of adding 250 rural household accounts every year at each of their rural and semi urban branches. The total number of no frills accounts opened by PSU and private sector banks is around 33 million as on 31st March 2009 vis-a-vis less than half-a-million till March 2006.
- In order to facilitate RRBs to undertake card based ICT projects, the FITF will extend viability gap support in one or two districts per RRB.
- NABARD has also decided to extend financial support from FIF and FITF at 100 per cent of project outlay for eligible activities in Jammu & Kashmir, Uttarakhand, Jharkhand, Himachal Pradesh, Chhattisgarh and Andaman & Nicobar Islands to commercial banks / RRBs / cooperatives on the lines of support in the North Eastern Region and Sikkim.

  Several projects under FIF and FITF have been sanctioned covering various initiatives. The Projects sanctioned under FIF include:

- Pilot project to establish farmers' service centres / village knowledge centres, mobile credit counselling centres, promotion of financial literacy and farmer education through mass media to promote financial inclusion in Kerala;
- Research and development project for ICT solutions in 15 select RRBs with support from World Bank and some technology providers;
- Financial Inclusion in the North East Region though biometric smart cards issued by State Bank of India.

Conclusion :- The problem of financial inclusion needs to be tackled with urgency if we want our country to grow in an equitable and sustainable manner. Traditional and conventional banking solutions may not be the answer to address the problem of financial inclusion in India. Banks, therefore, need to innovate and think 'out-of-the-box' for solutions to overcome the problem of financial exclusion in India. They need to deploy new technologies and create financially viable models to take Forward the process of financial inclusion in an effective manner. This way banks in India would be doing a great service to the cause of financial inclusion and make their name in

history. Financial inclusion may be a social responsibility for the banks in the short-run but will turn out to be a business opportunity in the long-term. Financial Inclusion is no longer adoption, but it is a compulsion. The entire world is looking at this experiment in India and it is important that banks rise up to this challenge and meet it successfully. The current policy objective of inclusive growth.

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Saffron Cultivation in Jammu and Kashmir: Opportunities and Challenges

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Abstract :- Saffron (Crocus Sativus L.) is a slender, dried, reddish brown, flattened stigma of cultivated saffron plant. Saffron is the world's precious spice and is very famous due to its fine flavor, colour and medicinal value. Saffron is a low volume cash crop. The State of Jammu and Kashmir has monopoly in the saffron cultivation in India. Economically creation of the strong market demand is the biggest opportunity for its revival and needs an association of traders and producers to be recognized at the international level for market assurance and price stability. But during last few years the production of the saffron cultivation is under threat due to uncertain climatic conditions, poor irrigation facilities and urbanization.

Key Words :- Saffron cultivation, economy, marketing, climate change, production.

Introduction :- Saffron (Crocus Sativus L.) is a natural herb mostly cultivated in Kashmir (India), Spain and Iran. The quality of Saffron is determined by the yellow (style) of the flower which is intrinsically attached to red thread like portions called (stigma). Saffron is the most attractive and intriguing plant species often called 'The Golden Spice,' saffron has a history rooted in the distant past. Saffron is used in pharmaceutical and health care product as well as the flavoring and coloring agent in foods (Basker and Negbi, 1983).

Saffron is extremely profitable and offers scope for employment generation. The economic analysis in terms of costs and returns, net present value, cost benefit ratio, payback period, internal rate of return and the farm profit measures indicate that the crop is economically reasonable.

There is much scope for making this crop more profitable, sincere efforts are made by providing quality planting materials, introduction of sprinkler irrigation system to expand the area as well as increase the production of saffron in the state.

The best quality of saffron is produced in Jammu and Kashmir. The Uniform set of standards for grading saffron as prescribed by the international standards. Saffron has also the potential of becoming an important source of foreign exchange. Saffron is one of the most important export products and plays a significant role in income and employment of saffron cultivators in India.

As per the reports of Jammu and Kashmir Agriculture Department during the year 1996-97 the area under saffron cultivation in Jammu and Kashmir was 5707 hectares and it has declined to 3674 hectares in 2014-15. In the same period production has decreased to 15.95 metric tons to 9.6 metric tons and the productivity also decreased to 2.80 kg/hectare to 2.61 kg/hectare.

Objectives :-

- To identify the opportunities of saffron in India
- To highlight the challenges of saffron cultivation in India

Research Methodology :- The present study has been conducted on available data which is taken from the Digest of Statistics Government of Jammu and Kashmir, Directorate of Economics & Statistics, government of Jammu and Kashmir, Agriculture and Production Department and Sher-e-Kashmir University of Agricultural Science & Technology. Various published and unpublished articles and reports were also used for the study.

1. Opportunities :- There is a tremendous scope for the growth of saffron industry in Jammu and Kashmir. There is an opportunity for developing a nationwide brand of saffron. The favorable agro climatic conditions, fertile soil and cheap labour offer vast scope for the cultivation of saffron in the state. There also exist possibilities of bringing uncultivable waste land under saffron cultivation. In view potential available, cultivation of saffron in Jammu and Kashmir State can become big industry and also can contribute chiefly to the export trade of the State.

1.1 Accelerating Credit Facilities :- Banks have to play a significant role as a medium to accelerate the process of saffron cultivation in Jammu and Kashmir. Banks should be proactive and make financial services available to saffron cultivators by establishing branches in these regions. They can design simple borrower-friendly lending policy, procedure, documentation and flexible financial products that match needs of cultivators. State government should create enabling environment with the cultivators that can improve the flow of credit. Government, banks and electronic media can launch massive campaign to create awareness among saffron growers to avail financial services.

1.2 Rising Demand :- Saffron has many uses in industries such as food, pharmaceutical, cosmetic and perfumery as well as in the textile dyes. The saffron is used in preparation of saffronic kehwas(a kashmiri speciality) and is also used in kashmiri wazan, more specifically it has been recognized as an anticancer medicinal herb. Saffron is now finding a major use in herbal medicines to support a vigorous global campaign for healthy living that is gaining momentum. In addition, saffron has also found use in wine preparation. Some brands of wine add saffron to make available a special flavor and sell at best price. The rapid expansion in the wine industry being witnessed in India after the ban on producing alcoholic beverages was lifted in the country has opened yet another opportunity for higher saffron consumption. Kashmiri saffron will definitely have an edge over the imported saffron because of its higher natural quality.

1.3 Expansion of Saffron in Non-Traditional Areas :- There is a great scope for area expansion on a large scale in the well drained Karewa lands of non-traditional areas available in Baramulla, Kupwara, Handwara and Sopore, etc. districts of Kashmir province; Kishtwar and upper area in Udhampur districts in Jammu province; and Leh and Kargil districts of Ladakh region. These should be exploited after location-specific trails are conducted by the SKAUST (K) to evaluate crop performance and then adjust crop management strategies appropriate to each location.

1.4 Cultivated as Mixed Crop :- The saffron can be cultivated in Apple and Almond orchids as mixed crop. The farmers can attend these crops without any problem and also both the plant species utilize the resources available without any competition because when saffron attains its vegetative phase the other fruit trees are in dormant phase and at the time of fruiting phase of apple, and almond, saffron remains in quiescent phase.

1.5 Government Support :- Government plays an important role for the growth of saffron in J&K. In 2010 authorities through Central Governments, all-out assistance started ambitious 'National Saffron Mission' (NSM) with a huge investment. The mission was a multi-pronged strategy of rejuvenation and restore congenial cultivation conditions to revive the saffron cultivation to its pristine glory and increase the flower production. The mission was well conceived with thrust on replacing exhausted seed corms and encouraging farmers to adopt scientific techniques of cultivation; installing state of the art irrigation mechanism to regulate moisture requirements of the rejuvenated crop.

2. Challenges :- Saffron industry is no doubt contributing the state's economy but there are certain weaknesses which are proving as hindrances for further growth of this industry. Saffron cultivators of Jammu and Kashmir are either unaware or do not want to invest in this sector because of poor returns. For flourishing this crop one has to take into concern all the challenges that lead to low yields. The major challenges are:

2.1 Lack of Proper Irrigation Facilities :- Lack of irrigation facilities is one of the main reasons for low production of saffron in Jammu and Kashmir, as it is grown under rainfed conditions. The irrigation facilities like sprinklers is in place but the authorities have failed to put them inproper use. Farmers are dependent on September rains for a good flush of flowers and delayed rainfall (late October) is unfavorable to the crop as it is accompanied with low minimum temperature leading to flower abortion. From the last several years, the weather has become quite unpredictable rains are either insufficient or irregular, and thus adversely affecting flowering or subsequent plant growth.

2.2 Adulteration :- In absence of proper quality control, branding and packaging, Iranian saffron is making heavy inroads into Indian markets as Kashmir product. Since saffron produced in Iran is cheaper than Kashmir grown species, many unscrupulous traders sell the product under Kashmir brand. The practice is going on for years and turnover of the spurious trade runs in crores. Iranian saffron, which is inferior in colour, aroma, flavor and oil content, is smuggled in to India in large quantities and purchased by some unprincipled traders who trade it after mixing it with the Kashmiri product. The adulteration of saffron by some unscrupulous elements had ruined this industry by mixing the manmade saffron with the original one to make fast bucks. This has brought a bad name to the entire saffron industry. Even the tourists are now hesitating to buy our original saffron saying that they have the experience of buying artificial saffron from Kashmir on very high rates. The illicit trade will continue until we increase our production substantially and lay modern pack houses with quality control laboratories.

2.3 Lack of Adequate Marketing Facilities :- In our state another challenge for saffron growers is the lack of adequate marketing facilities. The saffron growing state of Jammu and Kashmir is far away from the big market centers of the country like Delhi, Mumbai, Bangalore, Kolkata etc. This forces the saffron cultivators to sell their product to the middlemen at low rates, existence of the various intermediaries in marketing in the saffron sale leading to its adulteration. There is a need to constitute special policies to strengthen the marketing facilities in the state so that the income of the farmers can be enhanced (Akhter, 2015).

2.4 Urbanization and Pollution :- The traditional saffron belt of Pampore is only just 15km away from the Srinagar. Due to the high rise in price of land in Srinagar, the land brokers have been trying hard to divert saffron fields toward construction business. The Legislative Council Committee on Environment has revealed that the state has lost 2 lakh kanals of fertile farmland from last decade. Agriculture land conversion is the biggest threat to our economy and stability. The shrinking of cultivable land has already reduced contribution of primary sector to the State Gross Domestic product from whopping 54% during 1980-81 to just 19% in 2012-13. The report while quoting state finance report 2010 states, in 1997 production of saffron was 16 metric tons on 5400 hectares of land in 226 villages. Due to non-implementation of laws, production decreased to just 6 metric tons and land shrunk to 3000 hectares in 2007 with a period of just 10 years due to land conversion to non productive activities. Above all 1100 kanals of saffron land in Kashmir handed over to national highway for construction of four lane highway, two dozen cement factories, stone crushers, brick kilns came up in saffron area posing a serious threat to heritage crop.

It has been observed that unfortunately agriculture land is being converted for construction activities, in such circumstances existing land law need to be made stringent and sharpened by amending some provisions to safeguard our natural resource base, the agriculture land.

2.5 Low Productivity :- Low productivity of saffron crop is a big weakness in horticulture industry of Jammu and Kashmir. The matter of concern is that the saffron cultivation has declined over a period of time. However, saffron production is currently suffering on several counts, especially those relating to productivity as well as post-harvest management. The low productivity of saffron crop is caused due to the negative effects of pests and

diseases. They reduce not only the productive capacity of saffron but also adversely affect the quality of crop. The other reasons for low productivity of saffron crop in Jammu and Kashmir can be attributed chiefly to non-availability of quality planting material, lack of research and development, lack of irrigation facilities, low adoption of modern technologies, high cost of cultivation, shortage of labour and skilled man power etc. (ICAR-Indian Institute of Horticultural Research, 2015).

Conclusion :- It is obvious from the foregoing results that Jammu and Kashmir State has much potential for development but what is missing is the proper identification of resources and their misuse or under utilization. The role of the planning is supportive and essential in the extension of saffron. Saffron is really a boosting factor of Jammu and Kashmir and economic status of growers. For Jammu and Kashmir and for India saffron is our identity in international market. There is need of rejuvenation of the saffron industry in the state by strengthening the marketing, financial support, co-operative societies, proper training and quality control of the saffron. However, to boost saffron cultivation in the state by enhancing the area of land, production and productivity are eminent measures. We should be proud that our country has the right agro-climatic conditions to produce this crop successfully.

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Role and Contribution of Agriculture on Indian Economy

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Abstract :- Agriculture as an important source of Indian economy. It is also known as primary sector of economy. This sector is essential growing sector in the world economy since from independence. This sector is occupying first place in employment providing. It contributes 18 per cent of India's Gross Domestic product (GDP) approximately 65 to 70 percent of the population in the country derives its livelihood directly as well as indirectly from agriculture sector. It also plays an important role in the growth of socio-economic sector in India. In India, agriculture sector has occupied around 43% of geographical area. The overall contribution of agriculture in various sectors in India like employment, national income, foreign trade, export of agricultural products, industries, service sector, purchasing power of people and revenue to the government. The purpose of the study is to understand the role and contribution of agriculture in the development of Indian Economy.

Keywords :- Agricultural sector, GDP and Economy.

INTRODUCTION :- Agriculture plays a significant role in maintaining the socio-economic profile of India. It is the backbone of Indian economy, because 65-70% of the rural households is depend directly or indirectly on agriculture or agro based industries. According to central statistic office (CSO) share of Agriculture and allied sectors was 16.1% of the Gross Value Added (GVA) during 2014-15 at 2011-12 prices. India ranks third in world in farm and agriculture output. It is the largest producer, consumer and exporter of spices and spice products. During the last two decades, India was mostly dependent upon food imports, but in recent years, the agriculture sector of Indian economy has made it self-sufficient in food grain production. Agriculture is the basic and main occupation for most of the Indian households. Approximately 58% of the rural families are directly as well as indirectly depends on agriculture as their principal means livelihood. Over the last few decades India's agriculture sector has registered impressive growth. The production of food grains has increased significantly from 51 Million Tonnes (MT) in 1950-51 to 250 Million Tonnes in 2011-2012 [1].

In the recent years, various factors have worked together to provide growth in the agriculture sector in India, like growth in household income and consumption expenditure, increase in agricultural exports and extension of processing sector. Export of Agricultural products constitute a fifth of the total exports of the country. Even 10% of the export earnings come from agriculture sector of the economy. It is the oldest business in the global economy. Agriculture is the foundation of Industrial and other sectors of the economy. The importance of agriculture sector in India is not likely to decline due to its deal with food security, rural poverty, employment and supply of wage goods [2]. India has put a lot of effort on agriculture sector to be self-sufficient in the production of food grains and this effort of India has led to Green Revolution. With the purpose of increasing agriculture production, Green Revolution came into existence.

METHODLOGY :-

Objectives :- The main objectives of the present study are as under:

- To study the role of Agriculture on Indian economy
- To study the contribution of agriculture on Indian Economy

- To study the major government initiatives for the development of Agriculture sector.

Data sources :- The data used for the present study is mainly secondary data and has been collected from various journals, books, magazines, news paper and the internet.

Scope of the study :-

1. The study is confined only to the role and contribution of Agriculture and Indian Economy.
2. The present study mainly based on Secondary data only.

Role of Agriculture on Indian Economy :- Indian Economy is also known as Agrarian economy; where 58% of population is mainly depend on agriculture sector. It is the main source of income generation of most of the Indian families. This sector contributes about 18% of total GDP and provides 50% employment to reduce country's unemployment. India exports a huge quantity of agricultural products like, vegetables, fruits, pluses, tea, tobacco, spices etc and the government is acquiring high revenue from it [3]. In India most of the income circulates for purchasing food items which is good for financial growth and balance. The agriculture sector provides increasing purchasing power for industrial and service sectors. In India agricultural activities is one of the oldest in the world. The primary role of agriculture is that it provides food to the people, supplies raw material for industries; generate employment to large number of people, surpluses for Indian economy and capital for agrarian development. The development of roads and railways network now mostly depends on agriculture sector. Economists have found that there is interrelationship and linkages between agriculture and other sectors of the economy. Economists like Lewis and Nurkse viewed that agriculture provides surplus labour for economic development of other sectors of the economy. Agriculture sector is important element of savings and capital formation in the Indian economy.

In the rush of developing countries towards technologies India has emerged as a new brand name among its rivals. The Govt. of India has signed a mutual memorandum of Understanding with other developing countries to provide productive agricultural facilities in multiple areas such as research and development, post harvest management and plant protection.

With the emergence of the private sector the Indian Agriculture, has already a witnessed a positive change that is defined by cutting edge technology and increased productivity. And this remarkable shift in agriculture practices has occurred over past century in response of new technology and the development of world market. Now, agriculture with its private sector is unquestionably the largest livelihood provider in India [4]. India's agricultural sector has made large pace in developing its potential. The green revolution largely increased the production of food grains and led to the introduction of technological innovations in to agriculture sector [5].

Contribution of Agriculture on Indian economy :- The economic contribution of agriculture can be given as follows:

1. Contributor to the national income :- Agriculture is the main source of national income of our Economy. The growth of the Indian economy is strongly affected by the better performance of agriculture. The share of agriculture in Gross Domestic product was 55.5% in 1950-51, 52.1% in 1960-61 and is declined to 18.5% only at present.

2. Important contribution to employment :- Agriculture sector is important as it provides large employment opportunities to the most of the people. It also provides livelihood about 65 to 70% of the total population. Agriculture sector is the single largest private sector occupation in our country. It provides employment 58.5% of country's work force that reduces the higher rate of unemployment in our country.

3. Contribution to International trade :- Foreign trade is an Engine of economic growth. Indian foreign trade is associated with agriculture sector. Agriculture products like Tea, Sugar, rice, Tobacco, spices, coffee etc. Constitute the important items

of export that depend on agriculture sector. This will reduce unfavorable balance of payments and helpful for the country's economic development.

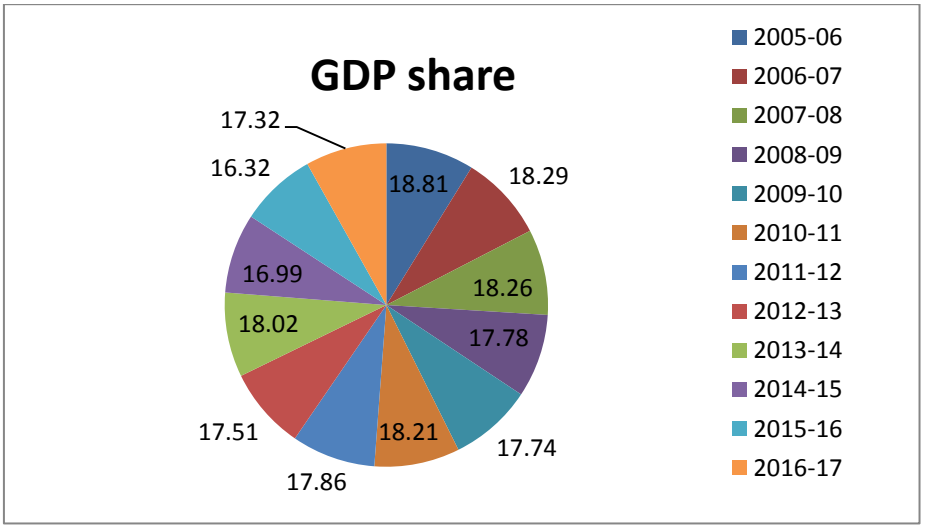
4. Contribution to Industrial development :- Agriculture is the main source of Industrial development. It provides raw material of basic industries like, cotton and jute textiles, tobacco leaves, crude oils, sugarcane, wood pulp, grains and crops, fruits oil seeds vanaspati etc are directly depend on agriculture sector for their raw material.

5. Contribution to Government revenue :- Finances of the Government especially state Governments are mostly depending on agriculture income. The main source of revenue of the state Governments is agricultural taxation because it is a state subject.

6. Contributor of internal trade and transport :- The exchange of goods is the foundation stone of markets across the country. India's internal trade & transport is mostly dependent on sale and purchase of agricultural commodities. And for this smooth navigation of commodities smooth transport facilities are needed to move those commodities from producing centers to the distant consuming centers.

7. Source of livelihood :- Rural India is the real India; around 70% of the population is living in villages. The main occupation of rural population is agriculture. About 65-70% of our population is directly or indirectly engaged in agriculture. It influences almost every aspect of life in rural areas.

8. Contribution in Planning :- The success of economic planning in India depends on resource mobilization. This, in turn is largely conditioned by the progress made on the agriculture sector.



Source: Planning Commission of India, GOI

Government Initiatives :-

- There are some of the recent major government initiatives in the Agriculture sector that are necessarily to be mentioned are as follows:
- The Government of India has allowed 100 % foreign direct investment (FDI) in marketing of food products and in food product e-commerce under the automatic route.
- In September 2018, the Cabinet Committee on Economic Affairs (CCEA) approved Rs 5,500 crore (US$ 820.41 million) assistance package for the sugar industry in India.
- In September 2018, the Government of India announced Rs 15,053 crore (US$ 2.25 billion) procurement policy named 'Pradhan Mantri Annadata Aay SanraksHan Abhiyan' (PM-AASHA). This scheme has three main components I.e. Price Support Price (PSS), Price Deficiency Payment Scheme (PDPS) and Pilot of Private Procurement and Stockiest Scheme (PPPS) under which states can decide

the reward scheme and can also partner with private agencies to ensure fair prices for farmers in the country.

- The Agriculture Export Policy, 2018 was approved by Government of India in December 2018. The new policy aims to increase India's agricultural exports to US$ 60 billion by 2022 and US$ 100 billion in the next few years with a stable trade policy regime.
- The Government of India is going to provide Rs 2,000 crore (US$ 306.29 million) for computerization of Primary Agricultural Credit Society (PACS) to ensure cooperatives are benefitted through digital technology.
- With an aim to boost innovation and entrepreneurship in agriculture, the Government of India is introducing a new AGRI-UDAAN programme managed by Indian Council Agricultural Research to mentor start-ups and to permit them to connect with potential investors.
- The Government of India has launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) under the leadership of Prime Minister Narendra Modi with an outlay of 50,000 crore for a period of 5 years (2015-16 to 2019-20).
- The Government of India plans to triple the capacity of food processing sector in India from the current 10 per cent of agriculture produce and has also committed Rs 6,000 crore (US$ 936.38 billion) as investments for mega food parks in the country, as a part of the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA). The objective of SAMPADA is to supplement agriculture, modernize processing and reduce agri- waste [6].

Conclusion :- Growth of agricultural sector is must for the development of Indian Economy. Even developed countries lay greater attention towards the development of agricultural sector. The progress of agricultural sector is essential to provide for non-agricultural labour force, generate tax revenue to support development of the rest of the economy, supplies raw material to primary industries, to earn foreign exchange and to provide a growing market across the country. The agricultural sector not only contributes to growth and development of the economy but also reduce poverty by providing employment opportunities and food security to most of the families in the country. Finally prosperity of the agricultural sector is directly proportional to the prosperity of the country.

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Agriculture and rural development

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Abstract :- Agriculture plays a very significant role in the Indian Economy. This sector is also known as primary sector. It is the main source of livelihood for the majority of rural population. Agriculture is the life blood of rural economy as more than 70% of village households depend of agriculture. India is a country of villages and agriculture is the soul of Indian Economy, as it is evident from the fact that this sector provides employment to about 60% of the population and contributes about 17% of the total GDP of the country. Agriculture plays a vital role n the process of economic development of a country and for the upliftment of rural economy. Currently the agriculture is the largest industry in India and plays a key role in the socio-economic development of the country. The rural agriculture production process plays a very crucial role in developing the Indian economy. Almost 61% of the total geographical area of country is occupied by agricultural sector. The main aim of rural development is to boost and increase farm productivity for achieving fast economic transformation, increasing employment opportunities, reducing income inequalities, increasing profits to farmers and to improve the household outputs of selected agricultural product.

Key words :- Agriculture sector, rural development, GDP, Employment.

Introduction :- India is an agricultural country and majority of population depends on agriculture. It is a primary economic activity and more than 70% population of India is engaged in agriculture. It is the back bone of Indian economy. More than 50% of the entire man power is observed in this sector. It not only provides food items but also unlimited raw materials for manufacturing various industrial products like jute, textiles, tobacco and sugar cane etc.

India is a rural country and majority of people are living in villages. The main source of livelihood to the rural population is agriculture that is why agriculture is called life blood of the rural economy. As we know India is predominately agriculture country and the main occupation of countries population is farming. Rural sector is extremely backward and weak in terms of methods of production, social organization and political mobilization. More than 70% of Indian population lives in rural areas, with more than 50% of population lives below poverty line. in the first three five year plans, agriculture accorded less priority than the industrial sector. Particularly in second and third five year plan agriculture and rural development begin to receive top priority only in 5^{th} and 6^{th} five year plans. In the 7^{th} plan great importance has been given to the all-round development for the rural economy.

Agriculture is directly linked to very many facets of sustainable development including sustainable consumption, management of natural resources, sustainable production, eradication of poverty, management of energy resources, fresh water, trade, education, health market access and as well as technology transfer and capacity building.

Objectives :-

- To study the eradication of poverty and creation of more employment opportunity in rural areas.
- To study the factories which become obstacles in rural development

- To indentify the challenges and role of agriculture in rural economy.

Policy recommendations :-

- Improving and modernizing various agricultural practicing methods and crop sowing efficiencies. Removing obsolete practicing methods will increase the farm production of farmers and will help to increase the economy of the rural people.
- Bringing of more and more land under cultivation in rural areas as at present the cultivate land is not sufficient to provide employment facilities as well as food to all the people.
- Improving farm productivity through better access to improved technologies, organized markets and to resources.
- To improve and strengthen rural-urban linkages, connectivity to market, and increase agriculture, non-agriculture productivity.
- Proper planning is necessary for rural agricultural development. Government should provide proper attention towards rural agriculture. More powers should be given to local self government in order to keep a watch and vigilance on various agricultural problems

Problems and solutions :- There are various problems and challenges which rural sector faces in India .Some of the main problems are discussed below.

- **Costly farm inputs :** The past few years have witnessed a sharp rise in the prices of farm inputs such as fertilizers, insecticides, pesticides, working instruments, farm labour etc. Due to this sharp rise in the cost of agriculture inputs the rural people are still in poverty.

Solution : Government should provide agriculture inputs on various subsidy basis. There should be quick and frequent delivery of these products.

- **Lack of storage facilities :** Rural areas lack adequate storage facilities. This leads to a great impact on market forces of demand and supply. Production in million tons spoils every year due to lack of storage facilities. As we known agriculture products are perishable goods based on short life span, so better storage facilities are essential for the benefit of rural farmers

Solution : Government should build various storage facilities in rural areas so that production will last very long. Due to storage facilities there will be no further damage of agriculture products. With storage facilities annual income of farmers will increase automatically due to safeguard of products which will further lead to rural development.

- **Lack of Agriculture marketing :** Rural farmers are often exploited by middle man and local traders due to lack of organized and regulatory markets .With the exploitation of farmers, large share of agricultural produce is taken away by middleman's and traders

Solution : Market is a network of products. It makes transactions between buyers and sellers. So in order to increase the agriculture production government should built strong structure of markets.

- **Lack of Irrigation facilities :** Irrigation is the life blood of agriculture. Majority of Indian farmers depend on monsoons due to lack of proper irrigation system. Due to lack of proper and timely irrigation facilities agricultural production remains low and this leads to poor rural development.

Solution: Govt. should build canals and as well as tube wells for rural farmers in order to increase the production and productivity per hectare.

- **Lack of finance :** Availability of finance is very essential for god farm produce. Due to lack of finance production productivity remains low. Without capital we cannot think of better rural agriculture development.

Solution : Govt. should provide loan facilities to every farmer. Kissan credit cards (KCC) facilities

should be provided to every rural farmer. Loans should be provided without interest rate or at low interest rates to the rural farmers.

Conclusion :- From the above discussion we come to conclusion that Indian agriculture has a great role to play in the rural development. More employment opportunities should be created in rural areas and agriculture inputs should be provided on various subsidy basis. More focus should be given to agriculture sector because India is an agriculture country and development of agriculture leads to the development of rural economy. In brief without the agriculture development we cannot think of better rural development.

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AGRICULTURE: ITS ROLE AND CONTRIBUTION TO INDIAN ECONOMY

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ABSTRACT :- Agriculture is the backbone of Indian economy. It bestows employment to 60% of Indian population. Agriculture development is the input to economic development of india.india is renowned as the land of villages where about 67% of population lives in villages. The main profession of the villagers is the agriculture and allied activities associated to agriculture. It provides livelihood to about 70%of population in India. It is the foundation of raw material to industries. The development of agriculture is important for economic growth, rural development and poverty alleviation in low income developing countries. This sector provides approximately 52 % of the total number of jobs available in India and contributes approximately around 18 % to the GDP. The agriculture Sector of India has occupied almost 43percent of India's geographical area. The increase in productivity of agriculture is an effective driver of economic growth and poverty reduction both within and outside agricultural sectors. In this paper secondary sources of data is used and the primary focus is given to the role of agriculture in Indian economy and the different problems faced by the Indian agriculture.

Key words :- Agriculture, GDP, Productivity

INTRODUCTION :- India is one of the fastest growing economies of the world and is currently the focus of a great deal of international attention. It is the seventh largest country in the world in terms of its geographical size. Today it has a population of nearly 1.1 billion which makes it the second most populous nation in the world. With current population growth by 2025 India may even have caught up with China according to the UN. India has a large and varied agriculture and is one of the world's chief producers. It is also a major consumer, with an expanding population to feed. The leading forecasting institutions expect that India will play a superior role in world markets in future. The agriculture sector employs nearly half of the workforce in the country. on the other hand, it makes a contribution of 17.5% to the GDP (at current prices in 2015-16). Over the past few decades, the manufacturing and services sectors have progressively more contributed to the growth of the economy, while the agriculture sector's contribution has diminished from more than 50% of GDP in the 1950s to 15.4% in 2015-16 (at constant prices). India's production of food grains has been increasing every year, and India is among the top producers of several crops such as wheat, rice, pulses, sugarcane and cotton. It is the highest producer of milk and second highest producer of fruits and vegetables. Although India occupies third rank in the production of rice, its yield is lower than Brazil, China and the United States. The same trend is experienced for pulses, where it is the second highest producer. Agricultural growth has been comparatively volatile over the past decade, ranging from 5.8% in 2005-06 to 0.4% in 2009-10 and 0.2% in 2014-15. Such a variance in agricultural growth has an impact on farm incomes as well as farmers' ability to take credit for investing in their land holdings. The Key issues affecting agricultural productivity include the decreasing sizes of agricultural land holdings, continued dependence on the monsoon, inadequate access to irrigation, imbalanced use of soil nutrients resulting in loss of fertility of soil, uneven access to modern technology in different parts of the country, lack of access to formal agricultural credit, limited procurement of food grains by government agencies, and failure to provide remunerative prices to farmers.

OBJECTIVES OF THE STUDY :-

1. To study the role and importance of Agricultural Sector in National Economy.
2. To study the problems faced by Indian agriculture.
3. To study the various initiatives taken by the government to improve the condition of Indian agriculture.

RESEARCH METHODOLOGY :- The data for this present study has been collected from secondary sources only.

A) **Secondary Data:-**The secondary data for this study has been collected from-

1) Leading Journals and Magazines
2) News Papers
3) Internet
4) Research Papers
5) Reference Books etc.

Scope of the study :-

1. The study is confined only to the Agricultural Development and Indian economy.
2. The present study is based on secondary data only

1. The role and importance of Agricultural Sector in National Economy :- Agriculture plays a decisive role in the entire life of a given economy. Agriculture is the vertebral column of the economic system of a given country. In addition to providing food and raw material, agriculture also provides employment opportunities to very large percentage of the population. Though industry has been playing an important role in Indian economy, still the contribution of agriculture in the development of Indian economy cannot be deprived of. This can be measured and gauged by the following facts and figures:

Source of living :- Agriculture is the main source of living foe many people in India. Approximately 70 % of the people directly rely on agriculture as a mean of living. This high percentage in agriculture is as a result of none development of non-agricultural activities to absorb the fast-growing population. However, most people in developed countries do not engage in agriculture.

Contribution to National income :- Agriculture is the main source of national income for most developing countries. However, for the developed countries, agriculture contributes a smaller per cent age to their national income.

Supply of Food as well as Fodder :- Agricultural sector provides fodder for domestic animals. Cow provides people with milk which is a form of protective food. Moreover, livestock also meets people's food requirements.

Significance to the worldwide Trade :- Agricultural products like sugar, tea, rice, spices, tobacco, coffee etc. constitute the major items of exports of countries that rely on agriculture. If there is smooth development practice of agriculture, imports are reduced while export increases considerably. This helps to reduce countries unfavorable balance of payments as well as saving foreign exchange. This amount may be well used to import other essential inputs, machinery, raw-material, and other infrastructure that is helpful for the support of country's economic development.

Marketable superfluous :- The growth of agricultural sector contributes to marketable surplus. Many people engage in manufacturing, mining as well as other non- agricultural sector as the nation develops. All these individuals rely on food production that they might meet from the nation's marketable surplus. As agricultural sector development takes place, production increases and this leads to expansion of marketable surplus. This may be exported to other nations.

Source of Raw Material :- The main source of raw materials to major industries such as cotton and jute fabric, sugar, tobacco, edible as well as non-edible oils is agriculture. Moreover, many other industries such as processing of fruits as well as vegetables and rice husking get their raw material mainly from agriculture. Agriculture supplies raw materials to various agro-based industries like sugar, jute, cotton textile and vanaspati industries. Food processing industries are similarly dependent on agriculture. Therefore the development of

these industries entirely is dependent on agriculture.

Significance in Transport :- Bulks of agricultural products are transported by railways and roadways from farm to factories. Mostly, internal trade is in agricultural products. Moreover, the revenue of the government, to a larger extent, relies on the success of agricultural sector.

Foreign Exchange Resources :- The nation's export trade depends largely on agricultural sector. For example, agricultural commodities such as jute, tobacco, spices, oilseeds, raw cotton, tea as well as coffee accounts for approximately 18 % of the entire value of exports of a country. This demonstrates that agriculture products also continue to be important source of earning a country foreign exchange.

Great Employment Opportunities :-: Construction of irrigation schemes, drainage system as well as other such activities in the agricultural sector is important as it provides larger employment opportunities. Agriculture sector provides more employment opportunities to the labor force that reduce the high rate of unemployment in developing countries caused by the fast growing population. In India at least two-thirds of the working populations earn their living through agricultural works. In India other sectors have failed generate much of employment opportunity the growing working populations**.**

Economic Development :- Since agriculture employs many people it contributes to economic development. As a result, the national income level as well as people's standard of living is improved. The fast rate of development in agriculture sector offers progressive outlook as well as increased motivation for development. Hence, it aids to create good atmosphere for overall economic development of a country. Therefore, economic development relies on the agricultural growth rate.

Source of Saving :- Development in agriculture may also increase savings. The rich farmers we see today started saving particularly after green revolution. This surplus quantity may be invested further in the agriculture sector to develop the sector.

Food Security :- A stable agricultural sector ensures a nation of food security. The main requirement of any country is food security. Food security prevents malnourishment that has traditionally been believed to be one of the major problems faced by the developing countries. Most countries rely on agricultural products as well as associated industries for their main source of income. Due to the excessive pressure of population labor surplus economies like India and rapid increase in the demand for food, food production increases at a fast rate. The existing levels of food consumption in these countries are very low and with a little increase in the capita income, the demand for food rise steeply (in other words it can be stated that the income elasticity of demand for food is very high in developing countries).Therefore, unless agriculture is able to continuously increase it marketed surplus of food grains, a crisis is like to emerge. Many developing countries are passing through this phase and in a bid to ma the increasing food requirements agriculture has been developed.

Contribution to capital formation :- There is general agreement on the necessity capital formation. Since agriculture happens be the largest industry in developing country like India, it can and must play an important role in pushing up the rate of capital formation. If it fails to do so, the whole process economic development will suffer a setback.

Contribution in government budget :- Right from the First Five Year Plan agriculture is considered as the prime revenue collecting sector for the both central and state budgets. However, the governments earn huge revenue from agriculture and its allied activities like cattle rearing, animal husbandry, poultry farming, fishing etc. Indian railway along with the state transport system also

earn handsome revenue as freight charges for agricultural products, both-semi finished and finished ones.

Need of labor force :- A large number of skilled and unskilled laborers' are required for the construction works and in other fields. This labor is supplied by Indian agriculture.

2. Various problems faced by Indian agriculture :- Indian agriculture is plagued by several problems; some of them are natural and some others are manmade. Some of the major problems have been discussed as follows.

Instability of monsoon affects crop output :- Indian agriculture is dependent on monsoon largely. As monsoon can be fluctuating, the production of crops also fluctuates. Thus, we see a year in which there is a good crop followed by one, which is followed by acute shortage of cereals. This leads to price as well as employment fluctuations.

Cropping pattern :- Indian crops can be categorized into two categories – food and non-food crops. Food crops comprise of sugarcane, food grains and beverages. Non-food crops include oilseeds and fibers. Agricultural production was seen to undergo structural change in the 90s when low production of non-food crops was noticed. One of the ways for addressing agricultural problems in India is to have a good crop rotation. When cereals are grown, it affects the fertility level of the soil. The solutions to agricultural issues like reduced soil fertility can be that pulses can be grown on the same plot after cereals have been grown and cultivated.

Ownership of land :- The land ownership of land in India is extremely varied. A major chunk of the land is owned by rich farmers, moneylenders and landlords. Many small farmers own just a small piece of land, which is not enough to sustain them. If they cannot make a profit in one year, then they have to borrow money at exorbitant rates of interest from moneylenders, and get caught in debt if they are not able to pay back the money. For centuries, small farmers have lost their land in this way. This is one of the problems of agriculture, in which the majority farmers do not own land or own a small plot. Another problem is that India's population growth and joint family system breakdown has led to further division of plots. Many of these plots are not farmed, and the bigger fields, which had been cultivated earlier, lie barren now. Majority small farmers are tenant farmers, who find it difficult to turn a profit after they have met all expenses and given the landlord his share.

Conditions of laborers :- The conditions of the laborers are pathetic. When understanding the importance of agriculture, the conditions of the laborers/small farmers have to be understood and helped, so that they can live a life, which is at least above the subsistence levels.

Poor quality of seeds :- While addressing agricultural problems, we have to consider the seed quality. The seeds' quality matters largely as the crop yield depends on the seeds. Seeds that are 'assured quality' are notoriously expensive and out of the reach of the majority of the farmers in India. This leads to the poor yield of crops, and poor famers find it hard to escape the cycle of debt. The government of India has set up many corporations to combat problems of agriculture, such as the seed quality. NSC, SFCI, SSCs were established to supply improved seeds to farmers. Despite the measures taken by the government, cereals/staples like rice, pulses and millets are grown chiefly from unimproved seeds.

Inadequate fertilizer and manure use :- Inadequate use of manure, which is readily available to farmers, is not used to the extent that they can be used. Vegetable waste, cow dung as well as chemical fertilizers are not used as much as they should be which leads to less agricultural production than Chinese or Japanese agriculture.

Improper irrigation :- Farmers suffer from the lack of proper irrigation facilities. The government has to help the construction of irrigation works, so that small farmers can benefit. According to

experts, there is still enough water in the country to irrigate whole areas of farmland, but the system of irrigation is poor. The crop is not adequately watered leading to less produce. On the other hand, over irrigation is one of the problems of agriculture. Irrigating canals have to be planned in such a way that the water reaches the entire area under cultivation without over watering the crops, or causing water level rise in the sub-soil.

Less use of machinery: While understanding the importance of agriculture, we have to consider the use of farm equipment. Many farmers still use just the plough and other indigenous farming tools, though modern farming machinery is quite readily available. The two reasons why farmers do not use this machinery is because they cannot afford to buy it. The second reason is that the plots of land are too small for the viable use of machinery.

Soil erosion :- The problems of agriculture that India faces today, is the deterioration of soil due to water and wind erosion. These large tracts of land have to be treated properly and restored.

Agricultural Marketing :- The major problems of agriculture are its marketing, especially by small farmers. The low income from farming is largely because farmers have to sell their produce at very cheap rates to the middlemen, thus making a very little profit. Due to the changes in land holdings, the plots have become very small, which leads to low productivity per acre. The surplus too is low, which means that farmers mange to eke out a living only for themselves. One of the solutions to agricultural issues is to improve communication between rural and urban areas, so that farmers can sell directly, without the need of the middlemen. There are many problems of agriculture – farmers are always in debt, and struggle to make a living. There is inadequate transport and communication between rural areas and the government has to step in with loans at low interest to save small farmers from the clutches of moneylenders. Better seeds have to be provided at low prices too, to help the farmers grow assuredly surplus crops.

Inadequate storage facilities :- Storage facilities in the rural areas are either totally absent or grossly inadequate. Under such conditions the farmers are compelled to sell their produce immediately after the harvest at the prevailing market prices which are bound to be low. Such distress sale deprives the farmers of their legitimate income. The Parse Committee estimated the post-harvest losses at 9.3 per cent of which nearly 6.6 per cent occurred due to poor storage conditions alone. Scientific storage is, therefore, very essential to avoid losses and to benefit the farmers and the consumers alike. At present there are number of agencies engaged in warehousing and storage activities. The Food Corporation of India (F.C.I.), the Central Warehousing Corporation (C.W.C.) and State Warehousing Corporation are among the principal agencies engaged in this task. These agencies help in building up buffer stock, which can be used in the hour of need. The Central Government is also implementing the scheme for establishment of national Grid of Rural Godowns since 1979-80.This scheme provides storage facilities to the farmers near their fields and in particular to the small and marginal farmers. The Working Group on additional storage facilities in rural areas has recommended a scheme of establishing a network of Rural Storage Centers to serve the economic interests of the farming community.

Inadequate transport :- One of the main handicaps with Indian agriculture is the lack of cheap and efficient means of transportation. Even at present there are lakhs of villages which are not well connected with main roads or with market centres.Most roads in the rural areas are Katcha (bullock- cart roads) and become useless in the rainy season. Under these circumstances the farmers cannot carry their produce to the main market and are forced to sell it in the local market at low price. Linking each village by metalled road is a gigantic task and it needs huge sums of money to complete this task.

3. The various initiatives taken by the government to improve the condition of Indian agriculture :- The state and central governments

of our country should take necessary steps to improve agriculture in India. It is essential to increase the production of food grains and other cash crops. To achieve this aim, a programme was devised through the Five Year Plans**.** It included the following:

i. To develop various means of irrigation, so that more land could be brought under agriculture.
ii. To increase the availability of chemical fertilizers at subsidized rates, either through production or through imports.
iii. To develop and produce new hybrid varieties of seeds, which will help in increasing the yield of various crops.
iv. The government would fix a minimum purchase price for various crops every year.
v. To provide adequate and timely loans to farmers, on easy terms, to buy farm machinery and other agricultural items.
vi. To help protect standing crops from pests, diseases and natural hazards, such as floods, droughts and cyclones.
vii. To educate and help farmers through specially developed programmes on radio and television.
viii. To set up demonstration farms, so that the farmers can learn and adopt new, suitable and latest farming techniques.
ix. The government should provide adequate diesel, electricity and water at highly subsidized rates.
x. Encourage the farmers to adopt mixed farming and work in cottage industries in their free time.
xi. This has resulted in increasing the agricultural production in many parts of India. A new package of agricultural practices was introduced in 1967. This package in India is known as the Green Revolution. It was initially introduced to the Indian scientists by Dr Norman Earnest Borlaug in 1963. The yield of dwarf and semi-dwarf varieties of wheat was about four times the yield from local varieties.
xii. Green Revolution is a phrase, generally used to describe the spectacular increase in the production of food grains, especially wheat in India. As a result of this, our country not only became self-sufficient in food production, but also exported some food grains for the first time in 1977. It has the following components:

Large-scale use of high-yielding varieties of seeds, Development of irrigation facilities, Large-scale use of chemical fertilizers, Widespread use of insecticides and pesticides, Consolidation of fragmented land holdings, Land reforms to save the small farmers from exploitation, Supply of agricultural credit to buy inputs, Rural electrification to supply cheap power, Farm mechanization with the help of government, Building roads to link the villages with commercial centers, Coordination between agricultural universities and farmers and The Command Area Development with irrigation projects. It should be understood that most of the components are closely inter-related and are dependent upon one another. The speedy maturing varieties help farmers to grow more than one crop in a year and that too on the same piece of land.

Unhappily, Green Revolution left its blow only in Punjab, Haryana and western Uttar Pradesh in respect of wheat production and Andhra Pradesh and Tamil Nadu in case of rice production. There seems to be no valid reason why other states in India cannot accept and get benefited from the Green Revolution. There are number of scheme launched by government of India like Krishi Kalyan Cess, Paramparagat Krishi Vikas Yojana (PKVY), Pradhan mantri krishi sinchai yojana (PMKSY), soil health card, Krishi dak, Pradhan mantri Faisal bima yojana etc.

- To begin with government took lead in providing various facilities on its own. In course of time different types of activities were entrusted to specific public agencies.
- Another significant input was the extensive use of radio and television for acquainting farmers The crop insurance was another step to guard the farmers against losses caused by crop failure on account of natural calamities

like drought, flood, hailstorm, cyclone, fire, diseases etc.

- Easy availability of capital or investment input through a well-knit network of rural banking and small scale cooperative societies with low interest rates were other facilities provided to the farmers for modernization of agriculture.
- Special weather announcements for farmers were introduced on radio and television. The government announced minimum support price for various crops removing the elements of uncertainty. It ensures minimum price for the crop grown by the farmers.
- The government abolished the zamindari system. It was followed with the consolidation of small holdings to make them economically viable.

CONCLUSION :- The majority of the Indians are directly or indirectly depending on the agriculture. Some are directly attached with the farming and some other people are involved in doing business with these goods. India has the ability to produce the food grains which can make vast difference in Indian Economy. To attain targeted mark by the government it needs to provide support in case of land, bank loans and other machineries to the small farmers along with the big farmers with this we can expect some improvement in Indian economy, even though its share of the economy has decreased over the past 50 years. India has made noteworthy advances in agricultural production in recent decades, including the introduction of high-yield seed varieties, increasenment use of fertilizers and improved water management systems. Reforms to land distribution, water management and food distribution systems will further enhance productivity and help India to meet its growing demand for food.

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Migration and urbanization, opportunities and challenges -Madhya Pradesh

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Urbanization has become a universally observable fact. It is a dynamic process by which a rural society changes in urban Civilization. The Urban population in India grows faster and main reason behind this is immigration, because growth of cities always affects by migration.

The present paper is an attempt to examine the trend of urbanization and migration in Madhya Pradesh, reason of migration stream of migration and challenges of the urbanization. The analysis reveals that rapid growth of population in urban area is resulting of uncontrolled migration. This Rapid unplanned and uncontrolled population growth is the origin of various problems in urban area.

Key words :- Migration, urbanization and challenges

Introduction :- Urbanization plays an important role in economic development and social transformation. Urbanization is a process that leads to growth a city due of industrialization. It transforms a society from rural to Urban. India is the second most populated country in the world .According to 2011 Census about 377 millions population out of 1210.2 million lives in urban area. It means 31.16% population of total population is urban population. India has 7935 cities and towns in 2011 but 70% of urban population lives in 468 class 1 cities or UAs.

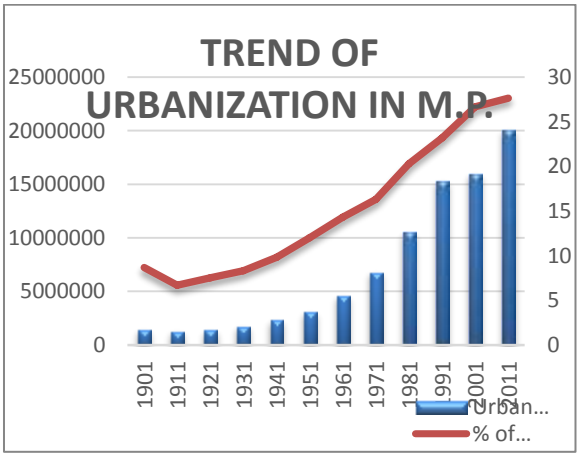
Objectives :-

1. To analyse the trend of urbanization in Madhya Pradesh.
2. To analyse the trend of migration in India and Madhya Pradesh.
3. To find out role of migration in the urbanization.

Database and methodology :- This study is mainly based on census data. For the discussion of study simple techniques have been used. Bar diagram and line graph has been used for showing the trend of urbanization.

Madhya Pradesh is a large and growing state. About 200 million populations, means 27.63% population of total population live in urban area. A significant proportion of this living in mainly class 1 city i.g.Bhopal, Indore, Jabalpur, Gwalior, and Ujjain. The growth of urban population accelerated in Madhya Pradesh since independence. The growth rate of Madhya Pradesh in urban areas has been always above the national average during the last five censuses.

The figure of any population change with the time. There are three components of population changes- fertility, mortality and migration. But in Urban population migration play an important role. Because of this Urban population grows much faster than the rural population. In 2001, about 2,305,999 population counted as migrant in Madhya Pradesh, about 3.8% of total population and 4.8% share of total migrants.



Source: census of India 1901-2011.

Trend Of migration -Madhya Pradesh & India

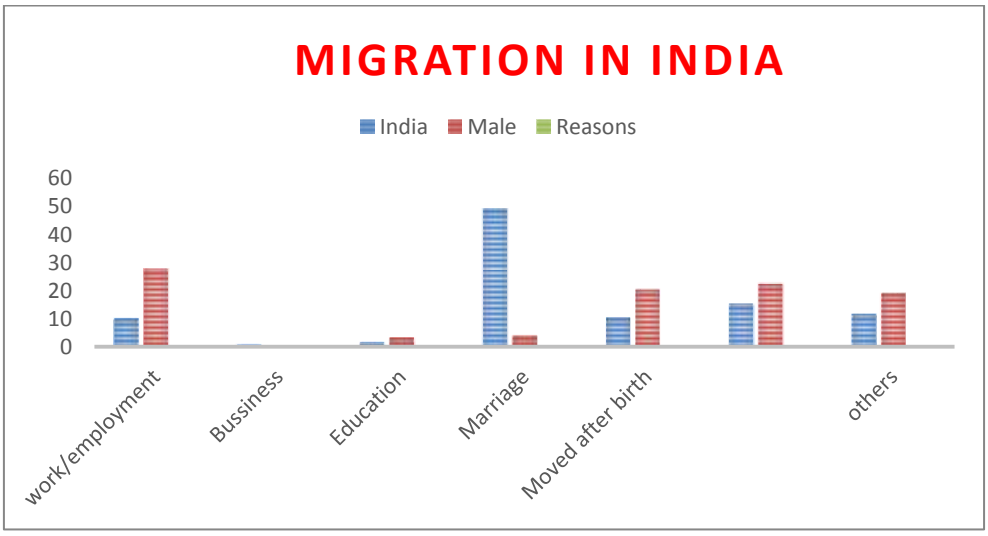
Census Years	India (Migrants in millions)	M.P. (Migrantsin millons)
1991	229.8	38.3
2001	307.1	23.5
2011	N.A	N.A.

N.A-Not Available

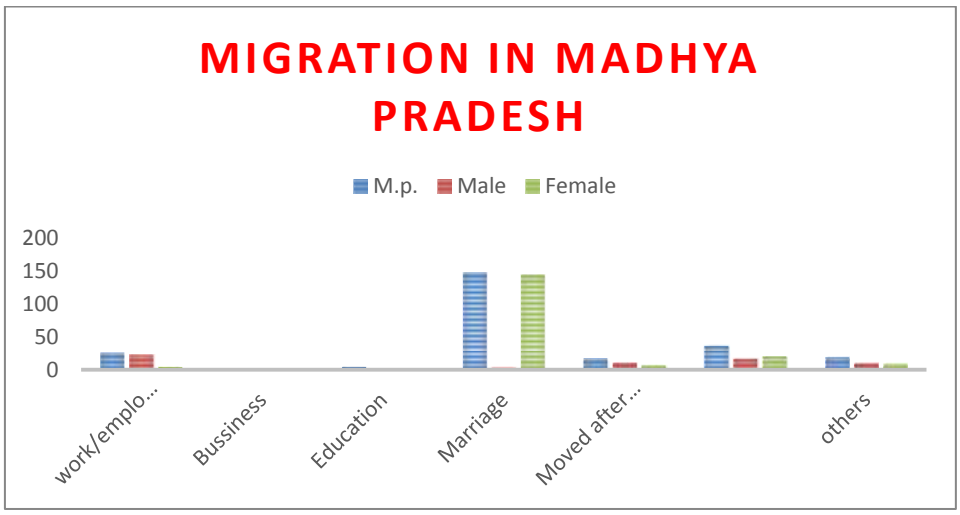
Source: census of India 1991-2011.

There was a declined in migrant population of Madhya Pradesh in 2001 because of Chhattisgarh separated from Madhya Pradesh as a new state in 2000.

Reasons for migration :- As mentioned previously, urban population grows faster due to rural to urban migration. Our census includes various reason of migration. From all those reasons employment -related migration has dominated to males and marriage- migration to females.



Source: census of India 2001.

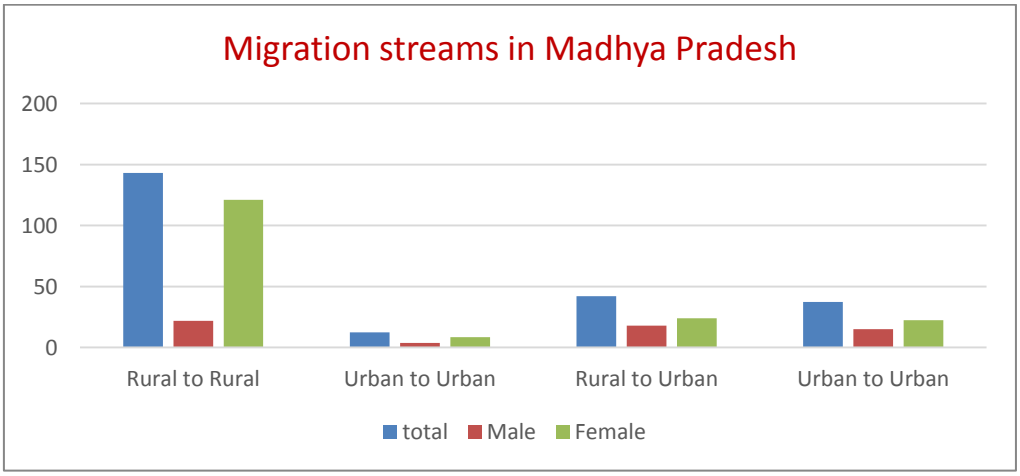


Source: census of India 2001.

Above diagrams indicates that the share of those who search for better employment as a reason for migration has been high. The numbers of female population migrant are high and reason for this migration is mainly marriage. So migration in Madhya Pradesh is totally dominate to marriage or employment

Migration Stream :- The distribution of migrant by migration Stream is help to understand the degree of economic and social development, population pressure on land, increase opportunities for work and education etc.

In India rural to rural migration with in the country is 53.3 million population and Employment is the basic for rural to Urban migration Stream in our country.



Source: census of India 2011

In above diagram we are found that in Madhya Pradesh migrant's number are high in the rural to rural stream and female migrants share a large number of this stream. As mentioned previously that the migration from one rural to another the main cause of this migration stream is marriage, because of this, this stream is dominant to women.

Madhya Pradesh is a state in which large numbers of villages are present so rural to rural migration is very high. But it is also true that migration from rural to Urban however male share is less than female share but Migration of male is mainly based on employment as shown in above table.

Opportunities of migration :-

Labour demand and supply - cities have come to be considered as engines of economic growth. Migrants are help in growth and capital accumulation by providing cheap labour.

Skill development - It enhance knowledge and skill of migrant through explore and interaction with the outside world and changing lifestyle.

Culture and trend - Migrants transformed one area's Trend and cultural activities to another place and it helps to make a culture rich.

Positive effects on Economy - migration is not only help in economic growth of immigration area but another stream of migration effects the out migration area economy also.

Negative effects and Challenges of migration :- However migration rural to Urban is good and positive for an urban area economy but there are many challenges for migrant and it cause of various problems in urban area.

Brain drain – The educated, professional and working population moves to another place for better opportunities.

Slum Problem – This problem increases due to improper and uncontrolled migration in the urban area. In Madhya Pradesh 142 Slums towns are reported which increased 303 in 2011.

Population below poverty line – Population below poverty line proportion continuously increases due to unlimited migration and lack of proper policies.

Utility and facilities – These facilities are developed according to natural growth but due to migration population is overloaded and resulting lack of basic facilities.

Sex ratio :- migration is deteriorations sex ratio not only a place of immigration but in outmigration areas also.

Crime : Crime rate increase in urban area because of unemployment and poverty. Uncontrolled and unplanned population growth is main reason for this and migration is also a one factor for unplanned population growth.

Lack of space : migration from rural and nearby area is the main cause for urban sprawl and rapid growth of urban population. This growth is resulting lake of space in urban areas.

Thus migration is multidimensional phenomenon, which can be having various positive effect and negative effects. It expand the opportunities for productive work, positive effect on Economy, it leads to many social issues. But on the other hand it can have negative aspects also. Dominantly in the nature of work, work conditions and possibilities for abuse of migrant workers by employer and others. These positive and negative effects are change the urban areas socio-economic condition. Both pull factors and push factors have operated together to flow the people from rural area to urban areas. As a result of this the population in urban areas has increased pressure on urban facilities and resulting various problems in urban areas. Some affective law and policies should be apply for uncontrolled growth of urban population and ensure access of all migrants basic right and facilities.

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Analysis of Stress of Workers in Spinning Mills With Special Reference to Kolhapur District

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ABSTRACT :- Stress exists with the existence of humans. Stress can be relieved, reduced, curbed and managed temporarily but it is very difficult to eliminate it all together permanently from a person's work and personal life both. Stress is all about how an individual reacts when he assumes that pressure of demands on him is more than his ability to meet those demands. Work life of individuals is strenuous and personal lives demands acts as add-ons to the work pressure. Considering this, the present study aims at identifying the stressor of workers of spinning mills and the techniques they adopt to overcome these stressors. Knowing that textile industry is one of the oldest and largest industries in India and spinning is a primary part of this industry; it is taken as the area of study. Data was collected from 106 spinning mill workers of Kolhapur district by using questionnaire method. Tools used to analyse the data were: percentage analysis and Chi-square method. It was found that the level of stress among the workers of the organisation is affected by the age, gender, experience of the workers. It is also affected by the number of hours workers sleep per day. One of the major recommendations to the organisation was to conduct seminars for the workers on stress management and health management programs.

INTRODUCTION :- In the present times, where every person is a participant in the mad race for sumptuousness and accomplishment and where everyone sees each other as an opponent, work is the only area where an individual looks for meaningfulness. Competition in the workplace which frequently promotes self interest can result in diminished feelings of well being and trust. Intense competition reinforced by globalization has resulted into less sheltered employment opportunities exemplified by the ever increasing number of mergers, acquisitions, outsourcing, downsizing initiatives. Not only individuals, but organizations as artificial human beings are also under pressure to outperform their competitors and attain competitive advantage. Globalization and subsequent quest on the part of the organizations to cut costs to remain profitable has increased the cases of restructuring and downsizing.

Sparks et al. (1997) found that the trend for restructuring and downsizing in many organizations has led to an increase in perceived job insecurity, particularly for white collar workers. The growth in non- permanent employment contracts in many countries also led to increased job insecurity. The perceived job insecurity was more prominent amongst the youngest and oldest members of the workforce. White collar workers, who reported high job insecurity, have been found to be less supportive of organizational goals, giving less effort to produce quality work and more actively seeking alternative employment. Due to increasing workloads, job insecurity, and pressures to perform, many individuals are found to be working longer hours. Work overload, resulting in longer hours of work, is linked with stress, indefinite complaints and fatigue. Aside from symptoms of ill-health, long working hours are associated with poor lifestyle habits such as heavy smoking, inadequate diet, lack of exercise, etc. Sharma and Sharma (2008) also opined that the main causes of stress were psychologically

demanding work, stressful relationships and excessive working hours.

SPINNING MILLS, KOLHAPUR :- Kolhapur district has four co-operative textile industries estates and these have played an important role in providing infrastructure facilities such as land, water, transportation, communication etc. The district has also been selected for funding under integrated industrial up gradation scheme funded by the GoI and GoM. In all, there are about 19 working spinning mills.

This study based on the sample of spinning sector workers employed in Kolhapur district. There is several works and non-work related stresses are responsible for the poor work performance of the employees. The employees working in textile sectors are facing stiff occupational stress rather than any other industries. Also they are all facing respiratory diseases, skin allergies etc. Stress directly affects the work performance of the company. High absenteeism, conflict and dispute with co-workers, showing disrespect on the superior and management, whistle blowing about the company, showing non-interest to safeguard the assets of the company are the indications to stress of employees and this will cause for poor work performance. In addition to that personal complaints with pay related issues and promotion related issues might lead for stress among the employees. The employees are sometimes get disturbed by external factors. These external factors are causing illness, revenue fall, legal and prestige issues, difficult to balance work and life, impossibility to fulfill family needs and requirements are the different facets of external stress. Hence, this present study is an attempt to study managing stress at work place of spinning unit workers.

LIMITATION OF THE STUDY :- Workers were engaged in 3 shifts of eight hours. After every fortnight their shift gets changed. During working hours, workers were fully engaged in working on machines so it was not possible to collect data at that point of time and once the shift gets over, they do not like to wait and interact. So the only time when the data was collected was before the shift gets started. It is the usual practice of the workers of the mills to come twenty minutes before the shift starts.

It was also experienced that the workers were not at ease while responding or they were not responding freely. Moreover they were only comfortable with local language Marathi. To serve the purpose questionnaire was translated in Marathi and then their responses were noted.

SCOPE OF THE STUDY :- The scope of the study was confined to the workers of spinning Mills, Kolhapur only.

RESEARCH DESIGH :- The study involves fact-finding enquires related to workers stress of spinning mills, Kolhapur District. The aim of the study is to find stress present and the ways it is being dealt. The study also highlights effect of stress on physiological, psychological and behavioural aspects of individuals. Considering these, it can be said that the research falls under descriptive research method. This study focuses on managing stress of workers at Spinning Mills of Kolhapur District.

OBJECTIVES OF THE STUDY :- Objectives give direction to the study. The study is about stress of the workers at workplace and the means to manage it. This study is based on the following objectives:

1. To measure the level of stress of the workers of the organisation.
2. To identify physiological, psychological and behavioural symptoms of the stress on workers.
3. To recognize various techniques used by the workers to overcome stress.
4. To find out relationship between demographic factors and level of stress of the workers.
5. To give suggestions there on.

SAMPLING AND DATA COLLECTION :- This study is confined to the workers of Spinning Mills,

Kolhapur district. In this study, responses collected from 106 workers by adopting random probability sampling technique. The study is mainly based on primary data. Questionnaire was the main tool for collecting the data. The questionnaire was designed in a systematic way of covering adequate and relevant almost all aspects of the study. The questionnaire has been divided into three sections. First section is of personal information. Second section includes type of problem affecting the workers most and stress related symptoms. Lastly, third section is of the techniques adopted by them to overcome stress. Secondary data required for the study was collected from books, journals, past research and various websites.

TOOLS FOR ANALYSIS :- The following tools were employed to analyse the data with reference to the selected objectives of the study.

- Percentage analysis: percentage analysis method is used for classification of demographic data of the workers.
- Chi- square method: This method is used to test analyse the demographic data, physiological, psychological and behavioural symptoms of stress of the workers.

HYPOTHESES OF THE STUDY :- Hypothesis designed with the questions in first section to get personal information from the employees and these variables are tested in accordance with level of stress experienced by the workers.

I. There is no significant relationship in number of hours a worker sleeps per day and the level of stress.
II. There is no difference in physiological symptoms of the workers.
III. There is no difference in psychological symptoms of the workers.
IV. There is no difference in behavioural symptoms of the workers.

ANALYSIS AND INTERPRETATION

Percentage analysis and interpretation

Table 1: Demographic data of the respondents

Variables	Classification	No. Of workers
Gender	Male	100
	Female	06
Age	less than 25 years	18
	26 to 35 years	29
	36 to 45 years	25
	46 to 55 years	15
	56 years and above	19
Experience	0- 5 years	26
	5- 10 years	16
	10- 15 years	30
	15- 20 years	14
	20- 25 years	08
	25 years and above	12
Income	Below Rs. 4 thousands	22
	Rs. 4 to 8 thousands	38
	Rs. 8 to 12 thousands	28
	Rs. 12 thousands and above	12
Type of worker	Permanent	64
	Temporary	42

Source: Primary Date

Table 1 shows the classification of all the respondents (workers) of the spinning mills. The classification of the workers is done on the basis of gender, age, experience, income and type of worker. Following interpretation can be made from the above table:

- There were 100 male workers whereas female respondents were 6 in number.
- Age of the workers is classified in five groups. Maximum respondents belong to the age group of 26-35 years i.e. 29 respondents. Followed by 25 respondents in 36- 45 age group and 19 respondents from 56 years and above. Thereafter, less than 25 years and less age group includes 18 workers and 46 - 55 age groups includes 15 respondents.
- Experience of the workers is classified into six categories.
  - 26 workers have upto five years of experience,
  - 16 workers possess 5 to 10 years of experience,
  - 30 workers are belongs to 10- 15 years category,
  - 14 workers have 15- 20 years of experience
  - 8 and 12 workers belongs to the category of 20- 25 years and 25 years and above respectively.
- Income is classified as below Rs. 4000 which includes 22 percent of respondents, 4000-8000 includes 38 percent of respondents, 8000-12000 includes 28 percent of respondents and 12000 and above comprises of 12 percent of respondents.
- Maximum workers from the sample are permanent in the organisation i.e. 64 workers whereas 42 workers are temporary in the organisation.

Chi- Square analysis and interpretation

Table 2: Relationship between number of sleeping hours (in a day) and level of stress

Level of Stress

Sleep (in hours)/	High	Medium	Low	Total
8 to 10	0	5	4	9
7 to 8	3	6	12	21
6 to 7	10	8	12	30
Less than 6	13	13	20	46
Total	26	32	48	106

Source: Primary Date

Chi- square Test

Calculated value	Degree of freedom	Table value	Result
33.79	6	12.592	Reject

Source: Primary Date

Interpretation :- The calculated value of chi-square (33.79) at 5% level of significance and 6 degree of freedom is higher than the table value (12.592). Hence hypothesis I is rejected. So it is interpreted that there is significant relationship in number of hours a worker sleeps and level of stress.

Analysis and interpretation of stress symptoms :- In the present study stress refers to three effects of stress namely physiological, psychological and behavioural stress. All the three effects of stress will be measured on a three point nominal scale to show their stress symptoms.

- ✓ **Physiological stressors :-** It refers to the impact that stress has on physical health of a person. The problems due to high effects of stress are exhibited physically by the individual such as fatigue, headache, backache, increased blood pressure and stomach ache.
- ✓ **Psychological stressors :-** It is the impact of stress on mental health of a person. Psychological problems resulting from stress are important in day to day job performance. Stress which displays psychological symptoms such as worrying, depression and frustration are included in the study.
- ✓ **Behavioural stressors :-** The stress- effects which may influence the behaviour of a person directly are considered here. Behavioural related stress symptoms in workers included crying, forgetfulness.

Table 3: Physiological symptoms in the workers

Physiological symptoms	Never	Sometimes	Always	Total
Headache	27	53	26	106
Stomach ache	68	38	0	106
Back ache	45	32	29	106
Total	140	123	55	318

Source: Primary Date

Chi- square Test

Calculated value	Degree of freedom	Table value	Result
51.55	4	9.488	Reject

Source: Primary Date

Interpretation :- The calculated value of chi-square at 5% level of significance is higher than the table value. Hence hypothesis II is rejected. So, it is interpreted that there is significant difference in physiological symptoms of the workers.

Table 4: Psychological symptoms of the workers

Psychological symptoms	Never	Sometimes	Always	Total
Forgetfulness	84	13	9	106
Anger	15	52	39	106
Gossip	4	39	63	106
Total	103	104	111	318

Source: Primary Date

Chi- square Test

Calculated value	Degree of freedom	Table value	Result
171.85	4	9.488	Reject

Source: Primary Date

Interpretation :- The calculated value of chi-square at 5% level of significance is higher than the table value. Hence hypothesis III is rejected. So, it is interpreted that there is significant difference in psychological symptoms of the workers.

Table 8: Behavioural symptoms of the workers

Behavioural symptoms	Never	Sometimes	Always	Total
Depression	57	38	11	106
Frustration	41	42	23	106
Loneliness	66	32	8	106
Total	164	112	42	318

Source: Primary Date

Chi- square Test

Calculated value	Degree of freedom	Table value	Result
93.84	4	9.488	Reject

Source: Primary Date

Interpretation :- The calculated value of chi-square at 5% level of significance is higher than the table value. Hence hypothesis IV is rejected. So, it is interpreted that there is significant difference in behavioural symptoms of the workers.

FINDINGS :-

1. Population of the study area includes 94 percent of the male workers and 6 percent female workers. Sampling is done in the same proportion of of population i.e. 94 : 6. From the population 20 percent of the workers were selected as a sample. Here it is seen that the female workers are very less in the organisation.
2. It is found that the majority of the workers belong to the middle age group.
3. During interview and while getting questionnaire filled it was found that most of the workers are also engaged in farming activity.
4. From the study it was found that majority of the respondents are having experience of 10 to 15 years.
5. It was found that the level of stress among the workers of the organisation is affected by the age, gender, experience of the workers. It is also affected by the number of hours workers sleep per day. But level of stress remains unaffected by income of the workers.
6. The study highlights that either watching television or listening radio is mostly used technique for relieving their stress. All of the workers are entertaining themselves by these media.

SUGGESTIONS :-

1. The number of female workers should be increased in the organisation.
2. Various facilities are provided to the workers of the organisation. Like easy credit from trust, canteen, medical check and many more. Management of the organisation can also start some co- curricular activities for the workers. Workers can be taken on some trips.
3. It is been suggested that the organisation can conduct seminars for the workers on stress management.
4. It is been observed that the working environment of the organisation is quite healthy in terms of relationship among the workers and the same should be maintained in the less experienced workers or the youth of the organisation.
5. At worker level the major symptoms causing stress found were physiological in nature. They are more engaged in physical activities than mental work. So management can also conduct some health management programs. Workers should

engage themselves in the activities like yoga and physical exercises on regular basis.

CONCLUSION :- It is generally observed that human beings are living their lives filled with fear of uncountable incidences until that thought itself becomes more damaging to the mind and nervous system than if the imaginary event had actually happened. This necessitates and creates a mandatory function on the part of employers to recognize optimally acceptable strategies and implement the same for prevention of stress for preventing employees' agony. De-stressing is a positive action which assists in better well-being of human resource and organization stay on heights and this is mandatorily required in the Indian Textile Industry because human resource is abundantly available in India and textiles is one of the biggest employers.

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Sustainable development in agricultural sector in India

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Abstract :- Being the largest private sector 'agriculture' enjoys a very important position in Indian economy. As it is having link from various sectors like production, processing and marketing; agriculture continuously dominate to change in the India. The paper aims to study the significance of the sustainable development in the field of agriculture by using the secondary data. Agriculture is the main occupation in India as large population is living in the rural areas and having agriculture as their livelihood. Sustainable development in the agriculture sector aims to increase the productivity, efficiency and level of employment and further aims to protect and preserve the natural resources by the over utilization.

Key Words :- Ecological Sustainability, Biodiversity, Economic Sustainability, Social Sustainability.

Introduction :- Being the largest private sector 'agriculture' enjoys a very important position in Indian economy. As it is having link from various sectors like production, processing and marketing; agriculture continuously dominate to change in the India. The role of agriculture in developing an economy can be analyzed by the GDP (Gross Domestic Product) contribution made by it. The agriculture sector also contributes to the sustainable development of a country. Sustainable agricultural development depends upon the availability of the natural resources of the country. India is a country where about two third of the population lives in the rural areas and having agriculture as their livelihood.

The issue related to agriculture can be studied through three basic categories. As follows

- Traditional production system
- Modern agricultural system
- Sustainable agricultural system

Naturally much work is needed to grow the agriculture to a level where it is least affected by vagaries of monsoon and needs little from outside the farm, i.e., lesser dependence on chemical fertilizers and waste.

Objectives of the Study :-

- To analyze the extent of sustainable development in the agricultural sector in India.
- To evaluate the performance of agricultural sector as a part of GDP (Gross Domestic Product) in India.

Method of data Collection :- The data used to study the impact of globalization on employment is based on the secondary data purely. The journals, article, web links, books have been used as source of information. There is no empirical touch to this paper.

Sustainable Agriculture Development :- The issue of sustainable development can be studied under three broad areas farming system which consist- traditional production system, modern agriculture system and sustainable agriculture system. Further we can compare them by three dimensions, ecological, economic and social sustainability.

Social Sustainability :- The sustainable development aims at increasing the productivity as well as increasing the level of employment in the country. Development is meaningless if it is not able to reduce the level of poverty. Social sustainability deal with social acceptability and justice. Many modern technologies are failed because of their limitation like complexities in use

and are not easily accessible to poor farmers. In old method of agriculture the women's had more burden of work.

Conclusion :- It has been observed that for a growing country like India the practice of sustainable agriculture is of quite importance as it accelerates the productivity, efficiency, employment, and providing guidance to reduce the practices which affect the quality of soil, water resources and degradation of other natural resources. It basically aims at adopting specialization and using environment friendly tools to protect and preserve the environment as well as to enhance the level of production without harming to the environment

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Agriculture and Rural Development

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"Agricultural is a science, art, or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting products."

Abstract :- Rural development became a planning concern as it became clear that the strategies adopted in developing countries remained largely ineffective in alleviating poverty and inequalities in rural areas. It became increasingly clear that apart from an effort to increase agricultural and industrial production, it was also necessary to address directly the problems of education, health services and employment and to attack the problem of poverty in rural areas. The increasing interest in rural development is a result of the realization that a systematic effort is necessary to create better living conditions in the rural areas where the vast majority of population of developing countries reside. The notion of rural development has been conceived in diverse ways by researchers, ranging from thinking of it as a set of goals and programmes to a well knit strategy, approach or even an ideology .There is a widely shared view that its essence should be poverty alleviation and distributive justice oriented economic transformation. The main aim of this paper is highlights the basic issues of agricultural labour. Once the economic conditions of rural people increases, the living standard also increases.

Introduction :- Agriculture usually refers to human activities, although it is also observed in certain species of ant, termite and ambrosia beetle. Agriculture is defined with varying scopes, in its broadest sense using natural resources to "produce commodities which maintain life, including food, fiber, forest products, horticultural crops, and their related services".Thus defined, it includes arable farming, horticulture, animal husbandry, and forestry, but horticulture and forestry are in practice often excluded. The development of agriculture enabled the human population to grow many times larger than could be sustained by hunting and gathering. Agriculture began independently in different parts of the globe, and included a diverse range of taxa. Agriculture was transformed with improved techniques and the diffusion of crop plants, including the introduction of sugar, rice, cotton and fruit trees such as the orange to Europe by way of Al-Andalus. After 1492, the Columbian exchange brought New World crops such as maize, potatoes,tomatoes, sweet potatoes and manioc to Europe, and Old World crops such as wheat, barley, rice and turnips, and livestock including horses, cattle, sheep and goats to the Americas. Irrigation, croprotation,and fertilizers were greatly developed in the past 200 years, starting with the British Agricultural Revolution, allowing global population to rise significantly. Since 1900, agriculture in the developed nations, and to a lesser extent in the developing world, has seen large rises in productivity as human labour has been replaced by mechanization, and assisted by synthetic fertilizers, pesticides, and selective breeding. The Haber-Bosch method allowed the synthesis of ammonium nitrate fertilizer on an industrial scale, greatly increasing crop yields and sustaining a further increase in global population. Modern agriculture has raised political issues including water pollution, biofuels, genetically modified

organisms, tariffs and farm subsidies, leading to alternative approaches such as the organic movement.

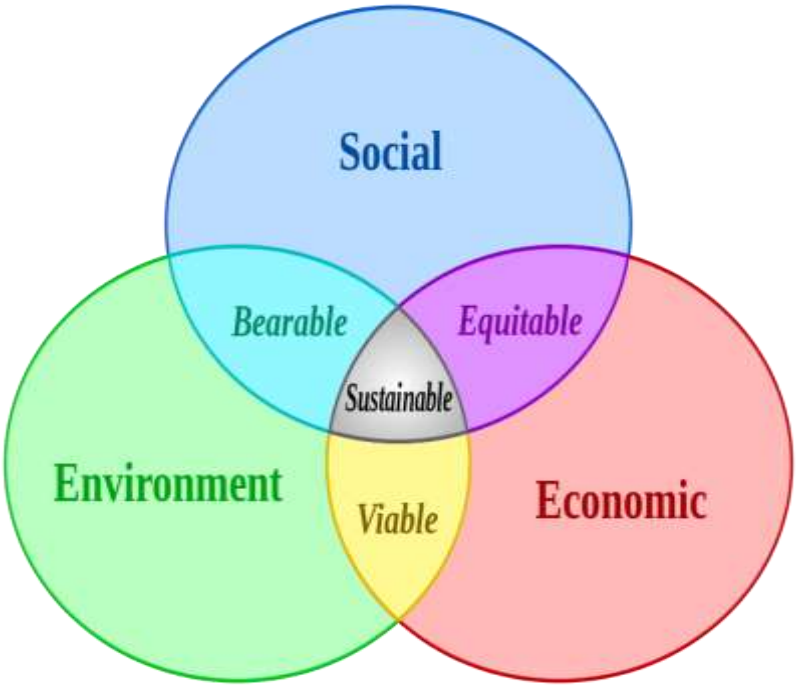
The following are the primary objectives of rural development:

A) To improve the living standards by providing food, shelter, clothing, employment & education.

b) To increase productivity in rural areas and reduce poverty.

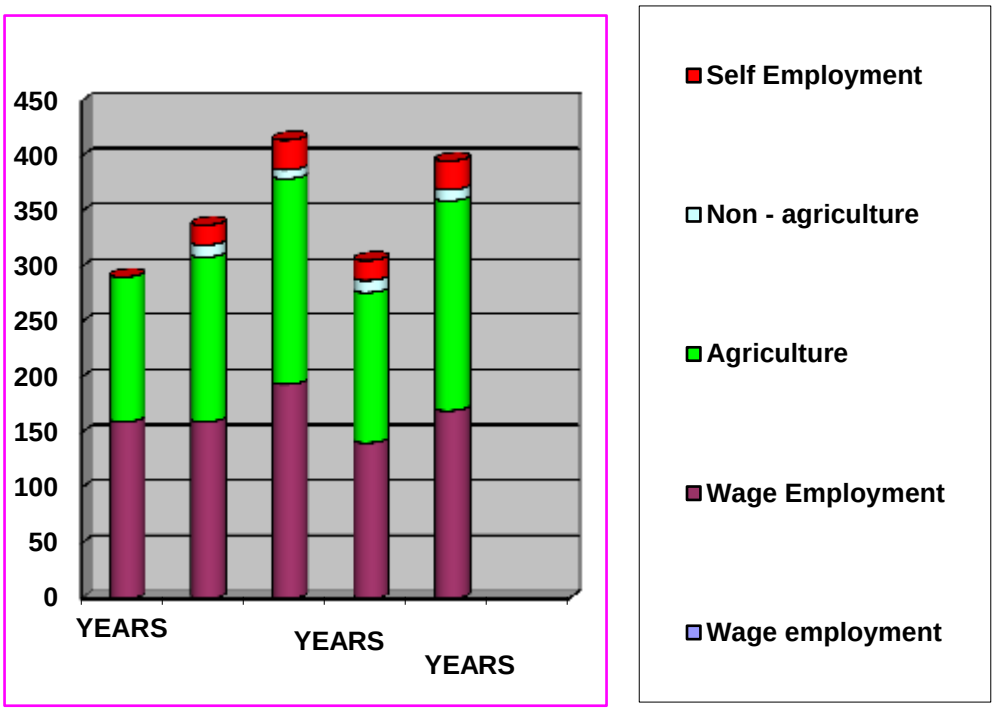
c) To involve people in planning and development through their participation in decision making and through decentralization of administration.

d) To ensure distributive justice and equalization of opportunities in the society.



Natural resource economics deals with the supply**,** demand**, and** allocation **of the** Earth**'s** natural resources **:-** Rural development has been one of the important objective of planning in India since independence. Intervention of the government in rural development is considered necessary in view of the fact that a sizeable population continues to reside in rural areas despite growing urbanization .It is also required, as the market forces are not always able to improve the welfare of the rural masses because of certain structural rigidities and institutional deficiencies existing in these areas. As a result, there is a danger of large sections of the rural population to remain outside the ambit of market driven growth processes. To enable the poorer sections of the rural population to participate more effectively in the economic activities has, therefore, remained the prime objective of Indian planning and the basic underlying theme of rural development programme. Rural development is utilization, protection and enhancement of the natural, physical and human resources needed to make long term improvements in rural living conditions. It involves provision of jobs and income opportunities while maintaining and protecting the environment of rural areas.

ISSUES AND CHALLENGES :- Agricultural growth remains a key pillar for economic development in developing agriculture-based economies, however difficulties remained to integrate rural development, food value chains, technological and institutional innovations, environmental constraints that have changed in the context of agriculture's role. The renewed attention on 'new agriculture for development' framework started to emerge to achieve several dimensions of development.



The above diagram shows that employment of per agricultural labourer shows decreasing trends. The various enquire also collected information on the income received by the household, from sources other than wage labour. Though this information is not available separately by sex, the average annual households, income of labour households (both money and real). The source would provide some insight in to the adjustments made within a labour households to take care of variations in the employment availability and incomes from year to year. The question of in this context is how to improve the agriculture of India . once the agricultural of india improves to compete daily basic needs of people the economic conditions improves .

New agricultural indicators and its determinants that examines :-

(1) The impact of agriculture and other sectors to enhance agriculture efficiency. (2) moving beyond farm income by assessing off-farm labour participation and supply allocation decisions in the agricultural households. To achieve desired dimensions of development beyond those driven by market competiveness.

(3) the role of remittances in the agricultural production estimations provide a new direction

and finding to increase income and identify the causes of success for scaling up agricultural output.

(4) Reducing poverty and inequality in agricultural households. In addition to contributing to the broader debates about agriculture-economic development nexus, the findings are also the first on applying new agriculture for development framework.

Results demonstrate that there exist sectoral linkages and to increase economic diversification developing forward linkages through innovations are crucial and advantageous for growth. Findings of double-hurdle factors indicate the push and pull factors that influence household heads' decision to participate and allocate time in off-farm income-generating activities. This implies that demand for labour, even for low-wage workers will not increase without a dynamic rural economy. The failure of low-wage and subsistence living depends on availability of land tenure and investment in agro-based industry clusters. The effects of remittances

on agricultural production and diversification show that remittances tend to encourage households to be more diversified in farming, and to grow more cash crops. Findings show that non-farm household income sources contribute significantly towards poverty reduction of the agricultural households. Policies aimed at low-wage to reduce income gaps and creating employment opportunities could exhibit higher labour productivity.

Conclusion :- "Agriculture is more than just the production of food and fibre" is the opening statement of this Paper and the promise was made to present the reader evidence for this statement. The choice was made to employ pragmatic concepts as those proposed by OECD. The OECD suggested identifying commodity and non-commodity outputs of agriculture in order to make concepts like the multifunctionality of agriculture operational, and hence improve Rural Economy.

Policy recommendation and suggestions :-

1. Consolidation of village lands and cooperative farming will ease the burden of **fragmented land** holdings. When the farmers form a consortium at the village level, the aggregate land can be farmed by using the latest technology.

2. Banks too will be willing to lend money to a village consortium which can be utilised to boost farm productivity, employ sustainable farming methods, reduce over – dependence on fertilisers and thus solve many problems.

3. The overall risk of a crop failure is less in this case and small farmers have a higher chance of earning a decent income at the end of the harvest season. Agricultural intensity also rises when a planned strategy adopted at the village level is implemented.

4. Agricultural credit and farm mechanisation for small and marginal farmers will continue to be difficult unless pooling of farm resources and/or a joint usage of farm technology are employed.

5. **Irrigation problems** can be addressed by Government – preferably at the State and National levels. Though the Government cannot force farmers to produce only the designated crops in particular areas, it can surely educate them about the alternatives.

6. When proper techniques (in water management at the regional, state and national levels as well as a crop plan of what to produce and where to produce) are employed, it will be a win – win situation for both the farmers as well as the country.

7. Irrigation problems as well as problems due to single/traditional crop dependence can be solved by a national level plan for agricultural production. Government can encourage farmers to shift to cash crops (oil seeds etc) instead of food crops in areas where food crops are not at an advantage to reduce imports and also to boost exports.

8. **Seed problems** can be overcome by creating in house seed banks at the village level for traditional crops (thereby reducing farmer dependence on external seed banks), selling Government approved seeds through proper channels (to eradicate spurious seeds) and strict penalties on seed marketing companies in case the seeds do not match the claims – germination and yield - of the companies. Terminator seeds should not be encouraged as a matter of principle as they force farmers to buy seeds for every crop.

9. Scientific research in this subject is to be encouraged to promote seeds which are mild on resource requirements but help the farmers in boosting the yields.

10. Sometimes small innovations at the grass root levels can solve a host of problems specific to a particular region. District agricultural officers must make it a habit to encourage such ideas and also take part in knowledge sharing to implement the ideas at a regional level.

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Microbial Inoculants : Enhancing Nutrient Use Efficiency and Zero Damage to the Ecosystem

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ABSTRACT :- An ecologically supreme way of improving nutrient use efficiency is harnessing plant microbe interactions, as it causes zero damage to the ecosystem. It is widely believed that a vast diversity of microorganisms inhabiting rhizosphere, phylloplane and as endophytes assists plant in uptake of mineral nutrients and various other growth factors and through which they ensure better plant productivity and hence an improved nutrient use efficiency. Agriculturally important microorganisms can positively influence the use efficiencies of different plant nutrients like N, P, K and many other secondary and micronutrients.

Introduction :- Low efficiency of applied nutrients is one of the main constraints in crop production and it is a major global concern with regards to food security for an ever increasing global population. In India in the past few decades use efficiencies for major nutrients like N, P and K has remained constant. This means large quantities of nutrients applied are lost which not only adds to the cost of production but also imparts detrimental effects on the environment like nitrate pollution. Nutrient use efficiency can be increased through various means like manipulation of application techniques, coating fertilizers like in the case of urea which is coated with different materials like neem, sulfur, gypsum, plastic and mud ball so as to enable slow release of nitrogen.

Microbes for use efficiency of Nitrogen :- Nitrogen is the primary nutrient and it is an important constituent of proteins, enzymes, nucleic acids and plays a major role in the establishment and maintenance of photosynthetic capacity, photosynthetic activity and sink capacity. Since the availability of nitrogen in the easily absorbable form is limited, soil external application of nitrogen becomes an absolute need. But much of the N applied to the soil does not find its fate in plant absorption. Only 30-35 % of the applied nitrogen is taken up by plants and the remaining is either fixed in soil or lost to the environment in the form of leaching and gaseous loss. Considering the cost of fertilizer nitrogen and the ill effects of lost nitrogen it is necessary to improve the nitrogen use efficiency. The use of microbial inoculants to improve nitrogen use efficiency is an ecofriendly option available to the farmers.

Barneix et al. in 2005 found out that inoculation with rhizobacteria, Bacillus simplex and Bacillus flexusin wheat improved nitrogen use efficiency and grain quality.

In another study. Adesemoye and his group of researchers have shown that reduction of chemical fertilizers by 25 % than the recommended dose and supplementing with application of a PGPR formulation (Bacillus amyloliquefaciens IN937a and Bacillus pumilus T4), has resulted in the same level of plant growth, yield, nitrogen and phosphorus uptake as that of full dose of fertilizers. When it was further supplemented with AMF Glomus intraradices the same effect was achieved even with 70% of recommended dose of fertilizers. Nitrogen fixing bacteria both symbiotic (Rhizobia) and free living (Azotobacter, Azospirillum and various N fixing cyanobacteria) are also known to improve nitrogen use efficiency and also can provide atmospheric nitrogen.

Microbes for use efficiency of Phosphorus :- Phosphorus is the second most important plant nutrient after nitrogen and it is an integral

component of nucleic acids, phospholipids, important in cellular membrane and provides compounds for photosynthesis in plants. In soil, P is present in large amounts but only a fraction of it is available to plants owing to very low solubility of phosphate salts in soils. Much of fertilizer phosphate applied to crop plants is fixed in soil and the total available phosphate has very low mobility. Plants have evolved a multitude of strategies to increase P uptake thereby increasing P use efficiency.

Arbuscular mycorrhizal (AM) symbioses is the most wide spread strategy used by plants to improve P use efficiency. AM symbioses is a special kind of symbiotic relationship in which the micro partner (fungi) helps in P uptake and mobility in the macro partner (plants), and macro partner provides sugars and space for colonisation to the micro partner. AM symbioses, because of its large surface area can contribute to plant nutrition uptake especially phosphorus uptake. Since phosphorus is highly immobile element, the left over phosphates which are not absorbed by plants are easily absorbed in the bulk soil and hence a phosphate free zone occurs in the rhizosphere. But, the extraradical mycelium formed by fungal partner can extend beyond this phosphate free zone and help plants in absorbing phosphate available at a far off distance from roots thereby making the otherwise unavailable phosphates to available phosphates.

Glomus, Gigaspora, Scutellospora, Acaulospora and Entrophospora are the most commonly occurring AM fungi (AMF).The role of AM fungi in improving P use efficiency and general growth parameters is established in different crops by various research groups.

Apart from AM fungi there is one more function group of microorganism called phosphorus solubilizers which improve phosphorus use efficiency alike AM fungi. Unlike AM fungi phosphorus solubilizers are not involved in P mobilization, but they solubilize fixed phosphates to available phosphates.

A number of phosphorus solubilizing microorganisms have been utilized for tackling the phosphorus fixation problem in the soil. A few to name are Pseudomonas striata, P.fluorescens, Bacillus megaterium and Aspergillus sp. Such phosphorus solubilizing microorganisms can be used singly or in combination with other microbial inoculants like AM fungi and nitrogen fixers.

Microbes for use efficiency of potassium :- Potassium (K) is the third most important plant nutrient which plays a key role in growth, metabolism and development of plants. An adequate supply of potassium to crop plants leads to well developed roots, fast growth and increased resistance to pests and diseases. Potassium, once thought of being adequate in Indian soils has been reported to be low in 21 % of Indian soils and medium in 51 % of arable land. Hence there is a need of immediate K fertilization of 72 % of Indian agricultural soils. Since the cost of potash fertilizer is dependent on global market, it's getting costlier every year which increases the cost of cultivation. An alternate option is use of microbe mediated technologies to improve potash use efficiency so that the input of potash fertilizer can be kept at a bare minimum.

K use efficiency can be improved by inoculation of crop plants with potash solubilizing microorganisms and AM fungi. Organic acids produced by microbial inoculants are able to chelate metal and mobilize K from K containing minerals. Field trial were carried out with a PGPR (Bacillus sp.) and AMF (Glomus intraradices) in maize across two tillage system (no till and conventional tillage). It was shown that treatment of AMF in combination with PGPR improved the uptake of K along with N and P across the tillage systems.

Microbes in use efficiency of other minerals :- Microbial inoculants have been shown to improve use efficiency of many other elements in addition to N, P and K. Mesorhizobium mediterannium when inoculated in barley and chickpea has shown to improve uptake of Ca and Mg along with N, P and K uptake. Pseudomonas mendocina in

combination with AMF (Glomusintraradices and G. mosseae) have shown to improve the uptake of Ca, Fe and Mn along with improved uptake of N and P in lettuce.

BENEFITS :- Inoculation with nitrogen fixing bacteria either at the time of sowing or at frequent intervals in the crop growth stages can reduce the application of chemical fertilizers. Arbuscular mycorrhizal fungi is known for increasing uptake of nitrogen and other plant nutrients just as they improve the uptake of phosphorus.

AM fungi have been shown to improve use efficiency of all major and micronutrients since they increase the surface area of roots. Incorporation of microbial inoculants technology as a component of integrated nutrient management has dual benefits of high crop productivity in the short term and sustained production without deteriorating the soil health in the long term.

CONCLUSION :- Although a plenty of microbial inoculants are available to increase nutrient use efficiency, it has to be considered that no microbial inoculants is universal as their activity depends on soil type, plant grown and various other edaphic and climatic factors. Hence there is a need for widespread studies on different microbial inoculants for improving nutrient use efficiency of different crops under varied agroclimatic conditions.

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Analysis of Pradhan Mantri Fasal Bima Yojana

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"Crop insurance is the Mangna Charta of the Indian agriculturists. It will mitigate rural poverty and will change the psychology of the Indian farmer in a radical manner."

Shri S. K. Patil,

Crop insurance makes up the loss or damage to growing crops resulting from a variety of causes such as drought frost, flood and disease. The cultivators pay a premium and protection is given to them on the same basis as in other insurance. When the production from an insured acreage falls below the insured coverage, the tiller is entitled to an indemnity.Coverage and premium rates are settled on the basis of productivity and susceptibility to risk of the lands under cultivation in the same, area.

Majority of the holdings are tiny, form which the farmers get marginal surplus in good years and incur heavy deficits in the bad ones.

Farming is more hazardous than any other enterprise. The weather can make all the difference between success and failure. Consequently, many farmers, particularly the small ones, feel shy of adopting new techniques.

The fear of loss is so overwhelming that even when convinced of the gain accruing from the application of science and technology, they prefer to go along the traditional track of low productivity. Once freed from fear by crop insurance they can quicken the pace to high productivity.

Pradhan Mantri Fasal Bima Yojana (PMFBY) :- The crop insurance in India was started about 3 decades ago.The first concrete step towards introduction of the insurance scheme was taken by the Govt. in 1948 an experimental pilot scheme. To provide financial support to the farmers in the event of failure of crops as a result of natural calamities, a Comprehensive Crop Insurance Scheme (CCIS) was introduced in the country with effect from Kharif, 1985. To enlarge the coverage in terms of farmers (loanee and non-loanee both), more crops and more risks, 'National Agricultural Insurance Scheme (NAIS) – (Rashtriya Krishi Bima Yojana)' was introduced in Rabi 1999-2000 season in the country.

After detailed discussions with various stakeholders including State Governments, representatives of farmers organizations, Government of India had formulated the new Crop Insurance Schemes viz. Pradhan Mantri Fasal Bima Yojana (PMFBY) along with pilot Unified Package Insurance Scheme (UPIS) and Restructured Weather Based Crop Insurance Scheme (WBCIS), which are being implemented in various States/ Union Territories of the country from Kharif 2016. These Schemes are being implemented during 2017-18 by 18 General Insurance Companies including all the 5 Government Sector Companies. Under the PMFBY, a uniform maximum premium of only 2% is paid by farmers for all Kharif crops and 1.5% for all Rabi crops. In case of annual commercial and horticultural crops, the maximum premium to be paid by farmers is only 5%. The premium rates to be paid by farmers are very low and balance of actuarial premium is being borne by the Government, to be shared equally by State & Central Government, to provide full insured amount to the farmers against crop loss on

account of natural calamities. There is no upper limit on Government subsidy.

Objective of PMFBY :-

* To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests & diseases.
* To stabilise the income of farmers to ensure their continuance in farming.
* To encourage farmers to adopt innovative and modern agricultural practices.
* To ensure flow of credit to the agriculture sector.

Advantages of PMFBY :-

(i) It provides protection to farmers against losses caused by crop failure and thereby ensures stability in farm income,

(ii) It also strengthens the position of co-operatives and other institutions that finance, agriculture to the extent it enables the farmer members to repay their loans in years of crop failure,

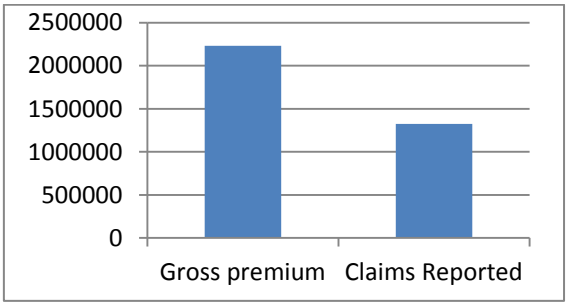
(iii) By protecting the economic interest of the farmers against possible risk or loss, it accelerates adoption of new agricultural practices,

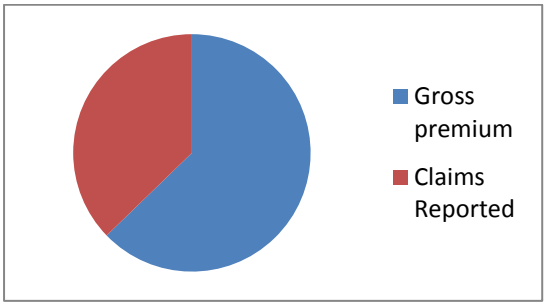
(iv) It minimizes the problem of rural indebtedness, which is traceable to the frequent failure of crops,

Coverage Details Under PMFBY (as on 20.12.2017)

State	No.of farmers insured	Area Insured (Ha)	Sum Insured	Gross Premium	Claims Reported	No. of farmers Benefited
32 states Total	57066232	55468269.01	20223127.05	2232036.18	1324818.15	11541516

Source:- Department of Agriculture,Cooperation & Farmers Welfare





Conclusion :- To conclude, it may be said that one of the basic objectives of our economic planning is to step up farm production. This can be achieved by adopting PMFBY. PMFBY will assure the farmers that they will be compensated for losses against natural calamities.

These schemes will not only spread the losses geographically but also spread them over the time. Therefore the earlier the scheme is put into operation, the better it will be for the farmers and for the nation.

Agricultural Insurance PMFBY market is on the threshold of a spectacular growth. A large chunk of credit for agriculture would be supported by insurance collateral. Agricultural insurance in future though is likely to be largely demand driven, the efforts of the government to support and finance insurance products and / or facilitate

congenial environment as meaningful risk management tool would further enhance the potential and credibility of agricultural insurance.

Good governance is as important for various developmental programmes as for successful operation of an agriculture insurance scheme like that PMFBY. Poor governance adversely affects development activities. With the improvement in governance, it is feasible to effectively operate and improve upon the performance of various programmes including agriculture insurance.

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Physico-chemical Characteristics of Ground water Quality in Two Different Zone of Central India

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Abstract :- Madhya Pradesh literally means' central province' and is located in the geographic heart of India, between latitude 21.2^0N-26.87^0N and longitude $74^0$02'-$82^0$49'E.In the present study forty sampling location were selected from study area. The ground water samples of residential area in two different zone of central India were collected and analyzed for various physic-chemical parameters, i.e. Temperature 24.67^0C to 26.87^0C, pH 5.9 to 8.53, Turbidity 0.10 to 4.77, Total Hardness 191.67 to 926.67 mg/l, TDS 141.3 to 533.67 mg/l, DO 1.43 to 5.90, BOD 3.07to 19.17, COD 3.23 to 49.89, nitrate 0.09 to 6.47, Sulphate 0.01to186.3,Phosphate 0.001 to 2.83 mg/l, in water of residential area of two different zone of central India were found. Temperature, pH, Turbidity, nitrate and sulphate of all the samples of study area were found below the permissible limit prescribed by WHO. The results of analysis of ground water quality in residential area of two different zone of central India, it indicates that extent of pollution occurred due to the urbanization and other anthropogenic activities increased human interventions in the ground water quality.

Key words :- Physico-chemical Parameters, Ground Water, Central India.

1. INTRODUCTION :- Water is the key to life. All life on the planet earth is sustained by water,though a significant portion of the earth's surface is covered with water. However the amount of fresh water which is the usable form of water is relatively a tiny portion of total water availability (Malik.et al,2014).The ground water source levels change by the regular withdrawal and hence the quality of ground water source levels change by the regular withdrawal and hence the quality of ground water reported seasonal as well as annual change in the ground water quality (Gergeetal, 1990; Rajmohanetal,1997; Singh etal, 2000; andTripathietal, 2013).Ground water which now account for 80% of rural and 60% of urban water supply in India is depleting at an alarming rate in several states (Gayatrietal, 2001; Dwivedietal, 2013).

Municipal sewage discharge is one of the problems and sewage water treatment is perhaps the most challenging environmental problem in India and all over the world. Various efforts and research are being vigorously pursued to complete treatment and healthy discharge as reuse sewage water and industrial effluents. The sewage water commonly contains both solids wastes and liquids wastes generated by various human activities and also sewage water contains various trace metals and metal compounds Now a day, both surface and ground water resources are contaminated by various sources like industrial effluents, agricultural discharge and municipal waste water, associated with large amount of inorganic and organic toxic pollutants along with harmful pathogens (Okohet al, 2002). In most of the developing countries huge debt burdens and due to population explosion and rapid urbanization, people rely heavily on water resources and polluting in the absence of better alternatives (Eoet al, 1996; Calamari et al,1994). The developing countries like India ground water is the major source of drinking water. In arid and semiarid regions ground water plays an important role in the development and the public health of the population. The estimation showed that ground water is the source of drinking for one

third of the world population. The suitability of ground water for drinking purpose is determined by its quality (Annalet al, 2014).

The water quality parameters like pH, Dissolved oxygen, total hardness and chemical oxygen demand have much influence on human health. The water sources with very low/high pH can cause ill health. Depleted dissolved oxygen will affect living marine organisms. The carbonate salts can cause hardness and they make the water unsuitable for human activities (Rao 1978).the potential health effects of high nitrate levels are diverse, including reproductive problems (Kramer et al, 1996), methemoglobinemiaand cancer. Infants are especially at risk for methemoglobinemia(blue- baby syndrome), and while little conclusive evidence exists for this disorder occurring where levels are below 10 ppm, higher values found throughout the world can significantly elevate the risk (Gupta et al, 2000). Some health professionals also believe that methemoglobinemia may often be under-or misdiagnosed (Johnson and Kross 1990).Sulphate ion present in water in high concentration may cause temporary and acute effects on humans and animals, including diarrhea. It is estimated that 1.4 million child deaths occur from diarrhea every year due to poor water quality. If excess amount phosphates present in water causes risk to human beings as algae produce toxins, which damage neurological syste and causes skin disease (Santhiet al, 2014).

1.1 Objective :- To determine the physico-chemical characteristics of various ground water samples in residential area of two different zone of central India.

1.2 Study Area :- Madhya Pradesh is the second largest state in the country by area. It borders the state of Uttar Pradesh to the north-east, Chhattisgarh to the southeast, Maharashtra to the south, Gujarat to the west and Rajasthan to the North West.Madhya Pradesh literally means' central province' and is located in the geographic heart of India, between latitude 21.2^0N-26.87^0N and longitude $74^0$02'-$82^0$49'E.The Central India covers the seven states of our country, it has long industrial development and also has deep cultural heritage.

2. MATERIAL AND METHODS :- We assume Madhya Pradesh as a central India (study area) which is divided in to two zones (a) East Zone of Central India (b) West Zones of Central India. In the present study we are intended to find out the diffuse chemical pollution in Central India on the basis of anResidentialarea and different water bodies. We have designed twenty sampling stations district for this study in east zones i.e.Rewa, Satna, Sidhi, Singrauli, Shahdol, Umaria, Katni, Panna, Chhatarpur, Jabalpur, Mandala, Dindori, Siwani, Chhindwara, Narsinghpur, Hosangabad, Betul, Damoh, Sagar, Bhopal and twenty district in west zone i,e. Gawaliar, Shivpuri, Ashok Nagar, Datiya, Muraina, Bhind, Guna, Tikamgarh, Vidisha, Raisen, Sihora, Rajgarh, Sajapur, Dewash,Ujjain, Ratlam, Indore, Khandawa, Burhanpur and Harda of Central India.Hundred twenty water samples were collected from bore welland tube wells of two different zones of central India samples were collected in polythene bottles and analyzed for various water quality parameters as per standard procedures (AWWA, 1999).The experimental values were compared with standard values recommended by world health organization (WHO) for drinkingpurposes.The locations of sampling station are shown in **table –1and fig-1**

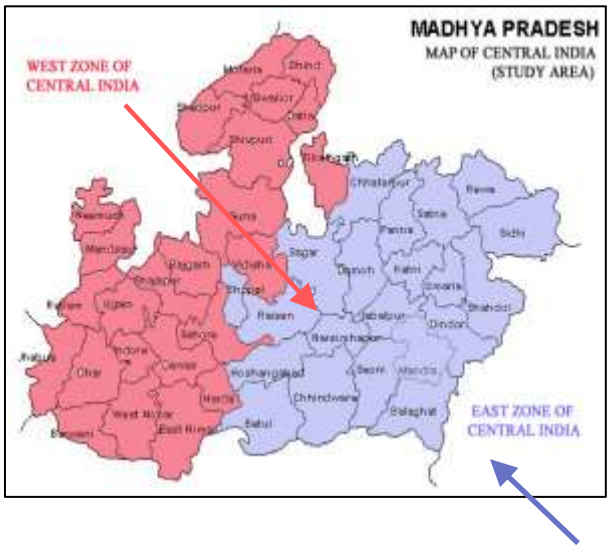

Table-1: Location of sampling station in Residential Area of Two Different Zone of Central India

S.N.	sampling station
1	R_1= Rewa Near Bus Stand,
2	R_2= Satna Near District Hospital,
3	R_3= Sidhi Near Sanjay Gandhi P.G. College,
4	R_4= Singrauli Near Railway station,
5	R_5= Shahdol Near New Bus Stand,
6	R_6= Umaria Near Govt. R.V.P.S. College,
7	R_7= Katni Near Swetamber Temple,
8	R_8= Panna Near Bus Stand,
9	R_9= Chhatarpur Near Higher Secondary,
10	R_{10}= Jabalpur Near S.B.I. Chhorha,
11	R_{11}= Near R.D. P.G College Mandala,
12	R_{12}= Dindori Near Main Post Office,
13	R_{13}= Near Govt P.G. College Siwani,
14	R_{14}= Chhindwara Near State Bank of India,
15	R_{15}= Narsinghpur Near Railway Station,
16	R_{16}= Near District Hospital Hosangabad,
17	R_{17}= Betul Near Excellence School,
18	R_{18}= Damoh Near Bus Stand,
19	R_{19}= Sagar Near Railway Station,
20	R_{20}= Bhopal Near Hamidia Hospital.
21	$R_{21=}$ Near Gajaraja Medical College Gawaliar
22	$R_{22=}$ Near Tatyatope Park Shivpuri
23	$R_{23=}$ Ashok Nagar Near Busstand
24	$R_{24=}$ Datia Near Pitamabra Temple
25	$R_{25=}$ Muraina Near Railway Station
26	$R_{26=}$Bhind ,Near Head Post Office
27	$R_{27=}$ Near Delhi Public School Guna
28	$R_{28=}$ Civil Line Tikamgarh
29	$R_{29=}$ Near S.A. Institute of TechnologyVidisha
30	$R_{30=}$Raisen,Near Higher Secondary School
31	$R_{31=}$Sihore, Near Railway Colony
32	$R_{32=}$ Near Anjalilal Temple ,RajgarhBiora
33	R33=Near GhatiShajapur Housing Board Colony.
34	R_{34}=Near Tilak Nagar Dewas
35	R_{35}=Near DussehraMaidan, Ujjain
36	R_{36}= Near Sai Baba MandirRatlam
37	R_{37}=Near Maheswari Higher Secondary School, Indore.
38	R_{38}=Near MalviyaColony,lalchowkiKhandwa.
39	R_{39}=Near Bus Stand Burhanpur District
40	R_{40}=Near HardaPolytechhnique College.

3. RESULT AND DISCUSSION :- Theground water samples were analyzed some parameters like, temperature, pH, turbidity, Total hardness, TDS, DO, BOD, COD, nitrate, sulphate and phosphate. Average physico-chemical characteristics of the ground water sample of study area were analyzed all the results are shown in**table-2 and figure-2 to 12.**

Temperature :- In the present study the temperature was found ranged between 24.67^{0}C to 32.73^{0}C**.** Themaximum temperature was recorded at sampling station (R_{14})Datia near Pitambara Temple.Aryaetal, 2011 studied assessment of underground water quality: A Case study of Jhansi city, utter Pradesh, India, reported temperature values varied between 12.0 ^{0}C to 32.0^{0}C.Karunakaran et al, 2009Temperature is basically important for the Chemical and biological reactions of organisms in water. The increase in temperature decrease the portable of water because of elevated temperature carbon dioxide and other volatile gases which import taste are expelled

pH :- The pH of all the water samples varied from 5.9 to 8.53, the highest pH was observed 8.53 at sampling station (R_7) katni near swetambartample and the minimum value 6.90 (R_{40})near hardapolytechniquecollege.Shrivastava etal, 2014 studied ground water quality assessment of Birsinghpur Area, Satna District, Madhya Pradesh and PH Concentration was found ranged from 6.8 to 7.8. Gupta et al, 2010slight alkaline range of pH may be explained on the basis of occurrence of limestone rocks in the surrounding of the sampling stations. Limestone changes into its soluble from, that in Calcium Bicarbonate under anaerobic Condition and provides slight alkalinity to the water.

Turbidity :- Turbidity of water was found to be 0.10 to 4.77 NTU. All the water samples of turbidity were found below the permissible limit set by WHO.Tripathi et al, 2014 studied physico-chemical parameters and correlation coefficients of ground waters of shahdol District and turbidity was found ranged between1.5to 4.0 NTU.Turbidity of water is actually the expression of optical property in which the light is scattered by the particles present in the water. Clay, slit, organic matter, Phytoplankton and other microscopic organisms cause turbidity in lake water.

Total hardness :- In the present study the total hardness of water was observed to be 191.67 to 921.67 mg/l.the highest value was found 921.67 mg/l at sampling station (R29) near S.A. Institute of Technology Vidisha.Sunita et al, 2005 Studied hydrogeo-chemistry of ground water, Gooty Area, Anantapur District, Andhra Pradesh and total hardness values were found ranged between 360 to 4040 mg/l. Hardness is caused by polyvalent metallic ions dissolved in water, which in natural water are principally magnesium and calcium.

TDS :- The results show that study area TDS values are between 141.3 to 533.67mg/l. Maximum concentration is found water samples collected from katni, which is 533.67 mg/l. Minimum concentration is 141.3 mg/l found in ground water sample of khandwa.(R38).Sharma et.al, 2014 Studied aPhysico-chemical Analysis and management of ground water Bodies from 20 locations of Jodhpur Districts, detected the TDS values varied from 960 ppm to 3650 ppm.The term total dissolved solid refer mainly to the inorganic substances that are dissolved in water. The effects of TDS on drinking water quality on the levels of the individual components, excusive hardness, mineral deposition and corrosion are common properties of highly mineralized water.

Dissolved Oxygen :- The condition in case of dissolved oxygen (DO) is slightly complicated since in complicated since in contrast to other pollutants; the quality of water is enhanced if it contains more oxygen. An ideal DO value of 5.0 mg/l is the standard for drinking water. In study area at has been found between the ranges of 1.43 to 5.90 mg/l. Maximum concentration is found in ground water samples collected from Sihore (R_{31}) is 5.90 mg/l.Tripathi et al, 2015 studied Quality and assessment of ground water in satna, Madhya Pradesh, reported the D.O. values varied from3.90 to 5.92 mg/l.

Biochemical oxygen Demand :- Biochemical oxygen demand varied from 3.07 to 19.17 mg/l. Maximum BOD was found (919.17 mg/l) at sampling station (R_{31}) Sihore, Near Railway colony. Values of BOD at sampling station R_2(7.43), R_4(10.73), R_9(6.27), R_{16} (6.33), R_{18}(6.43), R_{21} (15.17), R_{22} (9.30), R_{23} (13.67), R_{24} (11.23), R25 (8.43), R26 (7.30) , R27 (18.83), R29 (6.33), R30 (9.77) , R31(19.17) R35 (6.63), R37 (6.80) and R38 (6.3) mg/l are higher than the permissible limit prescribed by WHO as 6.0 mg/l.Dwivedi etal, 2016 studied Quality of Ground Water Used for Drinking inOrai, District- Jalaun, Uttar Pradeshand reported the BOD Values varied from2.9to13.8 mg/l.BOD refers the oxygen used by the microorganism in the aerobic oxidation of organic matter. Therefore with the increase in the amount of organic matter in the water the BOD increases.

Chemical oxygen Demand :- The chemical oxygen demand was found ranged between 3.23 to 49.87 mg/l. COD value at sampling station R_8(12.83), R_{21}(37.0), R_{22}(18.75), R_{23} (11.50) , R_{24} (34.97), R_{25} (49.87), R_{27} (27.30) , R_{28} (14. 17), R_{29} (46.37) , R_{30} (32.90), R_{32} (31.80) , R_{33} (15.27), R_{35} (19.90) , R_{36} (12.50) , R_{37} (11.37) , and R_{38} (10.33) mg/l are more than the standard limit set by WHO 10.0 mg/l.Chemical oxygen Demand is defined as the amount of a specified oxidant that reacts with the samples under controlled condition and is often using as a measurement of pollutants in natural water(AWWA, 1999).Chaurasia et al, 2013carried out pollution sources and water quality of River Mandakini at Chitrakoot, Analyzed the chemical oxygen demand in mandakini River Chitrakoot found COD ranged between 12-140 mg/l.

Nitrate :- In the present study the nitrate content of water was found to be 0.09 to 6.47 mg/l. The maximum value of 6.47 mg/l was observed at location (R_{19}) (Sagar , near railway station) while the minimum value 0.09 mg/l was observed at , which is within permissible limit prescribed by WHO for drinking water standard. Srinivasetal, 2012 Studies on chemistry and Water Quality Index of ground water in ChincholiTaluk, Gulbarga district, Karnataka India, nitrate content was observed ranged from 26.2 to 122.0 mg/l. Mahananda et al, 2010monitoring of nitrate is important in drinking water because of health effects on human beings.

Sulphate :- Sodium sulphate and magnesium sulphate exert a cathartic action in the human being and also surface is associated with respiratory illness. Therefore the recommended limit of sulphate content in drinking water is 200 to 250 mg/l. The concentration of sulphate ranged from 0.001 to 186.3 mg/l in the study area. The maximum concentration of (186.3 mg/l) was detected at sampling station R_{27}(Guna District).The results obtained in the present study showed that sulphate content in all water samples were 0.001to 1286.3 mg/l and is within permissible limit.Tripathi et al, 2016 studied the physic-chemical studies on ground water and surface water in and around Katnicity; Madhya Pradesh observed the sulphates values varied from 2.9 to 81.93 mg/l.

Phosphate :- In the present study the phosphate concentration varied from 0.001 to 2.83 mg/l. The maximum concentration of phosphate 2.83 mg/l was detected at the location R10 (Jabalpur near S.B.I. Chaorha) while minimum concentration of phosphate was observed to be 0.001 mg/l at R12 (near Govt. P.G. college Siwani) sampling station. Santhi et al,2014workedphysico Chemical studies on water quality in thirukattlupallinearthanfavur and reported the phosphate content varied from 0.1 to 1.8 mg/l

Table-2: AveragePhysico-Chemical Characteristics of ground water in Residential Area of Two Different Zone of Central India.

S.N.	District	Two different Zone of Central India	Samplin g Code	Temperature	pH	Turbidity	Hardness	TDS	DO	BOD	COD	Nitrate	Sulphate	Phosphate
1	Rewa	East Zone	R_1	29.37	6.50	2.37	228.33	345.33	4.68	3.60	5.37	4.17	5.53	0.187
2	Satna	East Zone	R_2	29.23	7.40	2.00	468.33	312.00	3.56	7.43	5.70	5.13	9.90	1.867
3	Sidhi	East Zone	R_3	25.27	6.57	1.23	322.67	412.67	1.43	5.57	5.50	0.30	0.03	0.007
4	Singrauli	East Zone	R_4	28.77	7.67	0.73	261.33	285.00	4.27	10.73	8.00	0.55	8.33	0.480
5	Shahdol	East Zone	R_5	28.53	6.77	0.27	191.67	252.67	4.03	3.10	7.13	0.82	4.97	0.026
6	Umaria	East Zone	R_6	26.07	7.70	2.40	215.33	328.00	3.10	4.53	6.33	3.47	170.00	0.167
7	Katni	East Zone	R_7	25.97	8.53	1.90	567.00	533.67	3.53	5.60	7.70	1.70	27.50	0.002
8	Panna	East Zone	R_8	27.93	7.10	4.77	362.33	341.00	3.03	3.70	12.83	0.80	10.03	0.029
9	Chhatarpur	East Zone	R_9	29.43	7.23	2.57	229.67	321.67	5.47	6.27	7.40	0.53	5.37	0.130
10	Jabalpur	East Zone	R_{10}	28.87	7.67	2.97	312.00	333.00	3.20	3.40	6.30	5.47	8.60	2.833
11	Mandala	East Zone	R_{11}	24.93	7.33	4.10	270.33	388.67	1.80	5.67	7.20	5.20	0.01	0.013
12	Dindori	East Zone	R_{12}	28.20	6.53	1.23	368.67	332.33	4.13	3.07	6.33	2.87	14.73	0.001
13	Siwani	East Zone	R_{13}	27.77	6.80	2.90	263.33	292.33	3.73	3.10	9.17	3.63	23.47	1.267
14	Chhindwara	East Zone	R_{14}	32.73	8.23	1.43	265.67	414.67	5.57	5.03	5.93	3.53	6.77	0.024
15	Narsinghpur	East Zone	R_{15}	25.93	7.23	0.10	236.00	321.00	4.63	4.50	3.50	7.80	12.30	0.008
16	Hosangabad	East Zone	R_{16}	25.77	7.97	1.67	210.33	369.67	3.10	6.33	7.00	7.63	7.93	0.060
17	Betul	East Zone	R_{17}	30.10	8.33	0.27	257.33	245.33	4.00	3.63	5.80	6.63	7.33	0.000
18	Damoh	East Zone	R_{18}	27.97	6.67	2.13	312.33	286.67	3.50	6.43	7.80	5.43	7.80	0.037
19	Sagar	EasZone	R_{19}	28.30	7.37	2.10	305.67	320.33	3.73	4.20	3.93	6.47	7.53	0.080
20	Bhopal	East Zone	R_{20}	27.67	6.87	2.33	214.67	323.00	2.97	3.63	8.50	5.23	5.53	0.047

Table-2 continue……

21	Gawaliar	West Zone	R_{21}	26.90	7.60	1.87	736.67	280.00	5.13	15.17	37.00	2.12	38.67	0.241
22	Shivpuri	West Zone	R_{22}	25.47	7.13	2.97	643.67	259.33	4.20	9.30	18.73	0.09	15.33	0.026
23	Ashok Nagar	West Zone	R_{23}	27.87	8.20	1.77	500.33	276.33	3.90	13.67	11.50	0.42	36.33	0.036
24	Datiya	West Zone	R_{24}	28.27	7.80	0.60	414.67	173.33	3.00	11.23	34.97	0.16	25.00	0.030
25	Muraina	West Zone	R_{25}	25.40	8.00	3.07	548.33	172.57	5.27	8.43	49.87	0.60	31.67	0.013
26	Bhind	West Zone	R_{26}	27.50	7.80	2.67	639.33	215.67	5.73	7.30	4.97	0.15	40.33	0.011
27	Guna	West Zone	R_{27}	24.77	6.73	2.73	697.67	323.20	2.10	18.83	27.30	0.04	186.33	0.064
28	Tikamgarh	West Zone	R_{28}	25.00	7.67	1.43	726.00	312.67	4.03	5.70	14.17	0.79	31.33	0.020
29	Vidisha	West Zone	R_{29}	27.27	8.27	3.83	921.67	266.93	3.83	6.33	46.37	0.30	37.33	0.052
30	Raisen	West Zone	R_{30}	27.10	7.83	1.80	730.00	212.07	3.40	9.77	32.90	0.46	27.00	0.021
31	Sihor	West Zone	R_{31}	26.43	7.97	2.77	751.67	200.67	5.90	19.17	9.40	0.50	53.00	0.034
32	Rajgarh	West Zone	R_{32}	30.60	8.20	3.87	683.33	243.43	3.63	5.20	31.80	0.73	41.00	0.036
33	Shajaput	West Zone	R_{33}	25.17	7.60	2.43	329.00	219.00	3.33	5.33	15.27	0.53	13.00	0.013
34	Dewash	West Zone	R_{34}	29.23	8.30	0.20	522.33	256.67	5.60	5.13	3.23	0.41	34.00	0.019
35	Ujjain	West Zone	R_{35}	26.77	8.00	0.90	296.67	156.00	4.00	6.63	19.90	0.61	43.00	0.034
36	Ratlam	West Zone	R_{36}	30.33	7.77	1.73	435.00	274.33	5.40	4.17	12.50	0.51	29.00	0.015
37	Indore	West Zone	R_{37}	29.27	8.13	3.20	475.33	288.00	2.63	6.80	11.37	0.61	96.00	0.011
38	Khandawa	West Zone	R_{38}	24.67	7.00	0.60	305.67	141.33	2.90	6.13	10.33	0.19	20.00	0.040
39	Burhanpur	West Zone	R_{39}	29.43	6.50	1.07	356.67	246.33	4.63	4.50	4.77	0.32	26.00	0.020
40	Harda	West Zone	R_{40}	28.00	7.53	0.27	264.33	160.67	3.13	5.00	7.20	0.09	7.00	0.008

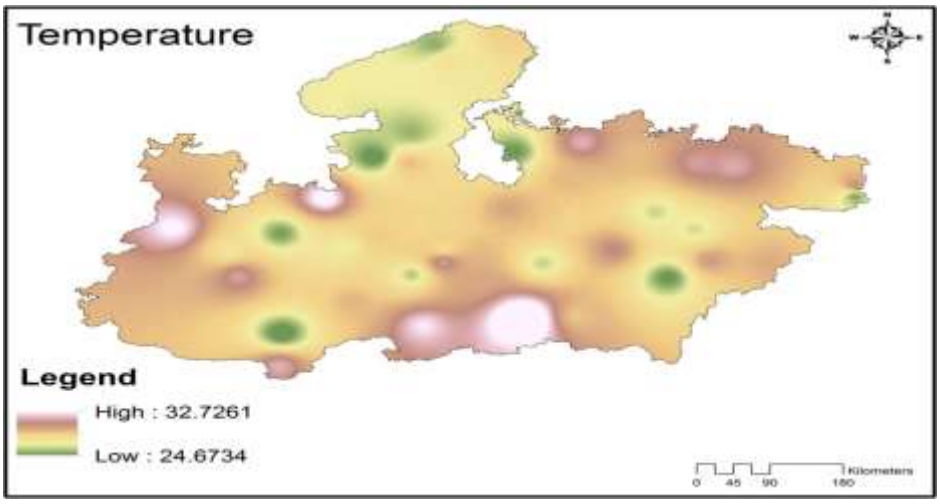

Figure-2:Average Temperature of ground water in Residential Area of Two Different Zone of Central India.

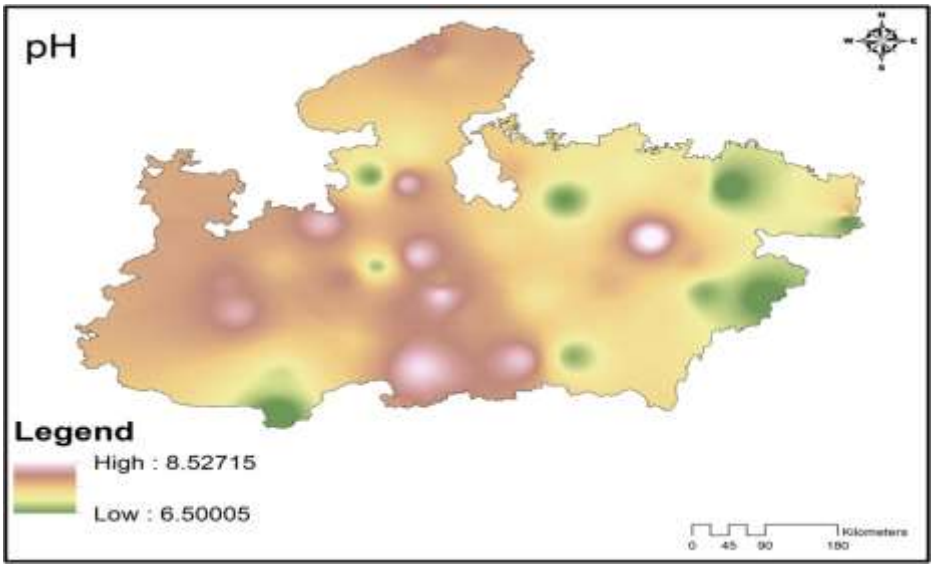

Figure-3: Average pH of ground water in Residential Area of Two Different Zone of Central India

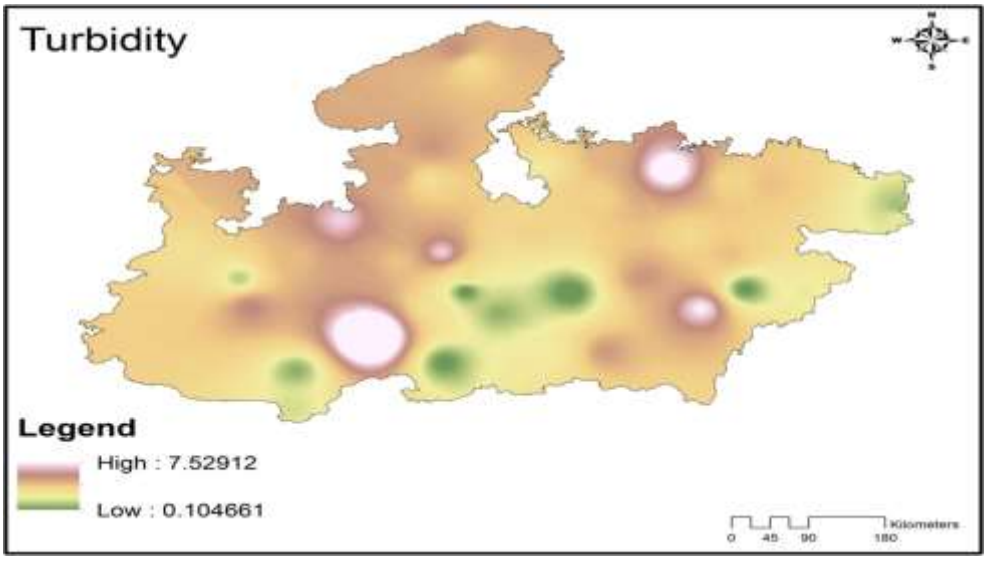

Figure-4: Average Turbidity of ground water in Residential Area of Two Different Zone of Central India.

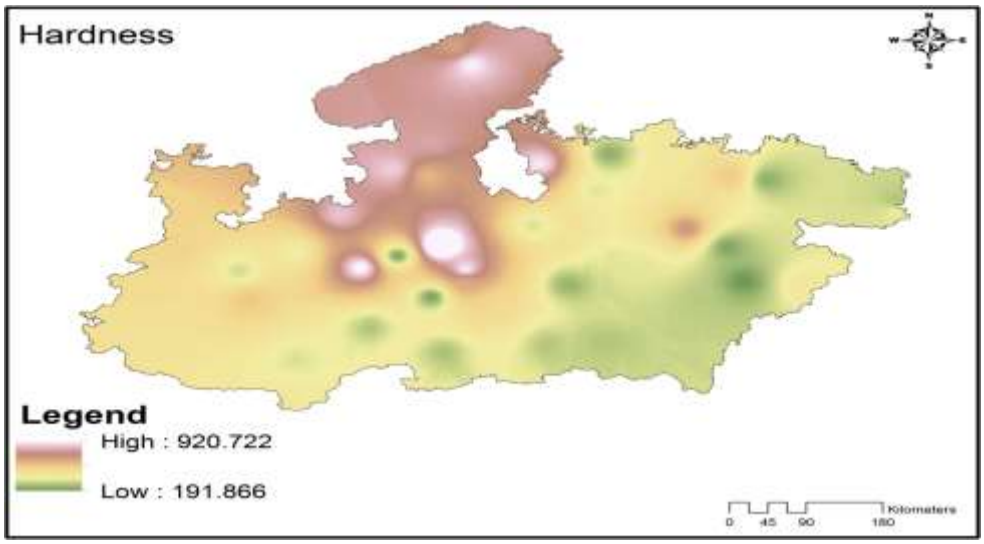

Figure-5: Average Total hardness of ground water in Residential Area of Two Different Zone of Central India

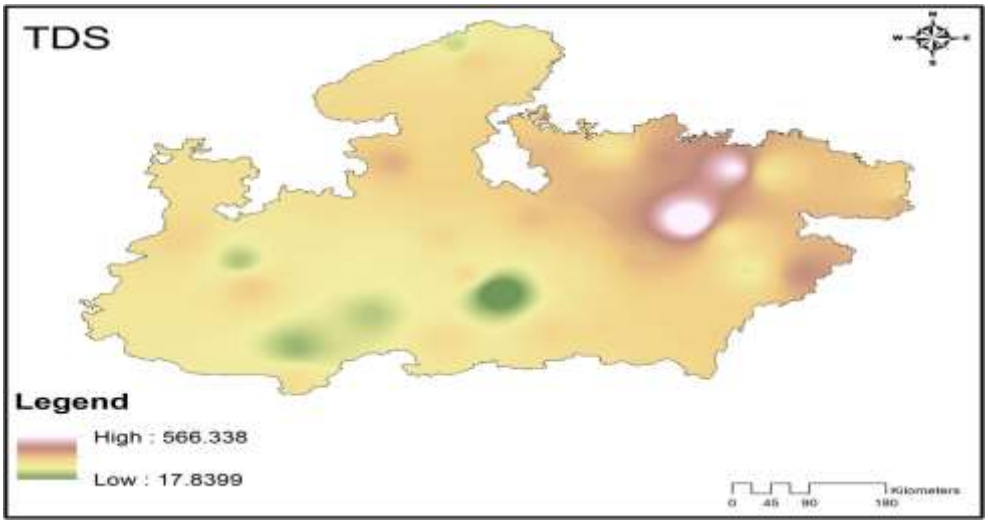

Figure-6:Average T DS of ground water in Industrial Area of Two Different Zone of Central India.

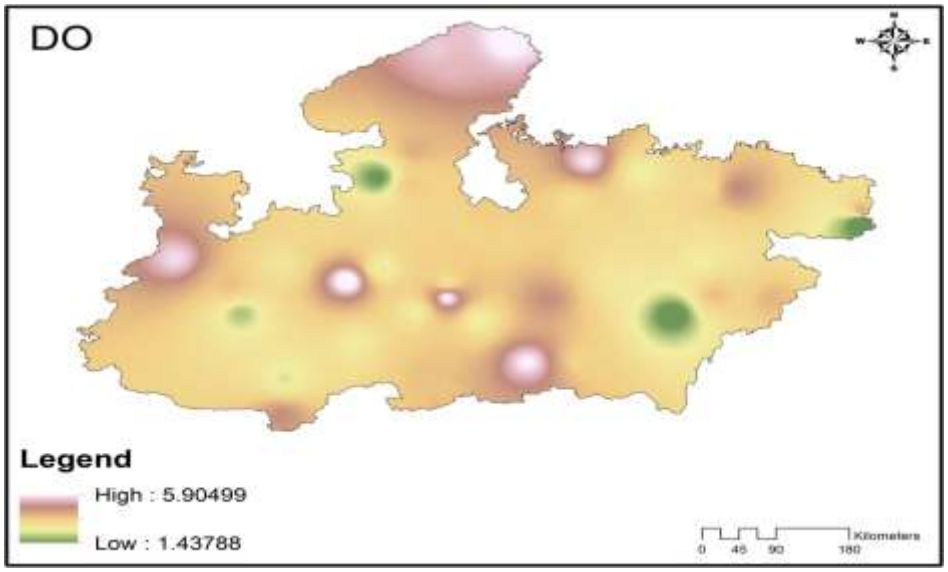

Figure-7: Average DO of ground water in Residential Area of Two Different Zone of Central India

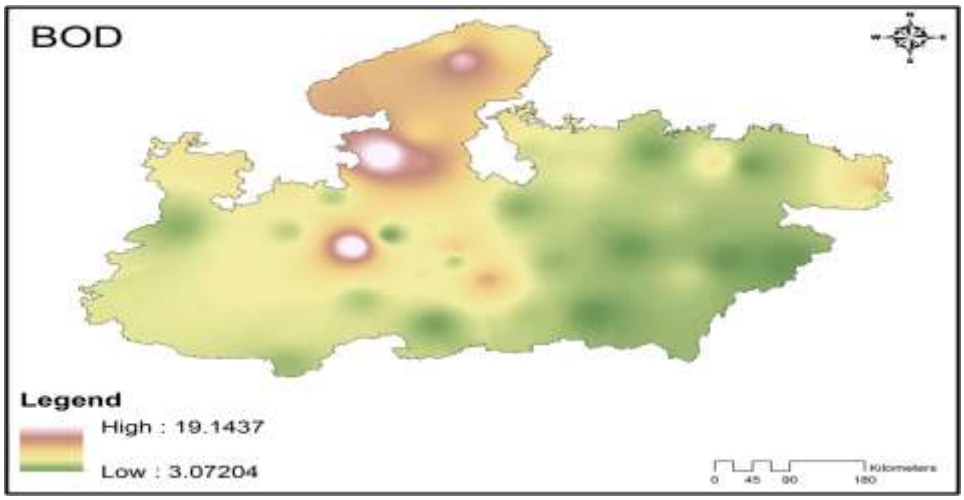

Figure-8: Average BOD of ground water in ResidentialArea of Two Different Zone of Central India.

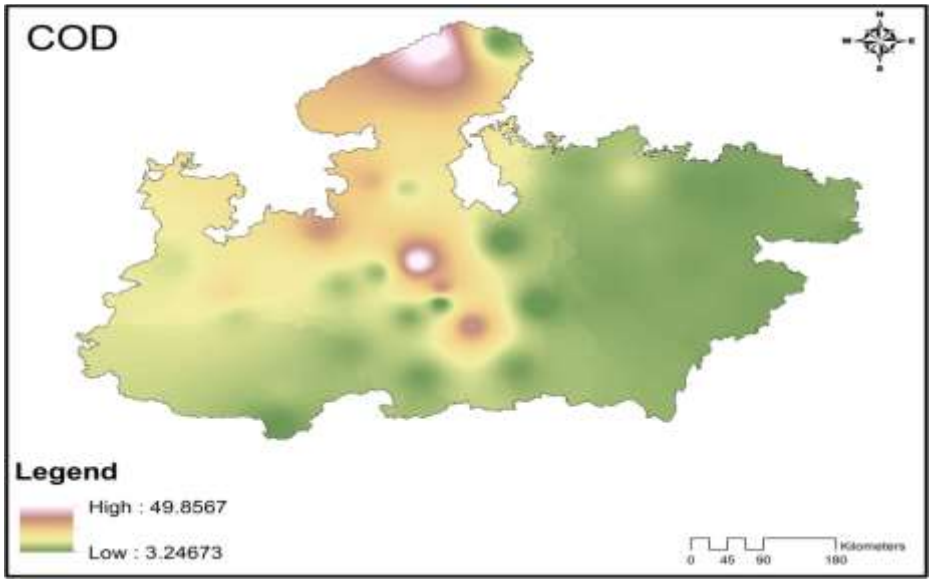

Figure-9: Average COD of ground water in Residential Area of Two Different Zone of Central India.

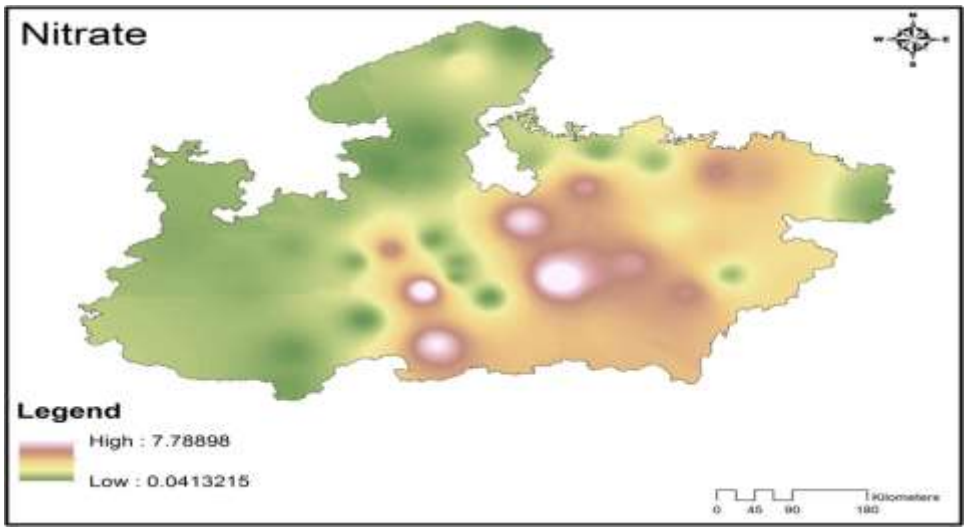

Figure-10: Average Nitrate of ground water in Residential Area of Two Different Zone of Central India.

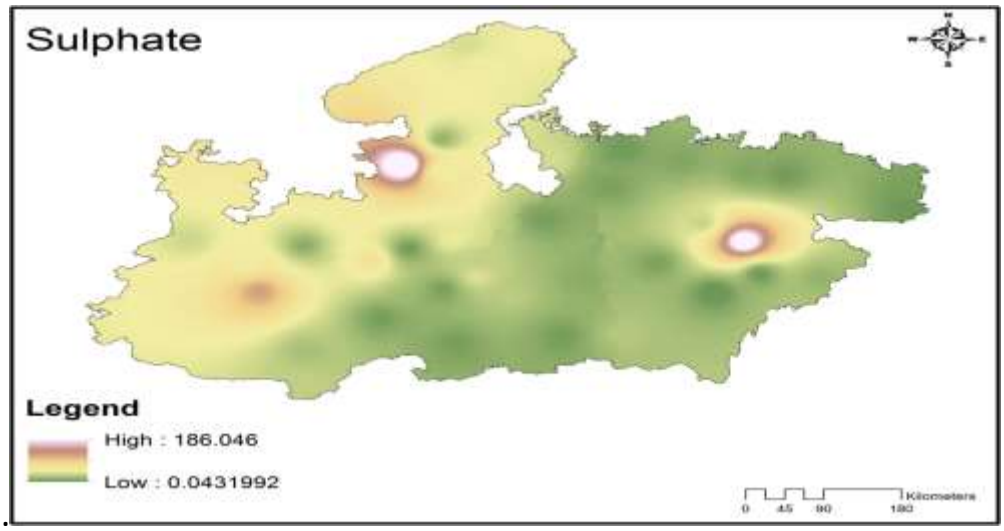

Figure-11: Average Sulphate of ground water in ResidentialArea of Two Different Zone of Central India.

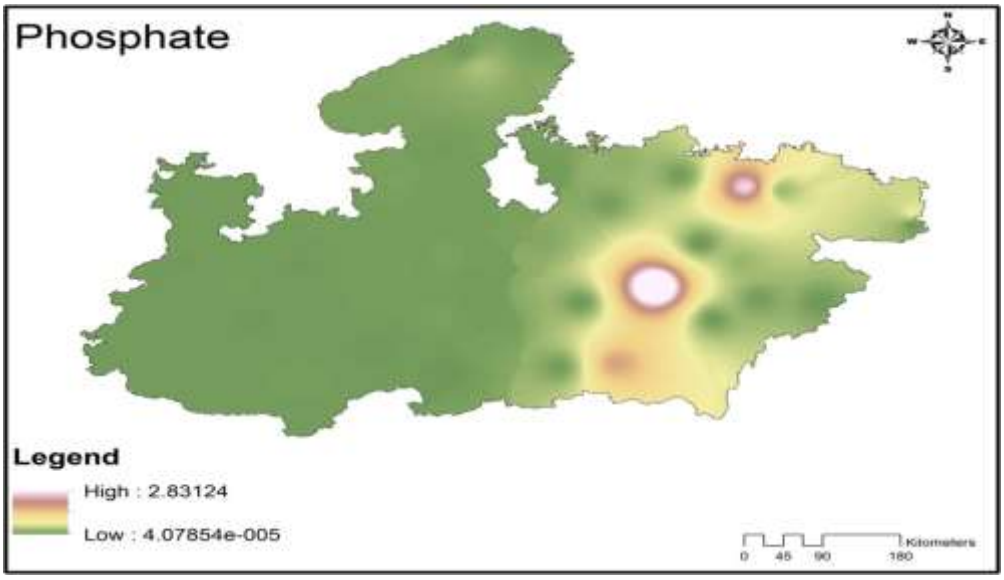

Figure-12: Average Phosphate of ground water in Residential Area of Two Different Zone of Central India.

4. CONCLUSION :- The present study has been carried out to evaluate the quality of ground water in residential area of two different zones of central India. Forty sampling location were selected from study area. Sampling was done seasonally, during the study period (of the year 2013 to 2014). These samples were analyzed for eleven (Temperature, pH, Turbidity, Total hardness, TDS, DO, BOD, COD, Nitrate, Sulphate and phosphate) physico-chemical parameters to evaluate their suitability for domestics applications. The results of the above work show that most of the physic-chemical parameters are well within the acceptable limit except some samples of TH, DO, BOD and phosphate in the study area, during the study period mostly exceeded the recommended value of WHO. The chemical oxygen demand concentration exceeds the permissible limit in sixteen samples locations. It indicates that the extent of pollution occurred due to the urbanization and other anthropogenic activities increased human interventions in the ground water quality. Ground water pollution in the studied area showed is controlled by the proper environment management plan to maintain proper health conditions.

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Agriculture Sustainable Development in India and its Challenges

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ABSTRACT :- Indian economy is an agricultural economy because 75 percent of people depend on agriculture. In the present Paper, we have studied the issues and Challenges of the Agriculture Sustainable Development in India. Sustainability entails and attains the equilibrium amid the demand and supply of agriculture produce. The green revolution may fetch the efficiency in the agriculture produce and thus, the productivity enhanced. The eventual performance of agriculture depends on the performance of a variety of resources, the strategies and the methods that should be adopted. To face the aridity due to the decrease in the rainfall, the agriculturists have to make use of the pioneering strategies. Agriculture is the main occupation in our country because the large population is living in rural areas and having agriculture as their source of revenue. Sustainable development in the agriculture sector aims to amplify the output, efficiency and the level of employment with more aims to keep and conserve the natural resources by the over-consumption.

Keywords :- Agricultural production, Sustainability, Agriculture, Biodiversity, climate change, Water Resources.

INTRODUCTION :- The development of Sustainable agriculture combines the three most important goals. Economic prosperity, Environmental health and livelihood sustainability. On the other hand, sustainability rests the opinion that we should convene the needs of the present with no compromising the ability of the future generations to assemble their own needs. Therefore, the maintenance of both natural and human resources is of prime importance. The conservation of human resources includes thought of the social responsibilities such as the working and living conditions of the farm families, needs of rural communities, and consumer health and safety both in the existing and the future. The conservation of land and natural resources involves maintaining and enhancing this vital resource base for the long term. Sustainable agriculture is one that produces the plentiful food with no depleting the earth's resources or polluting its surroundings. It is crop growing that follows the principles of nature to expand systems for raising crops and livestock that are, like nature, self-sustaining. Sustainable agriculture is also the agriculture of social standards, one whose success is interchangeable from exciting rural communities, rich lives for families on the farms, and nourishing food for everybody. But in the first decade of the 21st Century, sustainable agriculture, as a set of commonly accepted practices or a model farm economy, is still in its infancy more than an idea, but only just.The agriculture sector also contributes to the sustainable development of a country. Sustainable agricultural development depends upon the availability of the natural resources of the country. India is a country where about two third of the population lives in the rural areas and having agriculture as their livelihood.

Characteristics of Sustainable Agriculture While reducing the impacts on environment and

- A Produce safe and healthy foode characteristics of sustaina
- Conserve natural resources
- Ensure economic viability
- Deliver services for the ecosystem
- Manage the countryside

- Improve the quality of life in farming areas
- Ensure animal welfare
- Ensures sufficient production for current and upcoming generations
- Supports the multi functionality of agriculture

POINTED FOR THE STUDY :- Agriculture plays an important position in economic growth and development and has, therefore, remained the largest platform. Agricultural performance in the 90s has randomly fluctuated extensively with a waning trend over the period. The close association between the performances of agriculture and that of the economy apparently entails that agriculture must grow at a high rate for it to stimulate economic growth. On the other hand, for agriculture to grow at the expected rate, and it is essential that quality investments are done in key areas that have potential for growth. In the last three decades, the government has realized that non-targeted investments in agriculture could be unacceptable. some future investments in agriculture should consequently be focused to shun such disappointments and attain the planned objectives. For example, even with the wide-ranging poor performance of the agriculture, few sub-sectors such as horticulture and dairy have performed glowing. Accordingly investments in agriculture ought to be targeted to the areas that are liable to attain the high productivity.

OBJECTIVES OF THE STUDY :- The study has the following objectives:

1. To study the problem and challenges with the position of the agricultural sector and development.
2. To examine that how and to what amount of sustainable development is touching the production policy in agricultural sector in India.
3. To recognize the areas of intervention that could attain the sustainable agricultural growth.
4. To analyze the extent of sustainable development in the agricultural sector in India.
5. To find the future prospects and solution for India.

DATA SOURCE AND METHODOLOGY :- The study is based on the secondary data that is obtained from the following sources: -

- Books, Articles, Reports, Journals, Magazines, News Papers and Government websites.

AGRICULTURE SECTOR OF INDIA :- Agriculture the most well-known sectors of the Indian economy. It is the source of income for approximately two third of the rural population workers in the country residing in the rural areas. Besides Indian agriculture provides the employment opportunities to 65% of the labor force, accounts for about 27% of GDP, contributes 21% of total exports and raw material to more than a few industries. The livestock sector contributes an predictable 8.4% to the country GDP and 35.85% of the agriculture production.

In India about 75% people are living in rural areas and are still dependent on agriculture, that is why Indian economy is an agragrian economy and about 43% of India's geographical region is used for agriculture actions. Thus the estimated production of food grains is about 211.17 metric tones in our country. The total geographical area comes under the agriculture are 329 MH out of which 265 MH represent varying degree of potential production. The net sown area is 143 MH out of which 56 MH are net irrigated area in the country.

AGRICULTURAL PRODUCTION IN INDIA :- The Agriculture production of india and in the most parts of the country is closely associated to the most favorable use of the available natural and human resources of the country. Therefore, riding on the back of agro climatic circumstance are rich in natural resource base, today india has become the world's leading manufacturer of the several commodities. India is a leading manufacturer of different commodities like coconuts, mangoes, milk, bananas, dairy products, ginger, turmeric, cashew nut, pulses and black pepper. India is also

the second major producer of rice, wheat, sugar, cotton, fruit and vegetables. Indian agricultural production is intimately associated to the adequate and wise water management practices. Most of the agricultural practices in our country cramped to a few monsoon months. During the monsoon season, India is generally capable with generous rainfall; even though not infrequently, this abundant monsoon turns into the terror, causing unmanageable floods in the different parts of the country and ultimately affecting the agricultural production.

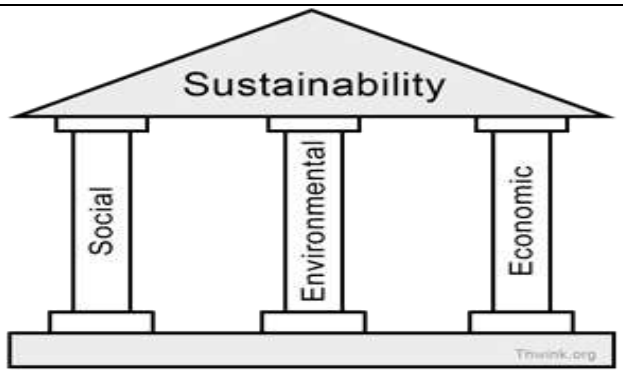
Tabular representation of Agricultural productivity in India.

Agricultural productivity in India, growth in average yields from 1970 to 2010

Crops	Average yield, 1970-1971	Average yield, 1990-1991	Average yield, 2010–2011
	kilogram per hectare	kilogram per hectare	kilogram per hectare
Rice	1123	1740	2240
Wheat	1307	2281	2938
Pulses	524	578	689
Oilseeds	579	771	1325
Sugarcane	48322	65395	68596
Tea	1182	1652	1669
Cotton	106	225	510

Source: http://en.wikipedia.org/wiki/Agriculture_in_India

SUSTAINABLE AGRICULTURE DEVELOPMENT :- The problems of sustainable development can be discussed below the three extensive types of farming systems viz. customary production system, modern agriculture system and sustainable agriculture system. Besides, we can contrast them diagonally into the three dimensions, environmental, economic, and social sustainability.



The three Pillars of Sustainability

The principle of The Three Pillars of Sustainability says that for the complete sustainability problem to be solved all three pillars of sustainability must be sustainable. The three pillars are social sustainability, environmental sustainability, and the **economic sustainability**.

Ecological Sustainability :- The majority of the traditional and conservative farm practices are not economically sustainable. They use wrongly the natural resources, tumbling the soil fertility which causes soil erosion and contributing to the global climatic transformation. Although the sustainable agriculture has some main advantages over the traditional practices.

Soil Fertility :- The constantly reduction in the soil fertility is one of the foremost problems in several parts of India.With the help of Sustainable

agriculture the fertility and soil structure of the earth is improved.

Water : Irrigation is the prime consumer of fresh water, and fertilizer and pesticides polluted both the surface and ground water. Sustainable agriculture amplify the organic matter content of the top soil, therefore raising its ability to preserve and store water that falls as rain.

Biodiversity : Sustainable agriculture practices involves the mixed cropping, accordingly increasing the variety of crops produced and raising the diversity of insects and other animals and plants around the fields.

Health & Pollution : The Chemicals, pesticides, and fertilizers defectively affects the local ecology as well as the population. Haphazard utilisation of pesticides, inappropriate storage etc. may leads to health problems. With the help of Sustainable agriculture it reduces the use of dangerous chemicals and control pests.

Land use Pattern : Over-exploitation of land causes soil erosion, landslides, and flooding clogs irrigation channels and reduces the arability of the land. With the help of Sustainable agriculture we can avoid these problems by improving the productivity and conserving the soil.

Climate : The conservative agriculture contributes to the production of greenhouse gases in different ways like tumbling the quantity of carbons stored in the soil and in vegetation, through the production of Methane in irrigated fields and the production of artificial fertilizers etc. By adopting sustainable agriculture system, one can easily beat this trouble.

Economic Sustainability :- The economic sustainability is the capability of an economy to sustain a defined level of the economic production indefinitely.For agriculture to be sustainable, it must be economically feasible over the long term. conservative agriculture involves more economic risk than sustainable agriculture in the long term. Sometimes governments are tending to view the export-oriented production systems as more significant than the supply of domestic demands. This is not exact, but focusing on the exports only involves the unseen costs in transport and in assuring the local food security etc.The policies must be care for the domestic demand and in exacting food security as similarly vital to the visible of the trade balance.

Social Sustainability : The capability of a society and to develop the processes and structures which not only meet the needs of its current members but also maintain the ability of the future generations to preserve the healthy community. The Social sustainability is in the farming techniques is associated to the ideas of social acceptability and justice. Development cannot be sustainable unless it reduces the poverty.The sustainable development aims at increasing the productivity as well as growing the level of employment in the country. Development is worthless if it is not able to reduce the level of poverty. Many modern technologies are unsuccessful because of their inadequacy like complexities in use and are not easily reachable to the poor farmers. In old method of the agriculture system the women's had more burden of work.

Emerging Challenges and Opportunities : The session on 'Emerging Challenges and Opportunities' began with a keynote address by Dr M.S. Swaminathan, Member of Parliament and Chairman, MSSRF. He cherished the timely proposal of TAAS in organizing the workshop since its recommendations could afford a new policy direction to the new government. Such efforts were required to address the current challenges like management of global food crisis, adaptation to climate change, and the cooperatives of increasing farm incomes. His address focused on the following five major issues:

The first and leading issue was of conservation and, wherever possible, enhancement of ecological foundations for sustainable agriculture, which included land, water, biodiversity, and marine resources.

Urbanization was exerting the terrific pressure on available of land and water resources. Prime agricultural land was getting converted to non-agricultural uses, which required to be reversed through the appropriate land use policy. Common property resources required to be protected as well. There was a noteworthy innovative development in small farm management in respect of all the sub-sectors, i.e., crops, animal husbandry and fisheries. This process required to be confident and to provide the power of mass production to production done by the mass of small farmers. The Institutional mechanisms enabling this process should encompass (i) a decentralized production for growing the availability of quality seeds with the essential insurance coverage, (ii) delivery of enhanced technology and associated services to the farmers, and (iii) aggregation of produce to get better market access, which basically should target 'end-to-end' or 'farm-to-plate' approach covering production, processing, marketing, etc. In addition, the agriculture should be made a efficiently pleasing and rationally satisfying occupation to attract the youths to farming.

The direction of the agricultural development should shift from increasing production to raising farm income. This was the significant to check the widening rural-urban inequality and to diversify rural livelihood options, covering crops, livestock, fisheries and horticultural activities. Consequently, linking farmers to market must receive the high priority.

ISSUES & CHALLENGES :- The middle issue in agricultural development is the obligation to improve the productivity, generate employment, and afford a source of income to the poor segments of population. Studies by FAO (Food and Agriculture Organisation) that have shown small farms in the developing countries that contributes around 30-35% to the total agricultural output.

The speed of adoption for the modern technology in India is slow and the farming practices are too messy and unscientific. Some of the basic issues for the development of Indian agriculture sector are renaissance of the cooperative institutions, improving rural credits, research, human resource development, trade and export promotion, land reforms and education.

FUTURE PROSPECTS AND SOLUTION FOR INDIA :- The Agriculture sector is an important donor to the Indian economy approximately which shows the socio and economic rights and deprivations rotate and any change in its structure is likely to have a corresponding blow on the existing pattern of social equity. Sustainable agricultural production depends ahead the efficient use of soil, water, livestock, plant genetics, forest, climate, rainfall, and topology. Indian agriculture faces resource constraints, infrastructural constraints, institutional constraints, technological constraints and policy induced restrictions.

Sustainable development is the organization and protection of the natural resource base and the direction of technological and institutional change in such a manner as to make certain the accomplishment and continued satisfaction of human needs for the present and future generations. The sustainable development in the agriculture, forestry and fisheries sector, conserves land, water, plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically possible and socially satisfactory. Therefore, to achieve the sustainable agriculture development and the optimum use of natural resources, human resources, capital resources and technical resources are necessary.

In India, the crop yield is profoundly dependent on rain, which is the main reason for the declining growth rate of agriculture sector. These uncertainties hits the small farmers and laborers worst, which are frequently leading a hand to mouth life. Therefore, something must be done to the support farmers and sufficient amount of water and electricity must be supplied to them as they feel anxious and carry on to die of drought, flood, and fire. Our country is the second largest country of the world in terms of population and it must be realize that it is a great resource for the

country. India has a enormous number of idle people. So there is a need to find the ways to explore their endowment and make the numbers which donate towards the growth, particularly in the agriculture and inactive unemployment can be noticed.

The sustainable development in India can also be achieved by the fuller utilization of human resources .A large part of poor population of the country nearly 75% is engaged in the agricultural sector, unless we increase their living of standard, and on the whole the growth of this country is not possible. If we keep ignoring the poor and this inequality will keep on the increasing between classes. Debt traps in the country were forcing to the farmers to commit suicides. People are migrating towards the cities with the great hope of better livelihood,but it is also rising the slum population in the cities. Therefore, the rural population should be given employment in their areas and a opportunity to grow. India has been carrying the label of "developing"country for quite long now; for making the move towards "developed" countries, we have got to get rid of this huge dependence on the agriculture sector.

CONCLUSION :- Thus we may conclude that for a growing country like India the practice of sustainable agriculture is of quite importance as it accelerates the productivity, efficiency, employment, and providing guidance to reduce the practices which affect the quality of soil, water resources and degradation of other natural resources. It essentially aims at the adopting of interest and using the environment friendly tools to protect and conserve the environment as well as to improve the level of production without harming to the environment. As we see the performance of agricultural sector of India we will be recognize without doubt that the performance have been increased in a considerable manner over the years. Despite of many challenges like urbanization, Growth of secondary sector etc. it has achieved a important growth.

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Migration and Urbanization Challenges in India, an Overview

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Abstract :- Migration and urbanization are direct advents of the process of economic development in space, especially in the current phase of globalization. Understanding the causes and consequences of the former in terms of the changes in the distribution of population and economic activities, along with the success and failures of the interferences by state and other organizations would be extremely important for evaluating the available policy options and exploring areas of possible strategic intervention.

Key words :- Economic development, Urbanization, Migration, Organizations.

Introduction :- Urbanization is the process that leads to growth in the number of people living in urban areas. It mainly results from the physical development of cities. Urbanization involves natural increase in population, migration and reclassification, which leads extension of urban areas both vertical and horizontal (WHO, 2010). According to Clark (1982), urban growth is a spatial and demographic process and refers to the increased importance of towns and cities as an attentiveness of population within a particular economy and society. The twentieth century witnessed a rapid shift of population from rural to urban areas in most of the countries of the world. A merely 13 per cent of the global population lived in urban areas in 1900, which increased to 29 per cent in 1950 and to about 50 per cent by the close of twentieth century (U.N. 2006). Globally, 54 percent (3.9 billion) of the world's population living in urban areas, and it is projected to reach 66 percent by 2050 (UN, 2014). According to UN (Population Division of the Department of Economic and Social Affairs, 2014) projection that three countries India, China, and Nigeria will account 37 percent of projected growth of the world population from 2014 to 2050. Economic growth has great impact on bringing faster urbanization (Bhagat, 2011). The present level of urbanization in India is 31 percent. During 2001-2011, 377 million people added in urban population with a growth rate of 2.76 percent (Bhagat, 2011). The rate of urbanization in India has been increased faster than expected rate. India's urbanization will be slow down as expected by urban experts (Kundu 2007). The present level of urbanization in India is 31 percent. During 2001-2011, 377 million people added in urban population with a growth rate of 2.76 percent (Bhagat, 2011). It is projected to add 404 million more urban dwellers by 2050 (UN, 2014). It will account around half percent of the total population by 2050.The state of Jammu and Kashmir also shows a significant variation in the distribution of urban population among its districts and regions. The urban population and settlement distribution exhibit a highly uneven pattern due to the influence of physiographic and environmental factors (Bhat, 2008). Census of India follows two criteria for defining urban; the first one is administrative principles and second is demographic and economic criteria. As per first criteria, the state government grants municipal status corporation, municipal council, notified area committee or Nagar Panchayats, etc. to a settlement. These towns are known as constitutional towns or municipal towns. On the other hand, if a settlement did not fulfill the above administrative standards but satisfied demographic and economic criteria i.e. a place having a population 5000 or more, a density of 400 per square kilometre (1000 persons per square mile) and at least 75 percent of the male workforce are engaged in the non-agricultural sector. Such urban areas are termed as census towns (Census of India, 2001).

Urbanization in Jammu and Kashmir :- The level of urbanization in the state of Jammu and Kashmir has increased from mere 8.46 percent in 1901 to 27.37 percent in 2011 witnessing almost a three-fold increase in more than a century. The number of towns has increased from only 10 in 1901 to 122 in 2011 in the state. Kashmir region shares the most of the urban population of the state with 63.42 percent followed by Jammu region (34.77 per cent) and Ladakh region (1.81 per cent) as per Census of India, 2011. Srinagar district is the most urbanized district 98.6 percent followed by Jammu district with 50 percent urban population. Ramban district with 4.16 percent and Shopian with 6.15 percent are the least urbanized districts.

Migration from rural to urban :- In the past seven decades geographers have been paying great attention towards the aspect of economic and regional development. The process of economic development involves dealing with a number of regional geographical aspects and hence, the problem has attracted the attention of many geographers. During ancient times, the cities and rural area were clearly defined; the cities and rural areas were around the city. In the rural area people were engaged in the agriculture and animal husbandry, in the cities people were engaged in non-agricultural activities. This distinction has persisted through time. But now, the scenario has completely changed. The towns and cities are growing rapidly. Rapid industrialization along with an unprecedented increase in population has enhanced the scope of economic activities of the urban centers both in magnitude and character (Gupta, Archana, 2012). Hence the cities are expanding beyond their administrative boundaries, encroaching upon their surrounding rural areas in the process of expansion. Generally, their development happens to be in a random, continues and unplanned manner. In this type of development, there is a revenue flow of people from the city to the country side. This rural urban interaction between the town and countryside has created a rural urban fringe around them, which exhibit an intermixing and overlapping of urban and rural character (Jyotsana, P., 2000).

The interactive system that had previously evolved through the centuries between a large number of handicraft, service and commerce-based towns and their vicinity of primary production, as well as between large cities and smaller towns in the pyramid, was the major fatality of this process of urbanization (Desa, U. N. 2014). A few of these towns were also inducted into a mechanism of extra expropriation and became centres of collection and processing of primary goods while the others were allowed to decline away. The new urban centres, endowed primarily with instincts for trade, failed to circulate impulses for balanced regional development. Instead, they acted as satellites of the port towns that were themselves satellitic to the global metropolis. Even the former were largely unfamiliar to the internal economic system because the productive activities and commerce transacted more with the world market than with the native people (Kundu, A. 2007). The foreign policy of industrialization resulted in the concentration of units producing goods mostly for consumption within the few large cities. These, however, exerted powerful backwash effects, resulting in the liquidation of secondary activities in the rural hinterland. The substitution of an interactive and generally symbiotic relationship with an exploitative one resulted in an overall weakening of the economic base. The displacement of the workforce from primary and secondary sectors in rural areas, and their non-absorption in the formal urban economy, led to serious problems of unemployment, informal employment and poverty.

As rural–urban migration was not taking place in response to the increased demand for labour in productive sectors of the economy, the urban centres did not have the capacity to integrate the migrants who shuttled like refugees between places of origin and destination, and also between various informal activities. Consequently, the dysfunctionality of the cities in the context of the regional economy increased and this, in turn, generated serious socio-economic modifications, affecting their internal organization. The cities

were planned with a view to providing high-quality civic facilities to the elites linked to the ruling class or those who could afford high prices. The segmented structure of the cities ensured that the service class lived nearby but did not overburden the infrastructure of the core areas.

Conclusion :- Urbanization is considered to be an important process of socio-economic development and cultural transformation. All over the world, urban centers, cities and small towns are expanding by migration and natural increase in population. One of the most important aspects of urbanization in India is the tendency towards concentration of population in large urban centers, this has serious implication. The cities are growing rapidly and services are not able to keep up with the pressure of population. These growing cities have literally expanded into the surrounding leading to change in land use pattern, morphological character and social and economic lives of the rural folk living in the peripheral areas of cities. It is this undeveloped space into which a town or city expands by circumferential or radial growth. Generally, their development happens to be in a haphazard, spontaneous and unplanned manner. In this type of development, there is a revenue flow of people from the city to the countryside. It is a continuous process through which rural landscape on the edge of the cities is being replaced by urban and semi urban development. This rural urban interaction between the town and countryside has created a rural urban fringe around them, which exhibit a melding and overlapping of urban and rural character.

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Importance of Agriculture on Rural development in Indian economy

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ABSTRACT :- Agriculture plays an important and vital role in any economy generally, for developing countries Particularly and for a country like India especially. Basically India is an agricultural country with 143 million hectares of land as net sown area, the highest percentage of land under cultivation in the world. The country accounts for 17 percent of world's population and ranks at second largest populated country. The country has about 69 percent of population living in its rural areas and villages and the sole source of their livelihood is agriculture and allied activities. Cereal and many ground crop production in agriculture has beset many problems and many scholars have admitted that agricultural diversification towards high value commodities will strengthen agriculture growth in future and will result high remunerative returns to farmers. Again the horticulture and other allied activities have lot of backward and forward linkages which resulted wide employment opportunities and income flow, equally distributed to all in these rural areas hence helps in the development of rural India. The paper will enshrine role of agriculture in rural development and role of diversification to develop agriculture sector itself and is based on secondary data sources, NSSO, Census data is being used in the paper. Agriculture is an important part of India's economy and at present it is among the top two farm producers in the world. This sector provides approximately 52 percent of the total number of jobs available in India and contributes around 18.1 percent to the GDP. Agriculture is the only means of living for almost two-thirds of the employed class in India. Agriculture plays the most crucial role in balancing the socioeconomic profile of India and occupies the centre stage in the country's economic welfare. Indian agriculture is a diverse and most extensive sector. Since Independence, the country has witnessed significant increase in food-grain production (green revolution), oilseeds (yellow revolution), milk (white revolution), fish (blue revolution), and fruits and vegetables (golden revolution). Gone are the days where the nation had to 'beg without a bowl', through PL-480, and had to depend upon the excess wheat that the United States was dumping in the open seas. Today, the country has marched on from food security to food sufficiency and has materialized food sovereignty. All these have become possible owing to the application of cutting edge of science coupled with the positive policy support, and commitment of agricultural research intelligentsia and Indian farmers alike. The role of successive central and state governments in the form of various schemes and plans regarding investment, technology transfer and other aspects have vitalized agricultural growth and rural development. The Green Revolution technologies and the liberalization policies have contributed immensely to the Indian economy by providing food self-sufficiency and improved rural welfare. The role of agricultural scientists has been proved imperative in this regard. Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture. Agriculture is an important sector of Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over last few decades. The food grain production has increased from 51 million tones (MT) in 1950-51 to 250MT during 2011-12 highest ever since independence.

Key Words :- Agricultural sector, GDP, Rural Development, High Value Commodities.

Introduction :- From a nation dependent on food imports to feed its population, India today is not only self-sufficient in grain production, but also has a substantial reserve. The progress made in agriculture during the last four decades has been one of the biggest success stories of independent India. Agriculture and allied activities constitute the single largest contributor (almost 33 per cent) to the Gross Domestic Product. About two-thirds of the work force in the country depends on agriculture as a means of livelihood. Despite these impressive gains, India, at present, finds itself in the midst of a paradoxical situation: On the one hand there are record food grain stocks standing at an all-time high (62 million tonnes against an annual requirement of around 20 million tonnes for ensuring food security), and on the other hand, over 200 million of India's population is underfed, and millions are undernourished. The challenge is to bridge this gap. In a scenario of shrinking land and depleting water resources, the challenge of the new millennium is to increase biological yields to feed the ever-growing population without destroying the ecological foundation. It is thus important–not to package this challenge as a demand or imposition of society on farmers, for which farmers would bear the cost, but as a necessity and methodology to also sustain their welfare and incomes. India has the potential to meet these challenges. This potential can be realized through policy and infrastructure support from the government and by strengthening proactive synergies among the various sectors that play influential roles in the field of agriculture and rural development. The National Policy on Agriculture seeks to actualize the vast untapped growth potential of Indian agriculture, strengthen rural infrastructure to support faster agricultural development, promote value addition, accelerate the growth of agro-business, create employment in rural areas, secure a fair standard of living for the farmers and agricultural workers and their families, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalization.

Promote Sustainable Agriculture and Rural Development :- Agriculture is directly linked to very many facets of sustainable development, including poverty eradication, sustainable consumption and production, management of natural resources, energy, freshwater, health, education, trade and market access, as well as technology transfer and capacity building. Agriculture is an integral part of the general development system, serving the system as a whole, and being served by it. If the effects of other sections of the development systems reduce sustainability, then sustainability of agriculture is also affected. A sustainable system should be resilient, and able to withstand shocks and failures of parts of its systems without the whole collapsing, and without small shocks leading to a spiral of unsustainability. Agriculture centres on integrated use of natural resources such as soil, water, climate and biological diversity. The integration of agriculture with other aspects of land management and ecosystem conservation is essential in order to promote both environmental sustainability and agricultural production.

• Natural resources have to be accessible to the poor, which in the farm sector means secure rights to land, water and genetic resources. For this, there is a need to develop public-private partnerships.

• Policies for land and water resource management, biodiversity protection, infrastructure investment, strategy on institutional market reforms, reduction of tariffs and phasing out of possible commodity control are integral to achieving sustainable agriculture.

• Sustainability should be seen in the context of different agro-climatic zones as well of as the country as a whole. Suitable technologies should be developed and indicators for sustainable agriculture should be identified for both.

• It is essential to provide funding for integrated rural development plans, programmes and strategies, at national and regional levels, with particular emphasis on investment in economic and social infrastructure in rural areas, enterprise

development, human resource development, and capacity building for local governance.

• An efficient credit policy regime with the required rural banking and credit system will play a major role in the future. The government should encourage investment in vital agriculture infrastructure, credit linkages, and use of new and appropriate techniques towards this end.

• More than 70 per cent of the country's agriculture is under small and marginal farmers with limited resources. A nationwide crop insurance scheme will provide such farmers the needed confidence to invest and gain from technological advances in agriculture.

The paper will discuss the common role that economy and agriculture sector has still lot of agriculture sector is playing and can play for rural bearings on the overall growth and development of development and will present a case show of various the country generally and rural development linkages through which agricultural growth can be particularly. Although, the economic contribution of transformed to rural development and overall agriculture to India's GDP is steadily declining with economic growth. Almost all the studies related to the country's broad-based economic growth, still agriculture and development enshrines that agriculture is demographically the broadest agriculture sector has prime hand in the growth and economic sector and plays a significant role in the development transformation of any country. The overall socio-economic fabric of India. Agriculture, paper will like to describe how agriculture sector will with its allied sectors, is unquestionably the largest lead to rural growth and development but for that it livelihood provider in India, more so in the vast rural is mandatory that agriculture sector itself must grow areas. 69% of India's population lives in rural areas, and develop at a steady and consistent reasonable and three-fourths of the people making up these growth. Rural populations depend on agriculture and allied.

The Government of India is deeply consumption patterns. Agricultural surplus is sold recognized and is concerned with the widespread through commodity markets which, while always poverty and unemployment in the rural areas and central to India's rural economy have undergone-has taken several initiatives including the rapid transformation in recent years. New implementation of Mahatma Gandhi National Rural commodities, the modernization of markets through Employment Guarantee Scheme (MGNREGS). The commodity exchanges, future trading and the rural sector in India is undergoing a transformation emergence of organized retail strongly linked to and the contribution of rural non-farm sector to the farming, have brought the rural and urban closer. Rural income and employment is growing (Kumar ET Agriculture remains at the heart of rural livelihoods al. 2011).

3. Current Status

1. The Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA) is responsible for the collection,.(a) weekly and daily wholesales prices, (b) retail prices of essential commodities, (c) farm harvest prices.

2. Weekly wholesale prices cover 140 agricultural commodities from 620 markets.

3. Retail prices of essential commodities are collected on a weekly basis from 83 market centres in respect of 88 commodities (49 foods and 39 non-foods) by the staff of the State Market Intelligence Units, State Directorates of Economics and Statistics (DESs) and State Department of Food and Civil Supplies.

4. Farm Harvest Prices are collected by the field staff of the State revenue departments for 31 commodities at the end of each crop season and published by the DESMOA.

3.1 Some salient facts about Agricultural scenario

1. Agriculture is the largest provider of livelihood in rural India
2. It contributes 25 percent to India's GDP
3. It is still dependent primarily on the monsoons
4. The growth in agricultural production has been stagnant for the past several years.
5. The drought in north and western parts in FY09 created shortages in supply of food grains.

3.2 Contribution to GDP over the years

Sector	1980	1990	2001	2003
Agriculture	38.1	31.1	24.7	22.2
Industry	25.9	29.3	26.4	26.8
Service	36	39.7	48.8	51.0

Source: Bayes and Ahmed (2003)

3.3 Role of agriculture in Indian economy :-

1. Share in National Income.
2. Largest Employment Providing Sector.
3. Contribution to Capital formation.
4. Providing Raw Material to industries
5. Market for Industrial Products.

3.4 Importance in International Trade :-

1. Share in national income.
2. Source of employment.
3. Provision of food grains.
4. Supply of raw materials to industrial sector.
5. Market for industrial product.
6. Earner of foreign exchange.

4. Conclusion :-

1. Change is happening in rural India but it has still a long way to go
2. Agriculture has benefited from improved farming techniques but the growth is
Not equitable.
3. Land use is changing in rural areas as farmers are getting good value for their holdings. The effort should be to stop the migration to urban areas
4. Wholesale prices are primarily used to monitor the weekly price movements.
5. The number of essential commodities should be reduced to an absolute minimum, especially the non-food crops.

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Impact of Globalization and Migration : A Philosophical Perspective

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ABSTRACT :- Globalization refers to integration of different national economies at the global level. It is a multidimensional process that amalgamates economic, cultural, and social change. Interconnectedness of globalization and migration is an old concept. We can see the causes and consequences of globalization and migration clearly. LPG (Liberalisation, Privatisation & Globalisation) helped world economy to align more efficiently thus leading to migration. World is experiencing an intra-country, inter-country, legal, illegal, political etc., types of migration. From the philosophical perspective the core issues of migration and its impact raises ethical and political concerns. Migration is still seen as something pathological, and nations act not only as natural and given but also as largely benevolent institutions. The history of humanity is a history of mobility, but political philosophy has often operated under assumption of stasis in which migration is ignored or treated as pathological and exceptional. But amidst of this we can also see some nation state as a source of solidarity, identity, and distributive justice.

New directions for the Philosophy of immigration reflects the idea that migration is something exceptional and temporal, a process that has to be brought to a swift end or has to be undone. This raises interesting questions on the relationship of political philosophy and neighboring disciplines such as law. In sum this paper presents many problems and demerits in contemporary political philosophy and ethical concerns regarding migration. It is helpful and enlightening because it points to several of these problems at the same time as it exemplifies some of them.

MIGRATION :- Actually the word migration is an umbrella term that not only includes those who migrate in search of greener pastures but also comprise of refugees and displaced people. The characteristics of these people is that they move across national or international borders either permanently or temporarily. If all migrants were to be put into a single nation, it would be the world's fifth populous country. By citing this example what I simply want to argue is that to understand why migration as a process is important for social scientists? It is important for various reasons, it is not merely numbers which are moving across but these numbers have a distinctive human characteristics. There are reasons for which they are leaving their places behind and also there are reasons which make them go towards places where they want to set up.

To dwell further on this lets understand the types of migration:

- **Voluntary and Forced migration**: Voluntary migration means willfully leaving behind their native places to pursue economic opportunities for personal gains whereas the forced migration means when the migrant is not ready to migrate, but is forced to do so.
- **Economic and Political migration:** In case of economic migration, this is done to seek monetary benefits where the person who is migrating can locate for himself/herself, greener pastures from purely economic terms. On the other hand political migration is not something which one would welcome in one's life. It's like forced migration. In political migration, migration takes place to avoid the trauma of war in the native's place or political turmoil where the individual has been on the receiving end. S/he or their family has been brutalized or there is a threat to the life, there is a threat to their very existence.So, economic

migration is for greener pastures whereas political migration is more for individual survival in terms of better condition of living not in terms of economics but purely in terms of existing as a human politically, socially, culturally and free of any kind of brutality or oppression and suppression by the State or other community or group.

Now many a times migration is welcomed whereas there are certain categories of people who are well qualified and are invited to migrate to a country. Hence we can also talk about, legal & illegal migration. In the case of former the papers are in order, the person migrates and gets permanent residency then that translates into the country of origin, which allows them to leave, go and settle in the new place, sometime it is citizenship of the new country. But you must have heard of people trafficked human beings across the borders, this is illegal migration. This is done through forged papers and other dubious means. So, migration is not a homogeneous category and there are different kind of migrants and also there are different processes of migration, legal and illegal.

- **Permanent and Temporary migration:** In permanent migration the people who are migrating, look forward to settling down for life. Traditionally these people are called as immigrants and the phenomenon is called immigration. Whereas temporary migration is when people migrate to fulfill certain needs like completing education, employment etc. but once their aim is achieved they would like to come back to their country of origin. Citing following examples:

1. **Jewish Diaspora -** In 586 B.C. after the destruction of temple in Jerusalem.
2. **Russian Programs -** When the Russians forced Jews to leave their soil and later, during the Holocaust in the Nazi, Germany the Jews migrated.
3. **Punjabi migrants from India -** migrates Vancouver, Canada other advanced have developed several hubs of Punjabi culture in their vicinity and are fondly called as mini-Punjab.

It is often said that population flow of refugees and exiles are outcomes of forced migration only and not a byproduct of state action, but they also occur due to market forces.

MAJOR NEGATIVE REPERCUSSIONS OF MIGRATION AND THEIR IMPACT – DISCONTENT

- **BRAIN- DRAIN :-** In modern terms that involves one way migration of highly intellectual manpower from less developed countries and that too, on a massive scale. Skill based migration from less developed countries is quite prominent in the present world scenario. For the receiving countries where in these migrants of intellect bring along- welfare, income, maximizing natural growth perspective. But same is the loss for the sending nations i.e., from where these migrants have originated and have left their mother land i.e., country where they were born. It is a process that leads to loss of income, welfare and development thus, widening disparities at international level. For individual benefit they do not stay back in their own country but move on to greener pastures. While they move up, the country suffers a loss of qualified people which we called as brain-drain. The migration of skilled people is harmful as the country loses the stock of high quality manpower that is essential for economic development. Chances that these migrant intellectual minds would come back to their roots are almost negligible.

- **AMALGAMATION OF CULTURES :-** Something which too carries a lot of meaning in times to come. On an emotional front, these migrants face difficulty in embracing culture of destination country which results into cultural shock and feeling of solitude disseminates. Moreover, natives of destination country lack cultural acceptability as well, thus, adjustment of migrant becomes a tedious task. The fusion of cultures and their adaptation has given rise to fears about the dilution or disappearance of

local or traditional culture. Global culture presents a picture of conjugated cultures, which are a mélange of diverse elements. The coexistence of multiple cultures does not mean that these cultures are free from tensions and conflicts. The spread of culture arouse the feeling of superiority among one section and inferiority amongst the other, serving as germinating ground for attacks, culminating hatred in minds and hearts of people of other culture. There is a strong chance of a development of a strong ingroup feeling thus resulting into a phenomenon of ethnocentricism which can be dangerous for local population. It can lead to strife, enormosity at individual level and also group clash. The loss of culture and the homogenization of culture both is something which is not a happy state for many cultural traits and by the time they would disappear.

- **RACIAL DISCRIMINATION :-** It is a direct manifestation of fear that germinates from migration. In this the basic standards of living provided to migrants suffer because native treat them as aliens and this creates an environment of feeling of hatred, biasness and imbalance. Migration fiddles with psychological state of local people and they think that migrants may take over their jobs, kill their share of seats in educational institutions and they become ethnocentric. Increase in multi-ethnic societies, has marked an onset of discrimination and violence directed against migrants, refugees and other non-nationals by extremist groups in many parts of the world.

- **TRAFFICKING AND SMUGGLING :** According to the article 3 of the trafficking protocol-trafficking of persons in the recruitment, transportation, transfer harboring, receipt of persons by means of treat or use of force or other forms of coercion, of abduction, of fraud, of deception, of abuse of power, of position of vulnerability or of the given or receiving of payments or of benefits to achieve the consent of a person having control over other persons, for the purpose of exploitation.

- **DEMOGRAPHIC RATIO :-** The dependency ratio is an age-population ratio of those typically not in the labor force (0 to 14 and 65+) and those typically in the labor force (the productive ages 15to 64). It decreased artificially in urban areas as the sex ratio decreased contrary to this demographic ratio increased in rural area.

- **OTHERS :-** Carrying capacity in urban areas got disbalanced as the rural population migrated in search of standard living, slums mushroomed, sewage problems increased and it affected health, environmental problem left everyone devastated, organized crime rate increased, challenges to women security at workplace raised severe concerns, economic disparity widens etc.

MORAL AND POLITICAL PHILOSOPHY OF MIGRATION :- Looking from the past till the present scenario world is experiencing profound migration. Sometimes the presence of migrants in the receiving country deems 'unwanted' and illegal. In this context, the moral and political philosophy of immigration offers a timely and important contribution to politico-philosophical debates concerning the issue of immigration. Far from being simply a case for 'applied ethics', immigration is 'the most pressing issue that moral and political philosophers have to grapple with today', as it is around immigration that the modern conflict over the competing moral and political commitments of security, liberty, and equality is currently fought out. Tracing this conflict from the modern Western political philosophy to contemporary debates around immigration we see how modern Western political philosophy has primarily been concerned with security on the one hand and liberty on the other. Taking the US and its plenary power doctrine as a case in point, we can argue that today's immigration politics are largely stuck in a 'security dilemma'. Such a Hobbesian perspective regards security as the primary purpose of sovereignty

complete discretion. Ironically, giving the sovereign such power can endanger the individual's safety through the emergence of a state of exception. The solution can be found in constitutional democracy as a model of sovereignty which is primarily concerned with liberty instead of security. However, this brings us to a second problem- the liberty dilemma- as constitutional democracy is based on three commitments that often stand in tension with one another: democratic self-determination, universal equality, and individual freedom. Classical liberalism tends to prioritises democratic self-determination and universal equality. Even though the gap between them bridged in John Rawl's two principles of justice, Rawl's theory rests upon the assumption of a closed society and is hence unable to be instructive for questions of immigration. Immigration therefore throws us back into the liberty dilemma in globalized form. This recasts the frontlines by putting those who value democratic self-determination on one side and those who put more emphasis on individual freedom and universal equality on the other. Whereas the former make a point to favor state's presumptive rights to exclude immigrants, the latter tend towards open borders. The limitation to state discretion over immigration concerns both border enforcement and the internal enforcement of immigration policies. The reduction of border enforcement to 'morally acceptable levels' paired with immigration policies that take the reasons why people (want to) come to a specific country- such as family ties or economic circumstances- into account in order to reduce irregular immigration to a bare minimum. Moreover, this approach pairs an 'equality of burdens' standard that distributes the costs of internal border enforcement policies equally among the citizenry with a universal protection standard that guards all people living in a country from excessive enforcement, thereby guaranteeing at least minimal access to healthcare and the legal system.

CONCLUSION :- There are both international conventions and national constitutional frameworks and laws that frame how States can and cannot legitimately enforce immigration policies. Hence, less extreme cases of border enforcement politics appear relatively unproblematic. Consequently, a variety of more pressing questions regarding the legitimacy and practicality of immigration regulation and border control remain unanswered. From the moral point we can say that we must not forget humanity. Ethical and moral concerns teach us not to forget the very existence of human being and work for the betterment of humanity.

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Agriculture and Water Pollution

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ABSTRACT :- Water pollution occurs when harmful substances are released into the water in large quantities which cause damage to people, wildlife or habitat. Most human activities whether domestic, agricultural or industrial have an impact on water and the ecosystems. World Health Organization statistics indicate that half of India's morbidity is water related. About 70% of India's surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic and inorganic pollutants due to mismanaged disposal of industrial effluents, domestic wastes and agricultural pollutants. Such water sources have been rendered unsafe for human consumption as well as for other activities such as irrigation and industrial needs. Until recently communal and industrial waste water represented the highest pollution load but at present agriculture is in the lead in polluting surface and ground water and this trend has become a serious problem.

KEYWORDS :- Water pollution, Agricultural pollutants, Pesticides, Water quality.

AGRICULTURE AS A WATER POLLUTER :- Agriculture accounts for 70% of total water consumption worldwide and is the single-largest contributor of non-point-source pollution to surface water and groundwater. Nonpoint source pollution refers to diffuse contamination that does not originate from a single discrete source and is often the cumulative effect of small amounts of contaminants gathered from a large area. A common example is the leaching out of nitrogen compounds from fertilized agricultural lands. Point source water pollution refers to contaminants that enter a waterway from a single, identifiable source, such as a pipe or ditch. Pollution caused by large-scale industrial farming (including livestock and fisheries) is categorized as point-source pollution, and pollution caused by small-scale family-sized farming is considered non-point-source pollution.

Agriculture intensification is often accompanied by increased soil erosion, salinity and sediment loads in water and by the excessive use (or misuse) of agricultural inputs (e.g. fertilizers) to increase productivity. Pollution caused by agriculture can contaminate water, food, fodder, farms, the natural environment and the atmosphere. Pesticides and fertilizers used in agriculture can contaminate both groundwater and surface water, as can organic livestock wastes, antibiotics, silage effluents, and processing wastes from plantation crops.

AGRICULTURAL POLLUTANTS

1. **PESTICIDES :** The pesticides belong to a category of chemicals used worldwide to control weeds, pests and diseases in crops. These include preparations involving chlorinated hydrocarbons, organophosphates, bromine and iodine compounds. It is the earliest source of water pollution. Modern day pesticides have to deal with the local pests that have existed for hundreds of years along with the new invasive species. And so, they are laden with chemicals that are not found in nature. Once they has been sprayed, it does not disappear completely. Some of it mixes with the water and seeps into the ground. The rest of is absorbed by the plant itself. As a result, the local streams that are supplied

water from the ground become contaminated, as do the animals that eat these crops and plants.

2. **FERTILIZERS AND OTHER AGROCHEMICALS :** Intensive use of chemical fertilizers in farming result in leaching of the residual nitrate causing high nitrate concentrations in groundwater. Excess nutrients impact surface water quality when water and soil containing nitrogen and phosphorus flows along with runoff into nearby waters. Many fertilizers contains Fluoride and metals which are toxic in high quantities. Use of such high quantities of chemicals is irrarional since plants are capable of using only a limited part of the nutrients. The rest enters the surface and ground water hence polluting them.
3. **ORGANIC CONTAMINANTS** : Manures and Biosolids frequently contain nutrients including nitrogen, carbon, phosphorus and nitrogen. Furthermore, because they are industrially processed, they may also have within them contaminants such as personal care products (PPCPs) and pharmaceuticals. These products have been found in human and animal bodies and are believed to have negatively health impacts to wildlife, animals, and humans. Agricultural pollution becomes even harder to manage with such types of organic contaminants.
4. **HEAVY METALS** : The primary agricultural inputs including pesticides, industrial by-product wastes, some fertilizers, and specific agrochemical products contain traces of heavy metals such as arsenic, cadmium, mercury and lead. When these substances accumulate in the soil or waste dump, they can be washed into waterways or leach into ground water sources or get absorbed by plants, and are eventually consumed by animals and humans affecting their health or even causing premature deaths. Heavy metals can cause crop failure and poisons the livestock from contaminated water or food.
5. **WASTE FROM DOMESTIC ANIMAL BREEDING CENTRES** : Liquid and solid excretions from domestic animals and pollution produced in maintaining such agricultural facilities also contribute to water pollution. They contain high number of microorganism including many pathogenic agents.
6. **SOIL EROSION AND SEDIMENTATION** : Soil is comprised of many layers and it is only the topmost layer that can support farming or grazing. Due to inefficient farming practices, this soil is left open for erosion and leads to declining fertility each year. Whether eroded by water or wind, all this soil gets deposited in water bodies. The resulting sedimentation causes soil build up in areas such as rivers, streams, ditches and surrounding fields.

EFFECTS OF AGRICULTURAL POLLUTANTS :- Agricultural pollutants are highly toxic and have the potential of remaining in the environment for ages.

HEALTH ISSUES – Due to extensive use of Chemical fertilizers, manure, and sludge these chemicals are leached into ground water and can pollute drinking water which can pose serious health hazards. High pesticide use contributes substantially to indirect emissions of toxic substances. Pesticides cause serious health hazards to living systems because of their rapid fat solubility and bioaccumulation in non-target organisms. High concentrations of nitrate in drinking water can cause methemoglobinemia, a potentially fatal disease in infants, also known as blue baby syndrome. Again, pathogenic agents like bacteria and parasites from animal waste which get into drinking water can cause serious heath issues.

EFFECTS ON AQUATIC BODIES - Fertilizers, manure, waste and ammonia are washed off in the water bodies causing algal blooms which can ruin swimming and boating opportunities, create foul taste and odor in drinking water, It also reduces the amount of oxygen present in water which results in the death of many aquatic animals. Suspended sediment resulting from agricultural fields impairs aquatic life by reducing sunlight, damaging spawning grounds and becoming toxic to aquatic organisms.

DECREASING CROP YIELD - Crop production suffers from use of contaminated irrigation water. High salt concentrations limit the amount of water a plant can take up, resulting in high plant stress and decreased crop yields. High concentrations of metals also have negative effects on crop production. Further, plants can absorb the contaminants present in the wastewater and pose health risks to the grower as well as to consumers of the wastewater grown produce (fodder crops, greens and vegetables).

EUTROPHICATION : When excess nutrients are washed into the water systems e.g. rivers, lakes, streams or oceans during rainy periods, it alters the marine and freshwater nutrient cycles, and as an outcome the species composition of the respective ecosystems. The most common consequence is eutrophication which depletes the water dissolved oxygen, and in consequence can kill fish and other aquatic life.

REDUCED WATER AVAILABILITY : The foremost implication of water pollution is reduced water availability for agriculture. With rising levels of water pollution, surface water bodies as well as groundwater in certain parts of India are becoming unsuitable for agricultural use. As the demand is increasing for agricultural commodities, farmers are looking increasingly at non-conventional water sources of marginal quality, including wastewater. Domestic and municipal wastewater presents an attractive option because of its high nutrient content, especially when conventional water resources are scarce or lacking. But the unsafe use of non-conventional sources of water – especially wastewater – in agriculture can lead to the accumulation of microbiological and chemical pollutants in crops, livestock products and soil and water resources and ultimately to severe health impacts.

STEPS TO CONTROL AGRICULTURAL WATER POLLUTION :

1. The improved management practices of applying fertilizers that matches crop needs and soil fertility status can significantly reduce the water pollution resulting from fertilizer leaching to the groundwater. Further, adoption of controlled, delayed and slow-release fertilizers can minimize the nutrient loss through leaching.
2. To reduce the indiscriminate use of pesticides, crop-specific management practices have been developed to control pests. Besides, adoption of suitable soil and water conservation measures can reduce pesticides load in water bodies. Reduced application of pesticides, bans on certain active ingredients, revised pesticide registration criteria, training and licensing of individuals that apply pesticides, reduction of dose and improved scheduling of pesticide application to more effectively meet crop needs and to reduce preventative spraying, testing and approval of spraying apparatus, promotion of the use of mechanical and biological alternatives to pesticides are some practices that need to be standardized. These management options can have great potential to reduce the pesticide residues in the soil and their movement in water bodies.
3. Spraying adjuvants, proper mixing and precise application can reduce the deposition of pesticides on soil surface and their subsequent leaching to ground water or streams.
4. To reduce contamination from pesticides, farmers should use Integrated Pest Management (IPM) techniques based on the specific soils, climate, pest history, and crop conditions for a particular field. IPM encourages natural barriers and limits pesticide use and manages necessary applications to minimize pesticide movement from the field.
5. Farmers and ranchers can reduce erosion and sedimentation by 20 to 90 percent by applying management practices that control the volume and flow rate of runoff water, keep the soil in place, and reduce soil transport. Planting certain grasses, grains or clovers can help keep nutrients out of the water by

recycling excess nitrogen and reducing soil erosion.

6. **Managing livestock waste :** Keeping animals and their waste out of streams, rivers and lakes keeps nitrogen and phosphorus out of the water and restores stream banks.

CONCLUSION :- There is an urgent need to prevent pollution of water resources though keeping agricultural pollution in check is much harder than it seems. For the farms to become clean once again, levels of water, soil and industrial pollution have to be kept in check. Though India has defined wastewater discharge standards for the domestic and industrial sectors, there are no discharge standards for the pollution emanating from agriculture. Increasing the number of monitoring stations for effective monitoring of agricultural water pollution is the hard pressing need of the present times.

Over the last decade or so, governments have become stricter about enforcing regulations. Farmers are also becoming more aware of the damage and are looking for solutions. Many farms are moving back to traditional manure, direct irrigation from local water bodies and organic means of keeping pest populations in check. Big Agricultural farmers are also seeking ways to scale preventative measures without widespread business disruption. With the adoption of improved nutrients, pesticides, crop, soil and water management practices, it is possible to reduce the agricultural water pollution. But for the process of agricultural pollution to be fully reigned in, there has to be a complete shift in the way agriculture is practiced.

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Ecological Assessment of patterns in diversity and assemblage of Macro invertebrates in a Himalayan lentic water body of Kashmir

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Abstract :- An extensive ecological study was conducted on famous Dal Lake situated in the heart of the Kashmir valley to explore the patterns in diversity and assemblage of macroinvertebrate community inhabiting the lake. During the investigation a total of 24 macroinvertebrate species were recorded. The mean population density of macroinvertebrates was estimated 1410 ind./m^2. Arthropods were found to be most dominant with relative contribution of 42% followed by Molluscs with relative contribution of 35% and Annelids with relative contribution of 23%. The study revealed that macrophytic growth and architecture and nature of bottom sediment plays a significant role in determining the diversity and distribution of macroinvertebrates in lake-ecosystem. Further, it was observed that undesirable anthropogenic activities like sewage loading, waste dumping and agricultural run-off are emerging as most detrimental threats to aquatic ecosystems, which need to be mitigated to achieve goal of sustainable development.

Key words :- Diversity, Macroinvertebrates, Macrophytes, Dal Lake.

Introduction :- The beautiful valley of Kashmir aptly referred as “paradise on earth” has been known for its scenic heart throbbing beauty. The high altitude valley of Kashmir is of tectonic origin, lying between 33^{o} 25^{1} to 34^{o} 50^{1} North latitude & 74^{o} $72^{1}$to $75^{o}30^{1}$ East longitude. It encompasses a great array of fresh water bodies like lakes, ponds, rivers, springs, streams etc. These fresh water bodies of the Kashmir Himalayas have been playing a great role in the sociocultural and economic status of the valley since historic times. Besides being a source of attraction for tourists from all over the world, the valley lakes are great source of natural products like fish, fodder and a variety of economically important aquatic plants. However, the ecology of these lakes have changed considerably in the last few decades due to unplanned and unethical anthropogenic activities which have adversely effected these water bodies and are posing threat to aquatic biota of these water bodies. To deal with these threats and associated problems (e.g chemical contamination, loss of diversity) it is necessary to implement adequate restoration measures.

However, the primary step towards this ecological restoration process is to assess the status of these lakes, by analyzing the structure of its biological communities. In this regard macroinvertebrates have been considered as the most familiar targets for carrying out biological monitoring of water body because they represent the most diverse group of organisms that react to anthropogenic influence on aquatic ecosystem strongly and often predictably (Rosenberg and Resh, 1993). Macrozoobenthic fauna constitute an ecologically important community in aquatic ecosystems and are of immense ecological value. Reports have indicated that the composition and diversity of macro-zoobenthic community is closely linked to aquatic habitat conditions, with many species serving as biological indicators of

pollution (Malik and Ali, 2012) Study of the macrozoobenthos has received considerable attention due to their significance as biological indicators of environmental change in aquatic ecosystem and also as source of fish food organisms (Lonkar and Kedar, 2014).They also play an active role in cycling of organic materials.(Mir et al, 2016). Macroinvertebrates are specified as the important areas for maintaining the biodiversity (Mayer et al, 2007, Richardson and Danehy, 2007).

The present study was undertaken to study the diversity, distribution and density of macroinvertebrate fauna of the Dal Lake in order to understand the status of the lake, so that necessary steps could be taken by management authorities towards the ecological restoration of the lake

Materials and Methods :

Study Area :- The present study was carried out on Dal Lake, one of the most famous and beautiful lake of world, Dal Lake is a world renowned tourist spot and an integral part of glorious heritage and culture of Kashmir and is aptly regarded as a cradle of Kashmir civilization. Dal Lake is a natural Himalayan urban lake of fluviatile origin surrounded by mountains on its three sides. Dal lake is situated in the north east of Srinagar at an altitude of 1886 m above sea level between geographical coordinates of 34^{o} 6' -34^{o} 10' N latitude and 74^{o} 8' -74^{o} 9' E longitude in the heart of the Kashmir valley on the north east of the state summer capital Srinagar at the foot of the Zabarwan mountains. This beautiful lake is bounded on the east by Mahadev mountain range, on the south by Kohi Suleiman and on the west by Hari Parbat Hill.

The total catchment area of the Dal Lake is about 317 km^2 and has been divided into five sub-catchments. The major one is Dachigam-Telbal which alone is spread over 228 km^2, constituting about 72% of the total area. The catchment area of the Dal Lake is more than twenty times the area of the lake. The total water surface area of the lake is 11.45 Km^2 of which 4.1 Km^2 is under floating gardens. 1.151 Km^2 to 2.25 Km^2 are land marsh respectively, whereas a total volume estimated is 9.05×10 m^3 and the ratio between the mean and maximum depth (m) ranges between 0.20 and 0.25 indicating the gentle slope of the lake bed. It is believed that the Dal is fed up by a number of underground springs, but the main source is the perennial stream known as Telbal Nallah from north side which brings water from high altitude Marsar Lake. A small canal “Nalla Amir Khan” connects the Dal with Anchar Lake through Nigeen and acts as an additional outflow channel. .The Lake is multi basined comprising of four basins viz., Hazratbal, Bod Dal, Gagribal and Nigeen with an average depth varying from 1.4 to 1.8 meter (Mukhtar and Chisti, 2013 and Shah, 2012)

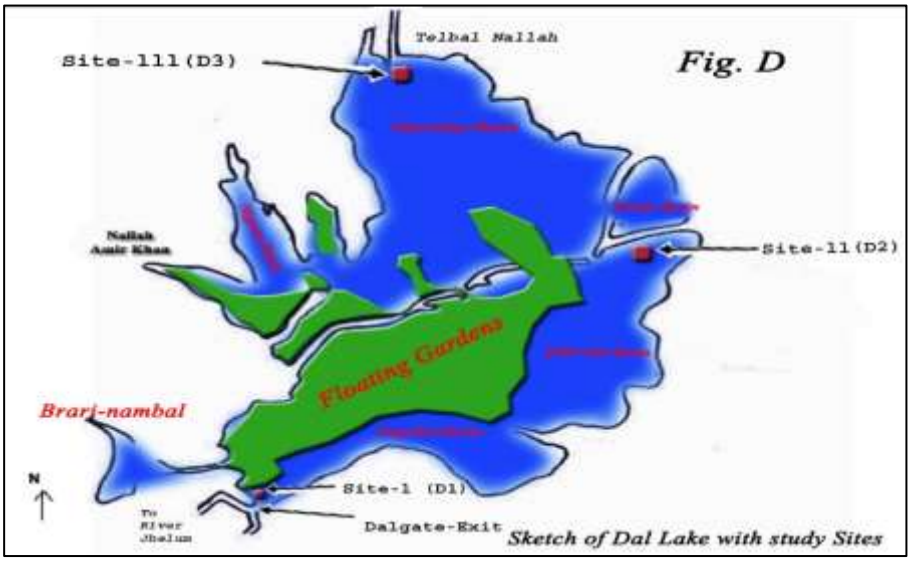
Description of Study Sites :- For carrying out the present study three sampling sites were selected from famous Dal lake of Srinagar city.

SITE-D1: This site is located on eastern side of the lake at exit (Dalgate) near Drogjun.

SITE-D2: This site is situated on western side of lake locally known as BOD dal basin.

SITE-D3: This site is located on northern side of the lake, where Telbal nallah along with heavy organic nutrient load enter into the part of Dal Lake locally known as Hazratbal basin.

Dal Lake



Collection, Preservation & Identification of Macroinvertebrates :- Sampling was done on monthly basis for a total period of one year from March 2015 to Feberuarary 2016 .Surface invertebrates were collected by help of D-Frame net having 0.2mm mesh size and area of 15*15cm^2. The organisms were collected while disturbing the substratum by kicking or forcing ahead the net (Hoffsten and Malmqvist, 2000) and also by lowering the net in the macrophytic vegetation and lifted carefully with entire mass of macrophytes (Kaul et al, 1980). Certain organisms were also collected by hand picking method .For the collection of macrozoobenthos, the bottom sediments were collected with the help of Ekman Dredge having an area of 15×15cm^2. At each site the sample was taken in triplicate and then pooled together. The samples were properly mixed with site water and passed through a series of different mesh size sieves. The individuals were sorted out manually using forceps and brushes and were preserved plastic bottles in 4% formalin and 70% alcohol depending upon the type of organisms to be preserved. The soft-bodied organisms were preserved in 70% alcohol while the shelled organisms like molluscs in 4% formalin (Borror et al, 1976). For qualitative analysis preserved samples were identified to the lowest possible taxonomic level according to standard taxonomic works of Edmondson (1959) Pennak (1978), Adoni (1985) and Tonapi (1980). However for quantitative analysis animals were counted individually species wise in whole sample and sub samples. The density of macroinvertebrate was calculated/m^2 of bottom and surface area by using the formula:

N= (O÷A×S) x 10,000 (Welch, 1948)
Where,
N = no. of organisms/m^2.
O = no. of organisms counted.
A = area of sampler
S = number of samples taken at each site.

Diversity, Richness & Evenness :- For calculating species diversity and richness, Shannon wiener diversity index and Margalef's richness index was applied.

Shannon-wiener diversity index (H) :- Shannon-wiener diversity index was calculated by the formula given below

$$H = -\sum_{i=1}^{S} pi \times \ln pi$$

Where,
H = Shannon wiener index
Pi = fraction of the entire population made up of species i
S= number of species encountered
∑= sum from species i to species s
ln = log normal

Margalef's richness index :- Margalef's richness index was calculated by the formula given below:

D = (S-1) ÷ Ln (N)

Where,

D = Margalef's richness index

S = total number of species

N = total number of individuals in a sample

ln = log normal

Species Evenness :- Species evenness was calculated by using the formula given below

H /Ln (S)

Where,

H = Shannon diversity index

S = number of species recorded

Results :- During present investigation, 24 macroinvertebrate taxa belong to three major phyla viz., Annelida (5 species), Arthropoda (12 species) and Mollusca (7 species) were recorded. The mean population density of macroinvertebrates Anchar Lake was estimated 1410 ind/m^2. Arthropods were observed most dominant contributing 42% with mean population density of 590 ind.m^2. The Arthropods were followed in decreasing order by Molluscs contributed 35% with mean population density of 494 ind./m^2.The population density of Annelids was least among the three phyla contributed 23% with mean population density of 326 ind./m^2 (fig. 1 & table-2).

The total population density of macroinvertebrate fauna at site-D1 was 1409 ind/m^2 (table-1) with Arthropods being most dominant (555 ind/m^2) followed by Molluscs (824 ind/m^2) and Annelids with 30 ind/m^2 (table-2). A total of 19 species were recorded from this site throughout the survey of which Erpobdella octaculata and Hirudo sp belong to phylum Annelida, Bezzia sp., Enallgama, Gomphus sp., Anax sp., Baetis sp., Corixa punctata, Sigara sp., Gerris sp., Coptotomus sp. and Gammarus pulex belong to phylum Arthropoda and Promenetus sp., Planorbis sp., Lymnaea auricularia, Lymnaea stagnalis, Lymnaea columella, Corbicula fluminea, and Sphaerium species belong to phylum Mollusca. Shannon-Wiener diversity index, Margalef's richness index and Evenness at this site was computed 2.75, 2.48 & 0.93 respectively (table-3).

The total population density of macroinvertebrate fauna at site-D2 was computed 1015 ind/m^2 (table-1) with Arthropods being most dominant (479 ind/m^2) followed by Annelids (281 ind/m^2) and Molluscs with 255 ind/m^2 (table-2). A total of 15 species were recorded from this site throughout the survey of which Hirudo sp. Tubifix tubifix, and Limnodrillus hoffmeisteri belong to phylum Annelida, Chironomous sp., Tabanus sp, Enallgama sp., Corixa punctata, Gerris sp., Coptotomus sp. and Gammarus pulex belong to phylum Arthropoda and Promenetus sp, Lymnaea auricularia, Lymnaea stagnalis, Corbicula fluminea, Sphaerium species belong to phylum Mollusca. Shannon-Wiener diversity index, Margalef's richness index and Evenness at this site was computed 2.44, 2.02 & 0.90 respectively (table-3).

The total population density of macroinvertebrate fauna at site-D3 was estimated 1805 ind/m^2 (table-1) with Arthropods being most dominant (735 ind/m^2) followed by Annelids (667 ind/m^2) and Molluscs with 403 ind/m^2 (table-2). A total of 14 species were recorded from this site throughout the survey of which Erpobdella octaculata, Hirudo sp. Tubifix tubifix sp., Limnodrillus hoffmeisteri, and Nais communis species belong to phylum Annelida, Chironomous sp, Enallgama sp., Gerris sp., Coptotomus sp. and Gammarus pulex belong to phylum Arthropoda and Planorbis sp., Lymnaea auricularia, Lymnaea stagnalis and Corbicula fluminea, belong to phylum Mollusca. Shannon-Wiener diversity index, Margalef's richness index and Evenness at this site was computed 2.38, 1.73 & 0.90 respectively (table-3). The species composition of macroinvertebrate at three different study sites in Dal Lake in given in table-4.

Table-1: Population density of macroinvertebrates (ind/m^2) at three study sites in Dal Lake.

S.no.	Macroinvertebrates	Site-D1	Site-D2	Site-D3
	Annelida			
1	Erpobdella octaculata	15	0	30
2	Hirudo sp.	15	15	30
3	Tubifix tubifix	0	147	325
4	Limnodrillus hoffmeisteri	0	119	282
5	Nais communis	0	0	193
	Arthropoda			
6	Chironomous sp.	0	164	297
7	Tabanus sp.	0	30	0
8	Bezzia sp.	45	0	0
9	Enallgama sp.	90	75	65
10	Gomphus sp	45	0	0
11	Anax sp.	30	0	0
12	Baetis sp.	60	0	0
13	Corixa punctata	45	15	0
14	Sigara sp.	30	0	0
15	Gerris sp.	30	45	75
16	Coptotomus sp.	105	45	15
17	Gammarus pulex	75	105	90
	Molluscs			
18	Promenetus sp.	105	45	0
19	Planorbis sp.	120	0	119
20	Lymnaea auricularia	105	45	60
21	Lymnaea stagnalis	135	60	149
22	Lymnaea columella	90	0	0
23	Corbicula fluminea	164	45	75
24	Sphaerium sp.	105	60	0
Total population density (ind./m^2)		**1409**	**1015**	**1805**
Mean Population density(ind./m^2)		**1410 ind./m^2**		

Table-2: Population density (ind./m^2) of Annelids, Arthropods and Molluscs at three study sites in Dal Lake

Site	Annelids (ind./m^2)	Arthropods (ind./m^2)	Molluscs (ind./m^2)
D1	**30**	**555**	**824**
D2	**281**	**479**	**255**
D3	**667**	**735**	**403**
Mean	**326**	**590**	**494**

Table-3: Diversity, Richness & Evenness of Macroinvertebrates at three study sites of Dal Lake.

Biological indices	D1	D2	D3
Shannon-Wiener diversity index (H)	2.75	2.44	2.38
Margalef's Richness index (D)	2.48	2.02	1.73
Evenness (E)	0.93	0.90	0.90

Figure. 1: Population density (ind./m^2) & Percent contribution of Annelids, Arthropods and Molluscs in Dal Lake

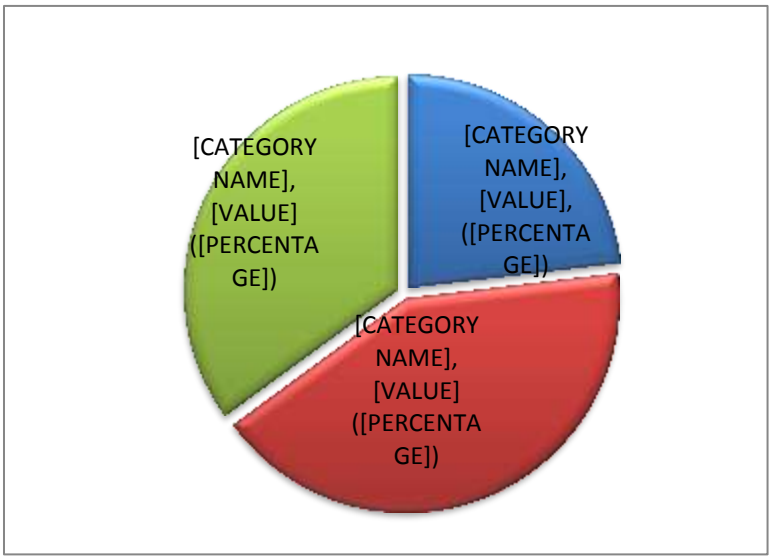


Table-4: Species composition of macroinvertebrates at three different study sites of Dal Lake

S.no.	Macroinvertebrates	Site-D1	Site-D2	Site-D3
	Annelida			
1	Erpobdella octaculata	+	-	+
2	Hirudo sp.	+	+	+
3	Tubifix tubifix	-	+	+
4	Limnodrillus hoffmeisteri	-	+	+
5	Nais communis	-	-	+
	Arthropoda			
6	Chironomous sp.	-	+	+
7	Tabanus sp.	-	+	-
8	Bezzia sp.	+	-	-
9	Enallgama sp.	+	+	+
10	Gomphus sp	+	-	-
11	Anax sp.	+	-	-
12	Baetis sp.	+	-	-

13	Corixa punctata	**+**	**+**	**-**
14	Sigara sp.	**+**	**-**	**-**
15	Gerris sp.	**+**	**+**	**+**
16	Coptotomus sp.	**+**	**+**	**+**
17	Gammarus pulex	**+**	**+**	**+**
	Mollusca			
18	Promenetus sp.	**+**	**+**	**-**
19	Planorbis sp.	**+**	**-**	**+**
20	Lymnaea auricularia	**+**	**+**	**+**
21	Lymnaea stagnalis	**+**	**+**	**+**
22	Lymnaea columella	**+**	**-**	**-**
23	Corbicula fluminea	**+**	**+**	**+**
24	Sphaerium sp.	**+**	**+**	**-**

Discussion :- During present investigation, the type of habitat was found to be the most influential factor affecting the taxonomic composition of macroinvertebrates. The macroinvertebrate fauna recorded from three sites of Dal Lake differ with respect to habitat selection and impact of commercial settlements in and around Dal Lake. The diversity and density of macroinvertebrates was found positively associated with abundance of macrophytes and organic matter rich bottom sediment. The abundance of phytophilous macroinvertebrates was found to be greatly determined by architecture of macrophytes. Macrophytes having large surface area were found to harbor large number of macroinvertebrates, attributed to the fact that macrophytes provide resources, refuge and suitable breeding sites for macroinvertebrates. The similar type of relationship between macrophytes and macroinvertebrates was observed by Siraj et al (2010), Bhat et al (2012) and Habib et al (2015) in their respective studies. Highest number of taxa were recorded from the sites (D2 & D3) having abundant macrophytic growth and organic matter rich bottom sediment. Further, maximum density of macroinvertebrates was recorded during spring due to maximum and dense growth of macrophytes during this season. Arthropods were found to be most dominant group in terms of number of taxa. During the study 12 species among arthropods were recorded from three different sites, when only 5 species among annelids and 7 species among molluscs were recorded. At site-D, located at the exit of Dal Lake, the bottom was found sandy with prevalence of gravely sediment and low availability of organic matter. The abundance of molluscs (824 ind,/m^2) at this site reported during the present study clearly indicates that macroinvertebrates belong to this phyla prefer to inhabit such type of habitat especially with high sand content and luxuriant macrophytic growth. Qadri and Yousuf in 2004 found similar type of results while carrying out an ecological study on macrozoobenthos of Nigeen Lake. Certain features of habitat at site-D1 like presence of sandy bottom, gravely sediment and low availability of organic matter interfere negatively with the numerical strength of oligochaetes. During present study it was found that site-D) reflected the lowest population density of Annelids (oligochaetes), ascribed to less organic matter loading at this site. Such results are in agreement with the findings reported by Lin and Yo in 2008, Schenkova and Helesic in 2006 who in their respective studies justified the preference of annelids to organically enriched habitat. The heavy organic nutrient loading into Dal Lake from nearby commercial enterprises like hotels at and from Telbal area via an inflow channel called Telbal nallah at site-D3 was found to influence macroinvertebrate spectrum to a greater extent. The abundance of certain species like Limnodrillus hoffmeisteri and Tubifix tubifix (oligochaetes) tend to increase in the habitat enriched with high organic nutrient loading, which coincides with the findings of Linn et al (2008) and Slepukhins (1984). During the present study the abundance of both Limnodrillus hoffmeisteri and

Tubifix tubifix clearly confirmed the fact that these species prefer organic matter rich habitat and clearly indicates that the entrance of organic matter in Dal Lake is the main factor in the determination of distribution and abundance of macroinvertebrates. The high numerical density and range of tolerance of Limnodrillus hoffmeisteri and Tubifix tubifix at site-D2 and site-D3 clearly indicate the organic pollution in Dal Lake especially at these sites. Such results correlate with findings of earlier studies carried out on different water bodies by Aston in 1973, Verdonschot in 1989, Wilham and Dorros in 1968, Adholia et al in 1990, Oliver in 1971 in Brinkhurst & Cook in 1974, Saether in 1979, Milbrink in 1980 and Bazzanti in 1983). Chironomids have also been targeted as pollution indicators in biological monitoring of water body (Bay et al, 1966 and Kaushik et al, 1991) and have been labelled as pollution tolerant species (Milbrink, 1980).The abundant presence of Chironomous species present in Dal lake especially at sites-2 and site-3 clearly confirms the high organic load (organic pollution). Mir and Yousuf in 2005 reported a total of 19 macroinvertebrate species from Dal Lake. Yakoob and Pandit in 2009 reported 11 macrozoobenthic invertebrate fauna from the lake. .Malik and Ali in 2012 reported only 9 macrozoobenthic invertebrate species from BOD dal basin of Dal Lake.

Present study revealed that a tremendous increase in densities of certain fundamental pollution indicator species like Limnodrillus hoffmeisteri, Tubifix tubifix and chironomous followed by decrease or disappearance of other species in water body indicates that organic pollution level and lake eutrophication is increasing in water body at an alarming rate as a result undesirable anthropogenic and urbanization pressure associated with sewage loading, agricultural run-off, waste disposal etc.. The abundance of Limnodrillus hoffmeisteri, Tubifix tubifix and chironomous at site-D2 and site-D3 clearly indicate that these two sites have high organic pollution level as compared to site-D1 where these species are almost negligible. Such an alarming increase in organic pollution level in Dal Lake may be attributed to heavy organic nutrient loading in Dal Lake from catchment areas and the nutrient rich sediment brought into the lake by 2014 water deluge. Site-D1 reflected better habitat conditions as compared to other two sites. The Shannon- wiener diversity index was computed 2.75, 2.44, and 2.38 at sites D1, D2 and D3 respectively. According to Willhm and Dorris (1966) species diversity index value above 3 indicates clean water and values between 1.00 to 3.00 indicates moderate pollution and between 0 to 1.00 indicates heavy pollution and with reference to this criterion Dal Lake can be categorized as moderately polluted water body. Cairns and Dickson (1971) holds the view that healthy water bodies are generally associated with high diversity but little numbers of individuals per species, and unhealthy water bodies reflect less diversity but large number of individuals per species. Margalef's richness index was computed 2.48, 2.02 & 1.73 at site-D1, D2 & D3 respectively. Somasheker and Ramaswamy (1984) related higher richness index value with healthy conditions of water body.

During the study period it was found that macrophytes show positive association with macroinvertebrate. This association was found to be influenced by architecture of aquatic macrophytes. Maximum number of taxa were found associated with macrophytes having large surface area. Similar type of macrophyte-macroinvertebrate association was reported by Cheruvelil et al in his studies in 2006 and Habib and Yousuf (2015)

Conclusion :- From the present study it is concluded that in spite of great economic, aesthetic and ecological value, Dal Lake is losing its natural charm as a result of undesirable anthropogenic pressure. The environmental conditions of a particular habitat in an aquatic ecosystem like level of pollution in lake etc. can drive changes in biological diversity, distribution and density of macroinvertebrate fauna of the lake. Dal lake is under great stress and is losing its aesthetic and ecological value as a result of organic pollution in lake not only due to the large amount of untreated sewage flushed into the lake from nearby residential areas, floating gardens, commercial enterprises in and around lake, but also

due to the heavy organic nutrient rich slit loading into the lake via various tributaries especially Telbal nallah. Hence an accurate ecological understanding of environmental factors that affect the biological diversity of lake must be taken into consideration so that proper measures could be planned for protection of Dal Lake from further deterioration.

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Management of National Agricultural Policies in the International Market

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Introduction :- To provide early warning of lack of food to inform human response guidance and national agricultural policies and field scale decisions, information on raw crop status and production indicators (RS) for some names, current satellite data and information Information has been provided to technology, which is rapidly producing crop types and health, development phase and production at global level. The transferee. Cost effective and timely information is provided. Today, we have significant progress in capacity in relation to the new era of satellite data availability only three years ago, and it is revolutionary to provide accurate, timely information across both crushing systems across the RSS field and agricultural monitoring community capacity. . In this regard, in order to support the decisions of artificial agriculture and insurance, to monitor the progress of agricultural intensities for more sustainable global food supply, satellite technology is playing a central role in the agricultural sector. However, with the broad commitment to the use of remote sensing data, it is important to understand the current capabilities and limitations of these techniques. Developing better and more robust methods for predicting the production of global cross-system systems in the field and in the field of convertible cross-system systems is an important challenge. This domain has made great progress, especially for large scale monitoring of agriculture. However, current capacities for effective monitoring of small holder systems, which are inadequate for food security, are inadequate for the world's most dangerous countries, and need to be immediately urgent. According to statistics, one of the basic anomalies to improve the RS-based model is reliable, representative land data is accessible. For example, through accessible public-private partners, it is one of the reasons for reducing data, which can access area data and archives in full knowledge intelligence methods. Technology is an important piece of infection and effective communication. The RS community has worked extensively in isolation, so people benefiting from RS-based information are often aware of whether they are available or restricted. Strengthening the partnership will help ensure that the RSS is implemented through the acquisition of products and applications, and satisfaction methods can be transferred to operation in a permanent way and apply the current monitoring current frame to work properly. In this regard, AMIS-Geogalm partnership has made significant progress in promoting the creation of space and construction among communal communities. This is an exciting time with traumatic possibilities for agricultural remote sensing. Satellite data costs and availability are combined with a joint partnership for revolution, counter agencies and long-term observations, and progress in key data analysis is a game changer for the ability to monitor agriculture. Agricultural Land Effective Monitoring is an important factor in the fight for global food security and the United Global Challenge, which is the only source of resources, methods and skills in countries, organizations and international cooperation in the field, and in the more open part of science, technology and data.

World supply - demand approach :- Forecasting of wheat production for 2018 has finally increased significantly In million tons In the month, along with several other countries in addition to cutting down the possibility of crop harvesting in Australia, along with reports of major crops in China. Use a little food with 2017/19 2017/19 with use Being the main driver of a slow-growing wheat and feed usage Speed this season due to strong

prices. Business moving forward in 2018/19 (July / June) pointing down Adjustments to imports by many countries including India, Indonesia and South Africa Stock upgraded rapidly (ending 2019), mainly on high Estimated Build-up in China.

WHEAT	FAO-AMIS 2017/18 est. 4-Oct	FAO-AMIS 2018/19 f'cast 1-Nov		USDA 2017/18 est. 11-Oct	USDA 2018/19 f'cast 11-Oct	IGC 2017/18 est. 25-Oct	IGC 2018/19 f'cast 25-Oct
Production	760.4	722.4	727.9	758.7	730.9	767.1	728.8
Supply	1,015.5	995.5	1,004.7	1,016.0	1,005.8	1,011.5	1,002.3
Utilization Trade	737.2	741.0	740.1	741.2	745.6	738.0	740.2
Stocks	176.6	174.0	173.2	181.3	180.4	176.4	172.0
	276.8	255.5	264.4	274.9	260.2	273.4	262.0

Mecca production forecast was raised for better prospects for 2018 In million tons Canada and Indonesia more than offset M / M downward modifications in many countries including Brazil and America.Use to grow faster than expected from 2018/19 First, many are supported by a strong increase in feed usage Countries To reach a new peak in 2018/19 (July / June) on the basis of which Continuous fast world demand and big export achievements Stocks (ending in 2019) proceed, now pointing at one point Nearly 14 percent of its record-high opening level has declined, In Argentina, Brazil, China and America, with the biggest reduction.

MAIZE	FAO-AMIS 2017/18 est. 4-Oct	FAO-AMIS 2018/19 f'cast 1-Nov		USDA 2017/18 est 11-Oct	USDA 2018/19 f'cast 11-Oct	IGC 2017/18 est. 25-Oct	IGC 2018/19 f'cast 25-Oct
Production	1,092.7	1,066.4	1,068.9	1,034.2	1,068.3	1,047.6	1,073.7
Supply	1,392.5	1,374.0	1,379.9	1,262.0	1,266.5	1,377.7	1,377.5
Utilization	1,072.2	1,104.1	1,109.8	1,063.8	1,107.2	1,074.0	1,111.6
Trade Stocks	154.7	155.7	155.8	147.1	163.0	151.6	158.4
	311.1	268.8	267.4	198.2	159.4	303.7	265.9

Rice production is projected to grow by 1.3 percent in 2018, thanks to the expansion of the region in Asia and to some extent North America and Africa. Use to continue growth in 2018/19, increased food use, dwarf feeds and industrial use have declined. Downgrade import forecasts for China and Nigeria were trimmed in 2018 and 2019.Stock (2018/19 Carry-out) Minimum converted M / M. Expansion in Indonesia, Philippines, America and especially in India and China has increased 2.6 percent Y / Y.

RICE (milled)	FAO-AMIS 2017/18 est. 4-Oct	2018/19 f'cast 1-Nov		USDA 2017/18 est. 11-Oct	2018/19 f'cast	IGC 2017/18 est. 25-Oct	2018/19 f'cast
Production	506.3	513.0	513.0	491.5	487.8	489.9	490.4
Supply	674.2	685.0	685.0	628.4	633.7	613.0	616.7
Utilization	503.7	509.2	509.2	482.5	488.5	486.8	492.3
Trade	48.0	47.7	47.3	48.2	49.5	48.2	48.8
Stocks	172.0	176.5	176.6	145.9	145.2	126.3	124.4

Soybean 2018/19 production was raised moderately Forecast for Argentina, Canada and Ukraine is more than offset in Brazil and many other countries in the revision below. Use in 2018/19 was slightly modified with less Compensated by high use in estimated crushing in Brazil Argentina and some other countries.

In 2018/19 the trade was raised on the basis of strong import demand In Argentina, Egypt, EU and some Asian countries Stock extended (partially by 2018/19 Carrier-Out) Forecasting for America and China by facing a reduction in Brazil And Canada

SOYBEANS	FAO-AMIS 2017/18 est. 4-Oct	2018/19 f'cast 1-Nov		USDA 2017/18 est. 11-Oct	2018/19 f'cast	IGC 2017/18 est. 25-Oct	2018/19 f'cast
Production Supply	341.1	370.5	371.1	337.5	369.5	339.6	369.4
Utilization Trade	390.0	410.6	412.2	434.1	466.1	386.5	411.8
Stocks	347.6	355.7	356.8	336.8	353.0	344.0	357.4
	153.3	151.0	155.6	153.1	157.4	153.5	154.8
	41.1	53.9	54.2	96.7	110.0	42.4	54.3

Crop monitor :-

Wheat :- In the Northern Hemisphere, the sowing of winter wheat has generally started under favorable conditions. In Canada, the spring wheat crop is delayed by rain and snow. Sowing of winter wheat has usually started under favorable conditions. In the southern hemisphere, the condition of winter wheat mixed with poor conditions in eastern Australia is mixed.

Mecca :- In the northern hemisphere, crops in the United States, Europe, Ukraine and Russian Union are expected to harvest, with bumper crop. However, dry Europe negatively impacted the expected yield in Northern Europe and Southern Russia.Are there. In the southern region, Brazil and Argentina spring-planted Sowing crop is sowing under favorable conditions.

Rice :- are favorable in the conditions of Eastern and South Asia because the main rice season approaches. In Southeast Asia, the wet season's rice crop is being started in northern countries, while in Indonesia the sowing of wet season begins.

Soybean :- In the Northern Hemisphere, American Crop is running with expected record yield and production. Conditions are favorable throughout China, India and Ukraine, while prospects for Canada are mixed. In the southern hemisphere, sowing is being done in Brazi.

Wheat :- In the EU, continuous dry conditions in parts of Europe are delaying sowing of winter wheat. In Ukraine, the sowing of cold wheat is usually completed with favorable conditions. However, in the southern and eastern areas there are some areas which are facing deficiency of soil moisture in the early phase of the season. In the Russian Federation, sowing of winter wheat is cured with emerging crops under favorable conditions. In Kazakhstan, the spring wheat crop has been completed, compared to the previous year, there has been a slight increase in yield. In China, sowing of winter wheat is under favorable conditions. In India, the sowing of winter wheat is being started in favorable conditions in the northern states. In the US, the sowing of winter wheat is being started in favorable conditions across the country. In Canada, delay in harvesting of spring wheat is due to the wet season due to prairie, affecting the conditions of the remaining crops. Compared with last year's yield, the yields vary according to the amount of seasonal rainfall received in the yield prize. In Australia, with favorable conditions in Western Australia and parts of South Australia, the country's production is quite different in the country, whereas in the past, conditions are poor due to lack of rainfall, especially in Queensland and New South Wales. In Argentina, the situation is generally favorable because the crop starts with some areas of concern in the northern regions.

Maize :- In the US, the crop is progressing with the expected bumper crop in many parts of the country. Conditions are mixed in Canada, with the favorable conditions in Ontario's main producers province and adverse conditions in Manitoba and Quebec. In Mexico, conditions for spring-summer crops are favorable. In the European Union, the ongoing crop is being benefited from hot and dry normal conditions. Overall EU yield expectations remain above average of five years. In Ukraine, crop is being harvested in the central and western areas with record yields. In the Russian Federation, the conditions in the central district are mixed with record yield and poor yield in the southern district. In China, thanks to the good yields, the harvest is completed with the second year of high production production. In India, in favorable conditions, kharif is wrapping the crop for maize. The increase in production has been estimated due to the total sown area and minor expansion of good yield. In Brazil, sowing of spring-planted crops is being operated in the main producing areas under favorable conditions. In Argentina, despite some delays due to low soil moisture areas, sowing is still under sown conditions for spring-planting crops, usually under favorable conditions. In some areas of Cordoba, low soil moisture is delaying sowing. In South Africa, sowing begins in the eastern areas generally under favorable conditions.

Rice :- In China, the crop for single rice operates under favorable conditions and matured late in the south due to favorable conditions. In India, the kharif rice crop is being started in favorable conditions in the northern states, while in the southern and eastern areas the crop is entering the phase of filling the grains. Due to good production, the total production increase has been estimated compared to last year and despite this being a little sown area this season. In Indonesia, dry season rice harvest continues with the above yield of last year. The sowing of wet weather has started with areas of concern in Java and less beautiful islands because of low levels of rainfall. In Vietnam, the autumn of summer - Autumn rice (wet season rice) started with a little report compared to last year. Earlier, due to floods in the south, the total area sown was reduced. In Thailand, wet weather conditions are generally favorable due to good rainfall and sufficient sunlight. However, the first flood in the North East region remains a worry. In the Philippines, the wet season sown crops during the April-June season was interrupted due to the landslide of the tigress demand, which affected the crop situation and consequently the losses occurred in particular in Northern Lausanne. In Brazil, sowing started under favorable conditions. In the US, the crop is wrapped under favorable conditions.

Soybean :- In the US, due to the extraordinary growing conditions across the country, crop is being harvested in many areas with estimated production and production. There are relatively few areas of concern with the North American border, due to the activity of the storm, early snow and southeast. In Canada, harvesting is in favor with favorable conditions in Ontario, whereas due to the above average temperature and poor soil moisture in the weather, the conditions are mixed in the region and recently due to damage due to snow and rain. In China, the crop is released under favorable conditions. In India, the crop is entering maturity stage under favorable conditions. Despite the slight decline in the fielded area, production is expected to increase. In Ukraine, the crop is almost complete with the increase in yield compared to the previous year. In Brazil, under sophisticated conditions sowing in the main producing areas

Policy development :-

Wheat :- On October 3, India increased the minimum support price for wheat for the 201 9/20 season by 6 percent to Rs 14040 a quintal (US $ 248 per tonne).On October 15, the US Patent and Trademark Office patented a new technology for Archdi Biosciences, Inc. which increases the storage life of wheat flour by reducing the oxidation process.

As part of the recently concluded American, Mexico and Canada (USMCA) agreement, quality and certification requirements for wheat business will be consistent with Canada and the US. New provisions on biotechnology and innovative plant reproduction techniques will also be applied when the agreement is approved by each of the three signatories.

Maize :- On October 21, Thailand launched a mecca growing promotion plan under the government's San-Pail Promotions Public-Private Partnership Initiative. The objective of the program is to encourage rice farmers to switch off-season rice to increase maize for animal feed on 790 million acres of land in 33 target provinces.

Rice :- Brazil announced under Decree No. 51 446/2014 that it would compensate the rice growers in the state Rio Grande do Sul for the loss due to the hail. Rice farmers should get BRL 2.62 million (USD 649 9 4) in total if they have registered their loss within three business days of loss.

Soybean :- In order to reduce dependence on soybean import, China decided to allow import of rapeseed food from India under certain inspection and quarantine requirements. Apart from this, on October 26, China's Food Industry Association approved new voluntary standards for animal feed, reduced the level of protein in pig feed by 1.5 percent, and reduced poultry by 1 percent.

Biofuels :- In the US, a President's directive instructed the Environmental Protection Agency (EPA) to begin the process of making a rule to expand the sale of Maize-based ethanol (E15) throughout the year, due to which ethanol -The prohibition of mixed gasoline was canceled.

Across the board :- China announced that 2019 import quota for wheat and maize will be maintained 9.6 million tonnes and 7.2 million tonnes respectively. After the end of the US Farm Bill on September 30, options will be considered after the US Congress elections in November. Although this delay may have the effect of money for the continuation of many agricultural assistance and rural development assistance programs, crop insurance and nutrition support will not be affected.

Logistics / infrastructure / trade fines :- The Russian Federation Food Security Agency has started stringent inspection procedures in major cereal loading points in response to buyers' complaints about falling quality standards.

International prices :- International Grains Council (IGC) Grain and Oilseeds Index (GOI) and sub-index of Government of India.

	Oct 2018 Average*	% Change	
		M/M	Y/Y
GOI	200	+ 1.9%	+3.9%
Wheat	200	+ 2.0%	+14.5%
Maize	173	- 0.7%	+6.6%
Rice	163	- 0.5%	- 1.1%
Soybeans	191	+ 3.7%	+ 0.9%

*Jan 2000=100, derived from daily export quotations

Wheat :- The price of global wheat export was firm during October, which was generally less than the difficult approach for supply. Support for cutting crop in Canada and lowering the expectations for Australia's crop support In addition, in most parts of Europe, planting of sub-plants for 201 9/20 crops contributed to long-term uncertainty about the achievements of the world. Nevertheless, the speed of the initial season of shipment from the Russian Federation continued to reduce the price and market participants hoped to reduce the surplus of Russia, there was little sign of any switch in the demand of other originals. During October, the IGC-GOI wheat sub-index was 2 percent more meters / meter.

Maize :- Between offsetting changes in key suppliers, the prices of world corn export show less overall changes at the lower level of nine months with the IGC-GOI sub-index in October. The sharpest decline in Ukraine was, where quotation was the availability of heavy new crops, barriers to storage and sometimes interest purchases abroad. Good initial weather season for seasonal offshore and pressure in crops in Brazil. Traders were also eager to generate sales before the start of 2019 with the hope of arrival of new crop soybean. On the contrary, generally concrete export profile, sometimes in the response to crop delay and increasing barged freight costs, has confirmed US values.

Rice :- The international market was lightly weak M / M in the form of inflation and new crop pressures in some markets increased support from the supposedly heavy purchasing by the Philippines. Along with the supply of new crop, the quotation in India has softened between the losses in local currency. There was a decline in Pakistan and US in the form of harvesting. On the contrary, FOB's offer in Thailand and Vietnam was strong on expected sales, the National Food Authority of the Philippines had expected to buy a total of around 700 000 tons before the end of the year.

Soybean :- Average world soybean export prices advanced Percent in October, with firmness on all major origins. Emotions were reduced by worries about the effect of the cold, wet weather on the crop's progress and crop quality in the US Midwest, while the USDA upgraded 2018/19 US production approach found little hope and support Was there. Recently, however, the improvement in the situation gradually reduced weight. Against the backdrop of a strong American market, citations in Brazil were pushed to strengthen supply and with the underlying strength of international demand. Currency movements have been reduced too, but pressure on record speed of 2018/19 gardens has been pressed. In Argentina, FOB prices were supported by fresh demand from China for thin achievements and nearby shipments.

AMIS Countries	Currency	Oct 2018	Monthly	Annual Change
Argentina	ARS	37.1	3.6%	-112.6%
Australia	AUD	1.4	-1.4%	-9.6%
Brazil	BRL	3.8	8.2%	-18.1%
Canada	CAD	1.3	0.2%	-3.2%
China	CNY	6.9	-0.9%	-4.4%
Egypt	EGP	17.9	0.0%	-1.4%
EU	EUR	0.9	-1.4%	-2.2%
India	INR	73.6	-1.9%	-13.1%
Indonesia	IDR	15,167.6	-2.0%	-12.1%
Japan	JPY	112.7	-0.6%	0.2%
Kazakhstan	KZT	367.3	0.1%	-9.0%
Rep. Korea	KRW	1,131.6	-1.1%	0.1%
Mexico	MXN	19.1	-0.5%	-1.4%
Nigeria	NGN	305.3	0.0%	0.6%
Philippines	PHP	54.0	0.0%	-5.0%
Russian Fed.	RUB	65.9	2.6%	-14.1%
Saudi Arabia	SAR	3.8	0.0%	0.0%
South Africa	ZAR	14.5	1.7%	-5.9%
Thailand	THB	32.7	-0.5%	1.5%
Turkey	TRY	5.8	7.5%	-58.5%
UK	GBP	0.8	-0.2%	-1.3%
Ukraine	UAH	28.1	0.3%	-5.5%
Viet Nam	VND	23,343.6	-0.2%	-2.8%

Futures prices :- reduced too, but pressure on record speed of 2018/19 gardens has been pressed. In Argentina, FOB prices were supported by fresh demand from China for thin achievements and nearby shipments. In spite of the end of stock for the US $ 2018/19 US dollar and the continuous prevention of China's 25% tariff on American-born soyabean, prices rose for M / M prices for wheat, maize and soybean. With some snow avalanche, rainy season has allowed maize plants to lose quality in some areas and soybean, thereby increasing the chances that in future, the production numbers can be revised in the USDA report. Mecca prices can be benefited from crude oil prices, which reached the highest level of four years at the beginning of the month and the promise of expanding Ethanol amounts in domestic gasoline compounds of US administration reached 10-15 per cent. The values of soybean were supported by amazing export numbers, which reached the highest level since February 11 for the week ended on October 11. Nevertheless, the American Soybean export value remained on huge discounts for Brazilian export

quotes, approximately 85 US dollars per tonne. Despite continued supply position, wheat, maize, soyabean and rice increased by 1.6, 4.5, 4.3 and 4.0 percent respectively. On a Y / Y basis, wheat and maize were more Respectively 17.7 and 5.4 percent, while soybean and rice were 9.7 and 11.1 percent respectively.

Volume and instability :- The volume of trade for wheat and maize dropped a little bit / meter but soybean increased by 42 percent, even though the sum of soybean open interest fell to some extent from the end of September.

Implied instability reduced slightly for all three items, while the historical instability fell for wheat and soybeans but rose for Mecca. The volatility measures were both WI / Y compared to the very low level of 2017.

Basis level sand transport :- While changing soya bean quota difficult, domestic base level was confirmed for maize in the internal M / M. In Illinois, internal bids for local lifts were quoted as under US $ 16 per tonne for maize and less than US $ 24 for soybean, December and November futures prices. In Iowa, the bid was less than 18 USD for maize and 37 US dollars (under the related futures) for soybean. The level of Gulf export distribution has improved significantly, M / M, for maize, increased to US $ 16 and US $ 10 for soybean, from USD 2 to US $ 8 (per tonne on December and November futures Base) increased The values of soft red wheat given in northern mills and Gulf were strengthened - about 3 US dollars per tonne and plus 22 dollars per tonne was quoted, Respectively (both on the basis of December futures). Barge Freight (Lower Illinois River Quotation) unchanged M / M was approximately US $ 26 per tonne because the harvest activity was accelerated, which was trading at the same level of average of three years. In the export market, since the beginning of the crop year (September), outstanding commitments and exports for maize have gone up 40 percent from last year, which shows another record year for food grains. Soybean and wheat, behind the last year's totals, shared a contrasting story with about 20 percent behind exports and commitments.

Forward curves wheat, maize and soybean M / M have been changed hard by the forward curves, the slopes above them show large scale yield for maize and soybean and show strong global competition for wheat. Wheat and maize curves, i.e. Y / Y, were spread between December 18 and December 19, for this time of year, respectively, were equivalent to USD 25 and US $ 12. Comparable soybean spread between November 2018 and November 2019, which reached the record high of 26 US Dollars during the September high quarter, compared to the US $ 24 for the last two years and 24 US dollars. Was quite wide. The large soybean carrying charge reflected the record ending stock data for 2018/19, which is estimated by the USDA to estimate 24 million tons.

The investment flows :- Managed money controlled wheat and soybean M / M for its business, while adopting another strong approach to Mecca. In wheat, while in soybean it was slightly added to its pure shorter position, it reduced its modest net to half. In Maize, Managed Money bought approximately 147 000 contracts (more than 18 million tons), shortened their large net to a shorter long time. Commercial Pure M / M remained in all three items, but with the exception of Mecca, there was no big situation. The major nets in swap dealer market are long, as did the "other reportbell" (large-scale traders) did some extent.

Monthly US Ethanol Update :- RBOB gasoline futures prices increased from ethanol but remained below the energy equivalent The increase in 67 percent price ratio was mainly driven by the fall in gasoline prices, which was easier than the sharp increase in September.

America's maize prices have risen in early October, even though the US is expecting a record supply (stock and plus production) as the crop delay supports the near cash and compressed base (futures low cash). Ethanol margins declined

further in the negative area because output receipts were largely unchanged, while the price of maize increased. On the negative margin, the speed of ethanol production slowed at an annual rate of 15.8 billion gallons, which was last month and last year Less than this month. The US President directed the Environment Protection Agency (EPA) to issue a rule to allow E-15 (15 percent ethanol content) to be sold for 12 months in the US. Current rules limit sales for about 9 months in a year.

Spot prices IA, NE and IL/eastern corn belt average	**Oct 2018***	**Sept 2018**	**Oct 2017**
Maize price (USD per tonne)	130.75	126.33	126.80
DDGs (USD per tonne)	135.39	134.97	114.54
Ethanol price (USD per gallon)	1.21	1.22	1.36
Nearby futures prices CME, NYSE			
Ethanol (USD per gallon)	1.30	1.28	1.41
RBOB Gasoline (USD per gallon)	1.97	2.01	1.65
Ethanol/RBOB price ratio	65.7%	63.6%	85.7%
Ethanol margins IA, NE and IL/eastern corn belt Average (USD per gallon)			
Ethanol receipts	1.21	1.22	1.36
DDGs receipts	0.42	0.42	0.35
Maize costs	1.21	1.17	1.17
Other costs	0.55	0.55	0.55
Production margin	-0.13	-0.08	-0.01
Ethanol production (million gallons)			
Monthly production total	1 342	1 315	1 347
Annualized production pace	15 806	15 996	15 862

Based on USDA data and private sources
* Estimated using available weekly data to date.

Monthly ocean freight market update :- Dry bulk freight market development

	Oct 2018 Average*	**% Change M/M**	**Y/Y**
Baltic Dry Index (BDI) *	**1 554**	**+ 7.4%**	**+ 4.7%**
sub-Indices:			
Capesize	2 149	+ 2.9%	- 28.5%
Panamax	1 741	+11.1%	+ 15.2%
Supramax	1 180	+ 2.9%	+ 12.3%
Baltic Handysize Index (BHSI)**	653	+ 10.0%	+ 0.2%

Source: Baltic Exchange.
Note: *4 January 1985 = 1000 **23 May 2006 = 1000. Baltic Handysize sub-Index excluded from the BDI from 1 March 2018

After dip in last month, the average Baltic Dry Index (BDI) quotes increased in October, 7 percent meter / meter climb on medium progress in all the underlying areas. With the Y / Y deficit in the capacitive market, the growth in the segment in grains and oilseeds increased, the index was 5 percent higher than the year before.

The average capsize value is almost continually up to 3 percent after the period of profit. With strong determination levels on major origins, the strength of supply barriers in Australia and South Africa was linked to high iron ore prices.

Compared to September, Panamax has an average increase of 11 percent. Continued demand of coal and minerals sent from Australia and Indonesia, especially with India, with busy business in South America, support was provided in the first part of October. Income in American bay was also supported with good demand of grains / oilseeds and coal, unusually large shipment of soybean was a remarkable feature for Iran.

Regardless of the report of harsh export inspection in the Russian Federation ports, supermax and handicrafts earnings were even more average with major underpinnings made from continuous grain shipment from the Black Sea region. In Australia, good cargo volumes have also been shown in Atlantic and mineral demand, although markets have changed slightly in Europe, because thin inquiry levels were in contrast to limited ton supplies. Reflecting changes between the price of attractive soybean flows, between the attractive prices - linked to low trade between the US and China - some unusual distribution was reported; It included the Hondissies trips from the Mississippi River to the Argentine River Plate.

Extensive Articles :- Concepts of being hard and easy to use in the summary table of "Market at a glance" reflect decision-making ideas that reflect basic principles of market, other values and short-term trends in demand and supply, especially in stock Keeping the changes in mind. All the sum (consolidated) is calculated from uncontrolled data. World supply and demand estimation / forecasts are based on latest data published by FAO, IGC and USDA. For the past, they also take account information provided by AMIS Focal Points (hence the notion "FAO-AMIS"). World estimates and forecasts produced by three sources may be different for many reasons, such as different release dates and different methods used in making commodity balance.

Specially :- Production: Wheat production data from all three sources refers to the production in the first year of the marketing session shown (for example, 2016 crop year crops are allocated in the marketing session). Mecca and rice production data for FAO-AMIS refers to harvesting crops during the first year of marketing session (eg 2016/17 for marketing session 2016) in both the northern and southern hemispheres. Rice production figures for FAO-AMIS include northern hemisphere production for second time harvested secondary crops in the second year of marketing season (such as 2017 for marketing seasons). On the contrary, production in the northern hemisphere occurring during the first year of the rice and maize data season (for 2016/17 marketing season) for USDA and IGC, along with the harvesting in the Southern Hemisphere during the second year. Season (for example 2017 for the 2016/17 marketing session) For soybeans, the latter approach is used by all three sources.

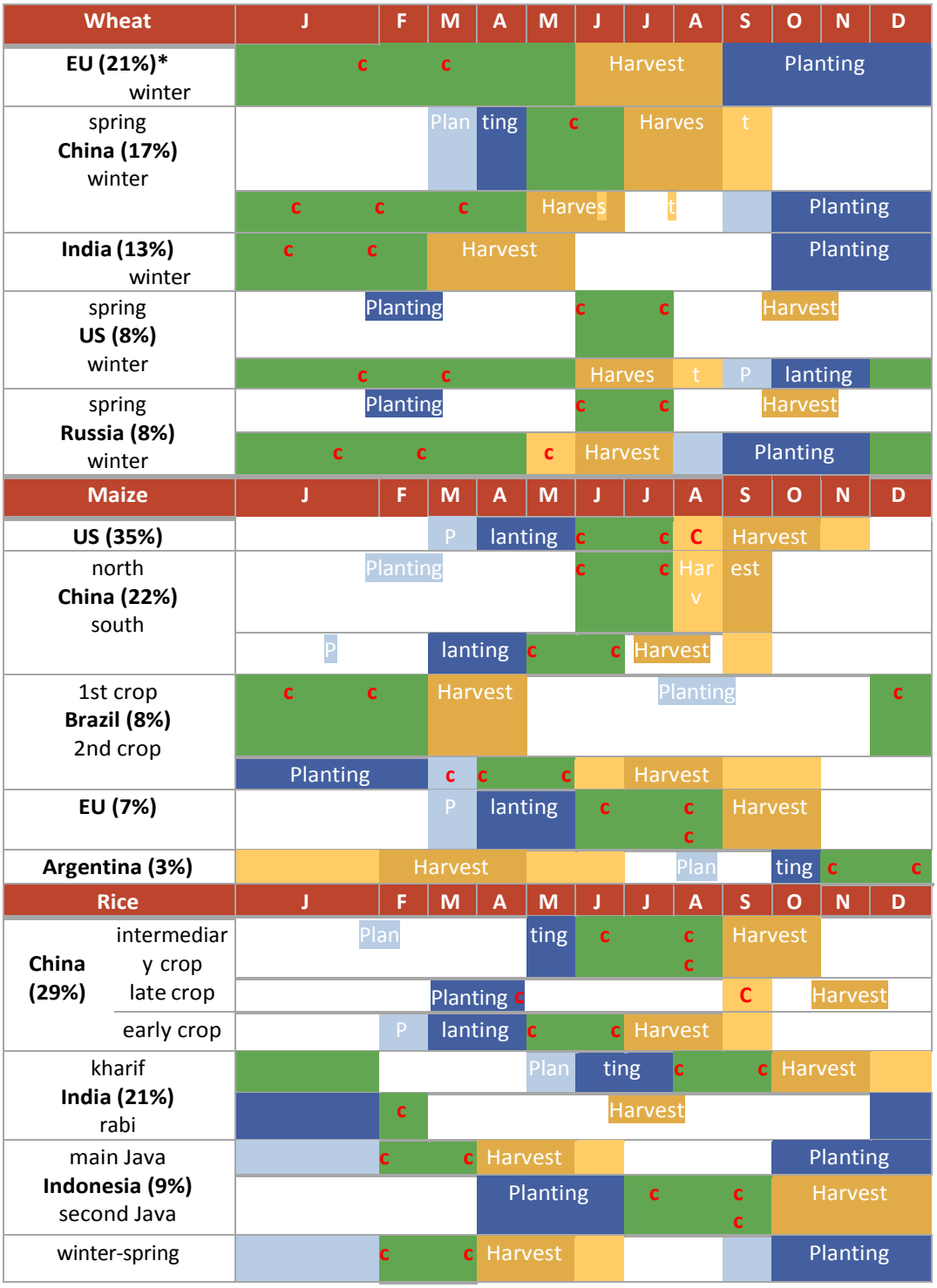
Supply :- Defined by all the three sources as the plus opening stock.

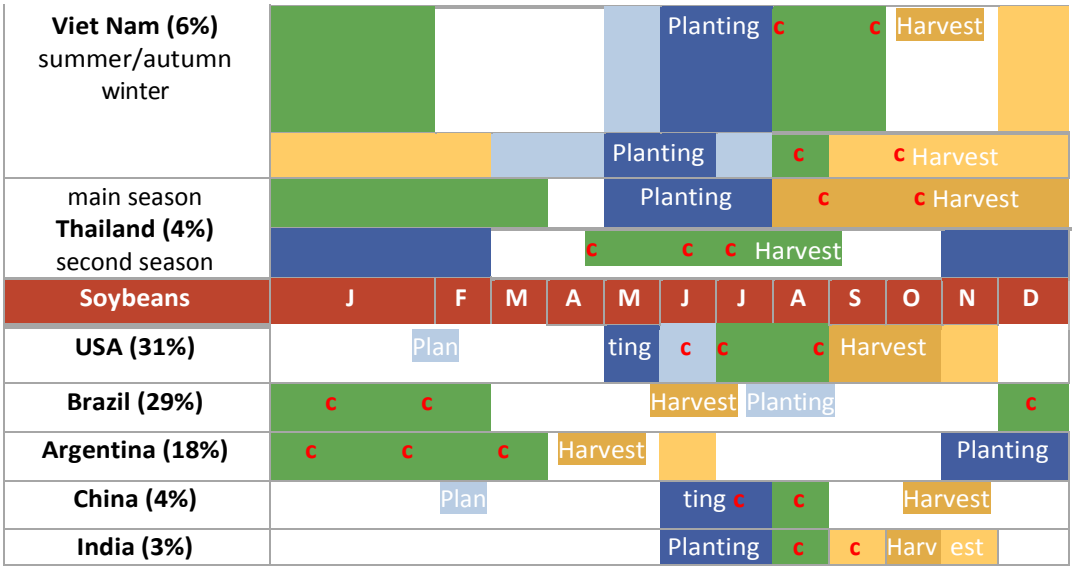
Use :- For all three sources, the use of wheat, maize and rice includes food, feed and other uses (i.e., seed, industrial use and crop damage). For soybean, it includes crush, food and other uses. However, for all AMIS items, the usage categories can be grouped individually in the sources and can also include residual values.

Business :- References the data export. For wheat and maize, trade is reported on the basis of July / June, except for the USDA Mecca Trade Estimates, which are reported on the basis of October / September. The Wheat's Wheat's Wheat Flour from all the three sources of wheat flour in Wheat's grain contains wheat flour while the USDA considers wheat products as well. For rice, the shipments cover shipments from January to December of the second year of the business related marketing session. For soybeans, FAO-AMIS and IGC have been reported on the basis of

October / September, while USDA data is based on the local marketing years, excluding Argentina and Brazil based on October / September. Trade has been excluded from EU member countries.

Stocks :- Generally, world shares of AMIS crops refer to the sum of the carry-over near each country's national marketing year. For soybeans, stock levels reported by USDA are based on local marketing years, except Argentina and Brazil, which are adjusted in October / September. Due to differences in production allocation in the southern hemisphere countries for corn and rice, global estimates may vary in sources.





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Attractant and repellent nature of ethanolic extract of Swertia densifolia flowers towards Apis florea

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ABSTRACT :- Leaf extract of Swertia densifolia (Griseb.) (Gentianaceae) is known to show dose dependent attractant and repellent properties towards Apis cerana indica F. and A. florea. The essential oil of these leaves has recently been shown to possess repellent properties towards A. cerana indica. Leaf de-oiled extract show 'Pheromone-like' properties towards Apis cerana indica F. As the next logical step in this programme, we now report screening results of ethanolic flower extract of S. densifolia on A. florea. The extract showed dose dependent repellent properties at lower concentrations and attractant properties at higher concentrations. TLC and HPLC analyses of the extract indicated the presence of six and eight constituents respectively.

Keywords :- Swertia densifolia, honeybees, Apis florea, bee attractants, bee repellents, round table bioassay, ethanolic extract.

INTRODUCTION :- Work towards developing attractants for Indian honeybees is an area of interest for researchers. As a result of this, numbers of commercial products have reached the market. Most of these products are either food based or pheromone based and a very few are derived from plant extracts.

Similarly, the repellents for honeybees are also equally important as these compounds can keep honeybees away from certain areas; especially if they have been sprayed with toxic insecticides.

The chemical constituents of Nasonov gland pheromone of the Indian honeybee Apis cerana indica were investigated and the attractant formulations were developed. The lures of A. florea were subsequently developed along similar lines. However, the activity of these lures was found to be limited to a very small range of concentrations of formulations. For this reason, alternate attractant formulations (Plant based) were researched.

It is a common observation of beekeepers from Western Maharashtra that the plant Swertia densifolia (Griseb.) (Gentianaceae) is frequently visited by honeybees in their foraging activity. The genus Swertia contains 170 known species found in India. S. densifolia, commonly known as 'Chirayata' is a well-known Indian medicinal plant.

It grows in the temperate Himalayas from Kashmir to Bhutan and in the Kaisa Hills[1]. It is also found in the Western region of Maharashtra state[2].

Literature survey reveals that many species of the genus Swertia have been studied for their chemical constitution and biological activities. Recent reviews of these findings are presented by Bramhachari et al.[3] and Negi et al.[4] It is interesting to note that the species S. densifolia, which is observed to be frequently visited by the honeybees, was not studied till investigated by Naik et al. in 2005. Screening of alcoholic leaf extract of S. densifolia on Indian honeybees Apis cerana indica and A. florea showed dose-dependent attractant and repellent properties[5,6] . However, the chemical constituent(s) responsible for the activity observed were not identified. Literature survey also reveals that flower, stem and root extracts are not screened on honeybees

and no information is available about their chemical constitution.

EXPERIMENTAL - Materials and Methods

Honey bees A. florea :-Two colonies of Apis florea maintained at the experimental apiary at the Agharkar Research Institute (ARI), Pune, were used for the bioassay.

Plant Material :- Whole plant S. densifolia (5 kg) was collected from three locations: (i) near 'Table Land', Wai (17° 57'N, 73° 53'E; 1371 m above msl), (ii) near 'Venna lake', Mahabaleshwar (17° 56'N, 73° 39'E; 1439 m above msl) and (iii) near 'Arthur Seat', Mahabaleshwar (17° 58'N, 73° 38'E; 1340 m above msl) from Mahabaleshwar region, Western Maharashtra, India and taxonomically identified by the Botany Group of Agharkar Research institute (ARI, Voucher No. WP - 115). The flowers were carefully separated, shade dried and powdered.

Extraction of the flowers :- The shade dried and coarsely powdered flowers (150 g) from each lot were extracted exhaustively with ethyl alcohol (1 lit) in a Soxhlet extraction apparatus (20 h). Alcoholic solution thus obtained was then concentrated in vacuo.

Characterization of the crude extract :- The extract was characterized by recording its Thin Layer Chromatography (TLC) on pre-coated TLC plate (10 x 6.5 cm) of 60 F 254 (Merck 1.0554.0007). The sample was loaded on the plate using sharp capillary tip. The plate was kept in the solvent system indicated. The solvent was allowed to run to a distance of about 8 cm. The plate was dried and then sprayed with the spraying reagent. The image was then observed and Rf values were measured.

High Performance Liquid Chromatography (HPLC) was carried out on a ZORBAX, Eclipse, XDB-C8, 4.6 mm x 150 mm, 5 µm column using Agilent 1100 high performance pump and 'Agilent 1100' variable wavelength UV detector (254 nm)

Bioassay of the Extract :- Eleven test formulations of increasing concentrations were prepared by mixing the flower extract with liquid paraffin (10 – 165 mg / ml). Bioassay of blank liquid paraffin was also carried out as a control. Formulation for the bioassay was selected randomly. Bioassay of each of the test formulations (10 replicates) was carried out in the campus of ARI using the rotating table bioassay[5]. The attractiveness or repellency of the test formulation was determined on the basis of average number of honeybees visiting these dishes in a stipulated time of 10 minutes.

A table with rotating circular wooden top mounted on an electric motor was used for bioassay. A removable glass top of the same size was kept on the wooden top. The table top was 25 cm above the ground and was rotated at a constant velocity of 1 rotation / 3 min throughout the experiment.

A quantity of 50 µl of the test formulation was placed on each of eight pre - dried cylindrical blocks of plaster of Paris (1 cm x 1 cm). These blocks were arranged symmetrically in a Petri dish (diameter 8 cm). Another Petri dish with eight similar blocks loaded with 50 µl of liquid paraffin was prepared as a control. The test table was located 10 m away from the colony of A. florea. Worker bees were trained to feed on the sugar syrup before beginning the actual experiment.

After about 100 bees had been trained, the glass top of the table was replaced with another glass top on which the two dishes with the test formulation and the control were kept diametrically opposite to each other. Each Petri dish was covered with clean and dry wire gauze. The number of bees visiting each dish during a 10 min period was recorded. Selection of this time period was based on the preliminary observations that the rate of visits of honey bees remained unaffected for 10 min even when the feeding dish was removed. The wire gauze on the dish was changed once it had been touched by a bee, to avoid the effect of any pheromone that might have been deposited during the visit of bees.

A set of 10 observations was recorded for each formulation. The mean difference (Δ) between the number of bees visiting the test formulation and that visiting the control recorded for each concentration was estimated as a measure of attractant or repellent nature of the test formulation. The data generated were graphically analyzed in Microsoft Excel 2003.

Statistical analyses :- All the statistical analyses were carried out using SPSS version11.0. Mann Whitney test and Kruskal Wallis test to determine the significance of the observations were used to analyse the data.

RESULTS :- The ethyl alcohol extract was obtained as a green, viscous liquid with a peculiar odour. The extracts obtained in these experiments were pooled together (48.75 g, 32.5 %).

Chromatographic analyses :- TLC analysis of ethanolic extract of flowers was carried out using the optimized solvent system hexane: ethyl acetate (8: 2, by volume) indicated six distinct spots with R_f values 0.67, 0.51, 0.27, 0.18, 0.14 and 0.09.

Its HPLC analysis was carried out using optimized solvent system methanol: water (80: 20, by volume). The chromatogram (Figure 1) showed eight peaks indicating the presence of eight components in the extract.

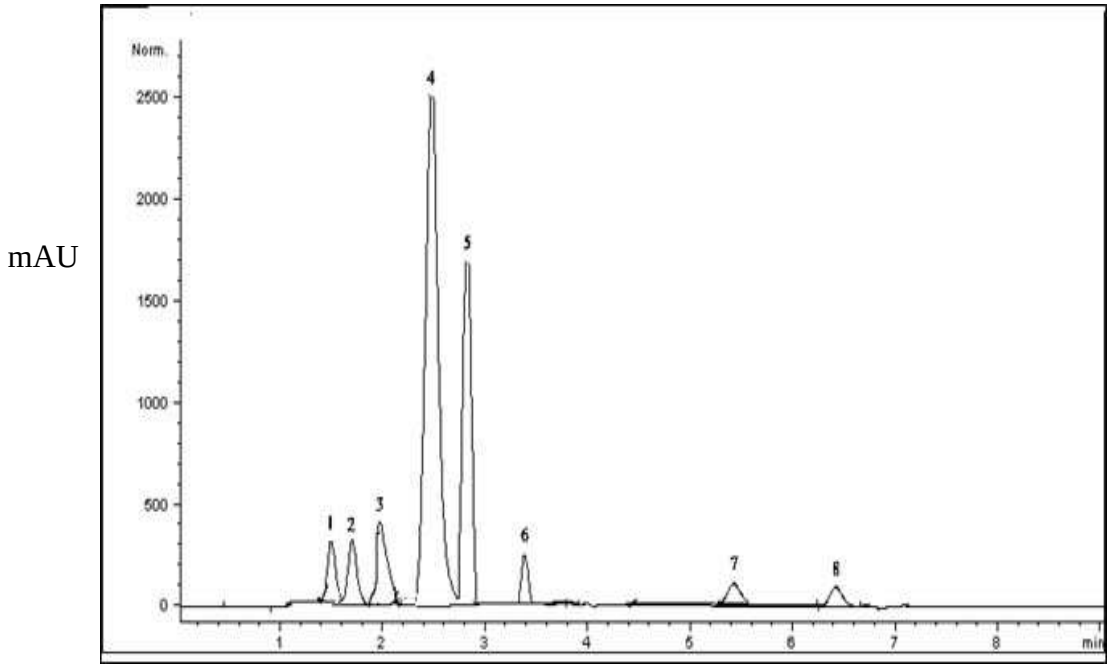

Figure 1. HPLC chromatogram of crude ethanolic extract of the flower.

Results of Bioassay :- The average number of honeybees visiting the control and test dishes during 10 mins was determined. The mean difference (Δ) between the number of bees visiting the test formulation and that visiting control recorded for each concentration was calculated (Table 1).

The statistical analyses of the observations by Mann Whitney Test yielded $p < 0.01$ and analyses using Kruskal Wallis Test yielded $\chi^2 = 93.947$, $\rho = 0.0001$ indicated the observations to be significant.

The plot of the difference (Δ ± std. dev.) recorded for each of the formulations against the concentration of the test formulations is shown in Figure 2. The standard deviation computed for each observation (Table 1) is also presented in this figure.

Table 1 Average number of honeybees visiting test formulations of crude ethanolic extract of the flowers of and that visiting control at different concentrations.

Sr. No.	Conc. (mg / ml of liq. paraffin)	Average no. of bees visiting test formulations* (a)	Average no. of bees visiting control* (b)	Mean difference* (Δ) (a - b)	Standard deviation
1	0	11.2	10.7	0.5	± 0.53
2	10	9.4	12.7	-3.3	± 0.95
3	25	8.3	15.4	-7.1	± 1.52
4	50	9.1	20.2	-11.1	± 0.99
5	63	12.4	16.6	-4.2	± 0.92
6	75	16.6	12.2	4.6	± 1.17
7	87	16.3	7.5	8.8	± 1.32
8	100	22.3	7.6	14.7	± 1.58
9	125	18.4	8.6	9.8	± 0.79
10	137	19.3	11.2	8.1	± 0.88
11	150	17.4	9.7	7.7	± 1.34
12	165	18.6	10.9	7.7	± 1.16

*Average of 10 observations.

a) Average number of bees visiting control counted during a period of 10 min (n=10),

b) Average number of bees visiting the test formulation counted during a period of 10 min (n=10).

A plot of mean difference (Δ ± std. dev.) against the concentration of test formulation is shown in Figure 2.

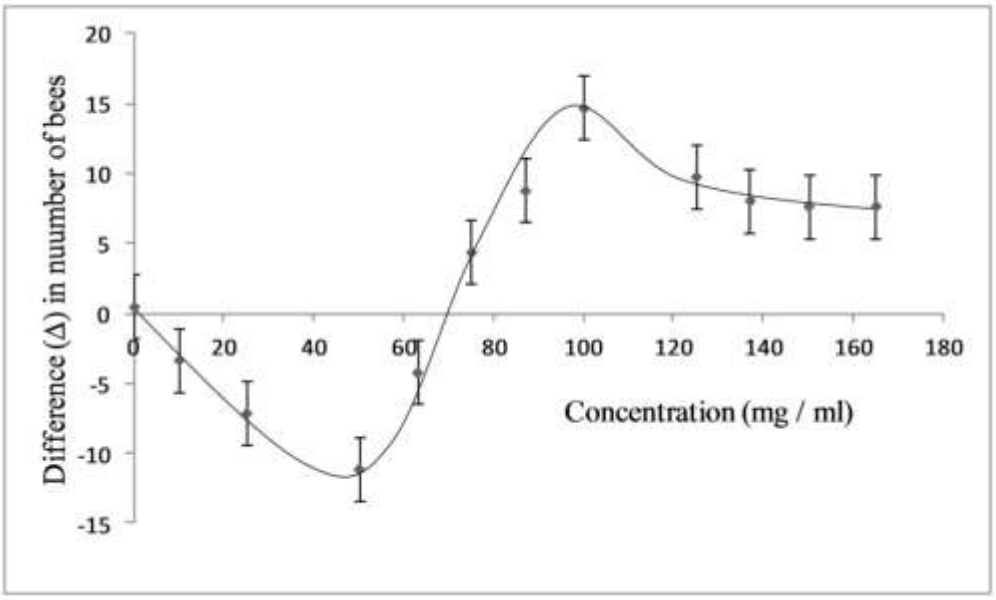

Figure 2. Graph of the difference (Δ ± std. dev.) between the average number of bees visiting the dish containing the test formulation of the flower crude ethanolic extract and that visiting liquid paraffin control versus concentration (mg / ml) of the test formulations. Standard deviation is shown at each point.

Examination of Table 1 and Figure 2 clearly brings out the properties of the test formulations. It is seen that there is almost no difference in the average number of honeybees visiting both the

dishes when only liquid paraffin is kept in them (Sr. No.1, Table 1) indicating the inert nature of liquid paraffin towards honeybees. The results of screening of formulations of lower concentrations (Sr. No. 2-5, Table 1) show that number of honeybees visiting the dish containing liquid paraffin (control) was more than that visiting the dish containing the test formulation. This indicated repellent behavior since the number of honeybees visiting the control was more than that visiting the test formulation. The dose dependent nature of the repellent behavior is clearly shown in Figure 2. It is further seen that the formulations of concentrations higher than 65 mg/ ml (Sr. No.6-12, Table 1) show the exactly opposite behavior. The number of honeybees visiting the dish containing the test formulation was more than that visiting the dish containing liquid paraffin (control). This demonstrated attractant properties since the number of honeybees visiting the test formulations was more than that visiting control. Further examination of Figure 2 shows the variation in the attractiveness of the formulation with concentration. Thus the dose dependent nature of the repellent / attractant properties is clearly demonstrated.

DISCUSSION :- The results, represented in Table 1 and graphically in Figure 2 indicate that the overall pattern of response of honeybees A. florea to the formulations of flower crude ethanolic extracts of S. densifolia is statistically significant dose-dependent attractant and repellent. At low concentrations the formulations work as repellents. Repellency is found to increase with increase in the concentration of the test formulations. It is maximum when concentration of formulation is 50 mg / ml of liquid paraffin. Further increase in the concentration of formulations is found to reduce repellent character. This pattern continues with increase in concentration and eventually the formulations become attractant. Results of screening of the formulations of higher concentrations indicate that there is a steady increase in the attractant nature of formulations until the concentration of formulation becomes 100 mg / ml of liquid paraffin. Further increase in the concentration of the formulations results in slightly reduced attractiveness. However, it is noteworthy that all formulations remain attractive and no repellency is seen in these formulations. It is well known that plant volatiles can elicit insect responses similar to those for pheromones[7]. Similarly, Malerbo-Souza et al. (2004) have demonstrated the use of lemon grass extract as a bee attractant for A. mellifera[8]. The leaf extract of S. densifolia, found to work as an attractant or repellent for A. cerana and A. florea can eventually be modified for field application by methods described by these workers. The ability of honeybees to detect and discriminate odours of flowers is well known. It is shown that both intensity and odour quality affect ability of honeybees to differentiate amongst floral perfumes[9]. The floral scents of rose and lemon were shown to act as an attractant through the induction of navigational and visual memories for A. mellifera by Reinhard et al.,[10,11]. These observations are consistent with the dose dependent attractant and repellent properties of leaf extract of S. densifolia towards A. florea reported in the present investigation. The dose-dependent attractant and repellent properties of the crude extract might be due to the presence of chemical constituents having different properties. The TLC and HPLC data indirectly support this hypothesis by showing the presence of at least six compounds in the extract. Moreover, these analyses indicate that their quantities in the extract are not uniform. Presence of a major compound is clearly indicated by these analyses.

CONCLUSIONS :- Ethanolic crude extracts of flower showed attractant and repellent properties towards honeybees A. florea. Activities were dose dependent. Formulations of lower concentration were repellent while those of higher concentration were attractant in nature.

Availability of attractant formulations can help beekeepers to direct honey bees to visit plants of interest, thereby improving pollination efficiency. Our results may help beekeepers to select appropriate formulations of S. densifolia

flowers to be employed for attracting or repelling honeybees.

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Seasonal eco – physicochemical evaluation of Mangifera indica L. bark in Indore City

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Abstract :- Plants being constantly exposed to environment, absorb, accumulate and integrate pollutants impinging on their foliar surfaces and sometimes even show specific response and thus can be used as bio indicator of air pollution. In case of trees not only foliar surface but bark also absorbs and accumulate the air pollutants. The paper deals with the study of different physicochemical properties like pH, electrical conductivity and accumulation of sulphate and nitrate in bark of Mangifera indica L. during rainy, winter and summer season in year 2015 and 2016 at three different polluted areas (Mixed(MPA), Vehicular (VPA) and Industrial (IPA)) and was compared by reference area. The result revealed lower value (more acidic) 5.0 at VPA during rainy season while in electrical conductivity higher values were recorded in rainy season and summer season comparison to winter at all pollution areas. An increased trend was observed for accumulation of both sulphate and nitrate at all pollution areas over LPA.

Keywords :- Bark, Physicochemical, Mangifera indica L., pH, Electrical conductivity, Sulphate, Nitrate.

Introduction :- A plant growing in its natural habitat is generally exposed to fluctuating levels of different pollutants. The use of plants as a complementary tool to traditional (instrumental) methods of studying atmospheric pollution from anthropogenic and natural sources become an established technique in the past 30-40 years because of the development of powerful analytical techniques. Monitoring using bark represents an interesting and economic alternative to other methods, particularly when large areas have to be covered and air monitoring is not frequent. The use of Mangifera indica L. bark for air pollution monitoring in four different areas was investigated.Mangifera indica belongs to the family Anacardiaceae which is a tall evergreen tree with dense spreading branches reaching upto 20m height. The bark of mango is greyish brown or sometimes quite dark, rough with shallow fissures, breaking off in thick, irregular, scabby plates.

Study area :- Sampling sites were selected on the basis of sources and nature of pollutants. Four sites were selected. Mixed pollution area (MPA) which was located in scheme No.78. Vehicular Pollution area (VPA), is a part of Eastern ring road between Khajarana to Bengali square. Sanwer Road, Industrial pollution area (IPA) the Industrial cluster situated on Sanwe rroad. Ralamandal village, which is located 10km away from Indore in north east direction was considered as reference area for comparison.

Material methods :- Bark is the main material for present work. Bark samples of Mangifera indica was collected in triplicate in all the three seasons i.e. Rainy (August) Winter (December) and Summer (April) in year 2015 and 2016. About 2 to 5 mm thick chips of bark were removed by sharp knife from all thedirections around the tree at a height of 5-6 feet above the ground level and after cleaning with brush placed in a zipper poly bag. For uniformity trees of same height, canopy and main trunk size were considered at all sampling sites. Bark samples was also collected from low polluted areawhich serves reference for comparison. The samples were brought in the laboratory for the

further analysis. The pH and conductivity of the bark was determined following **(Grodzinska, 1971)** using a Digital pH meter EI – 112 and Digital conductivity EI-611 meter respectively.For the Quantitativeestimation of Sulphate - Sulphur, the method given by **Patterson (1958)** was adopted. The nitrate contents in bark powder was determined by using rapid colorimetric method given by**Cataldo et al., (1975).**

Observation

Table no. 1 Bark extract pH of Mangifera indica growing in different pollution areas of Indore city in different seasons.

AREA	LPA			MPA			VPA			IPA		
Season	*R	**W	***S	R	W	S	R	W	S	R	W	S
Year												
2015	7.3	7.0	6.1	5.5	6.1	5.7	5.1	5.5	5.6	5.0	5.4	6.0
2016	6.9	6.7	5.5	5.1	6.0	5.2	4.9	5.0	5.0	4.7	4.9	5.7
AV ± SD	7.1 ±0.3	6.9 ±0.2	6.1 ±0.8	5.3 ±0.3	6.1 ±0.1	5.5 ± 0.4	**5.0 ±0.1**	5.3 ±0.4	5.3 ±0.4	5.9 ±0.2	5.2 ±0.4	5.9 ± 0.2

***R –Rainy season, **W –Winter season, ***S – Summer season**

Table no.2 Bark extract electrical conductivity of Mangifera indica growing in different Pollution areas of Indore city in different seasons (µmohs/cm^2)

AREA	LPA			MPA			VPA			IPA		
Season	*R	**W	***S	R	W	S	R	W	S	R	W	S
Year												
2015	167.3	212.3	215.3	178.3	217.3	234.7	227.3	237.3	264.7	238.3	250.0	262.0
2016	169.6	213.3	220.7	179.3	221.7	237.0	226.7	233.7	270.3	235.3	252.7	264.3
AV ± SD	168.5 ±1.6	212.8 ±0.7	218.0 ± 3.8	178.8 ±0.7	219.5 ±3.1	235.9 ± 2.6	227.0 ±0.4	235.5 ±2.5	**267.5 ± 4.0**	236.8 ±2.1	251.4 ±1.9	263.2 ±1.6

***R –Rainy season, **W –Winter season , ***S – Summer season**

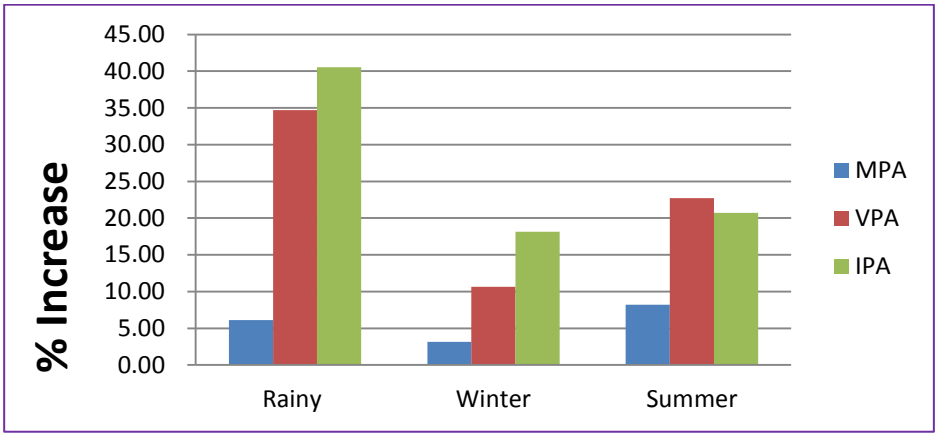

Fig. 1 Showing Seasonal % Increase over LPA in bark extract conductivity of Mangifera indica

Table no. 3 Sulphate accumulation in bark extract of Mangifera indica growing in different Pollution areas of Indore city in different seasons (mg kg^{-1} dry weight)

AREA	LPA			MPA			VPA			IPA		
Season	*R	**W	***S	R	W	S	R	W	S	R	W	S
Year												
2015	24.4	25.3	24.7	41.9	42.8	42.3	48.7	49.5	34.0	44.6	42.5	42.9
2016	21.3	23.3	20.3	40.3	44.3	40.3	41.3	47.0	36.3	40.3	45.0	44.3
AV ± SD	22.8 ±2.2	24.3 ± 1.4	22.5 ± 3.1	41.1 ±0.4	43.6 ± 1.1	41.6 ±1.4	45.0 ± 5.2	48.3 ± 1.8	35.2 ±1.6	42.0 ± 1.8	43.8 ± 4.2	43.6 ± 1.0

***R –Rainy season, **W –Winter season , ***S – Summer season**

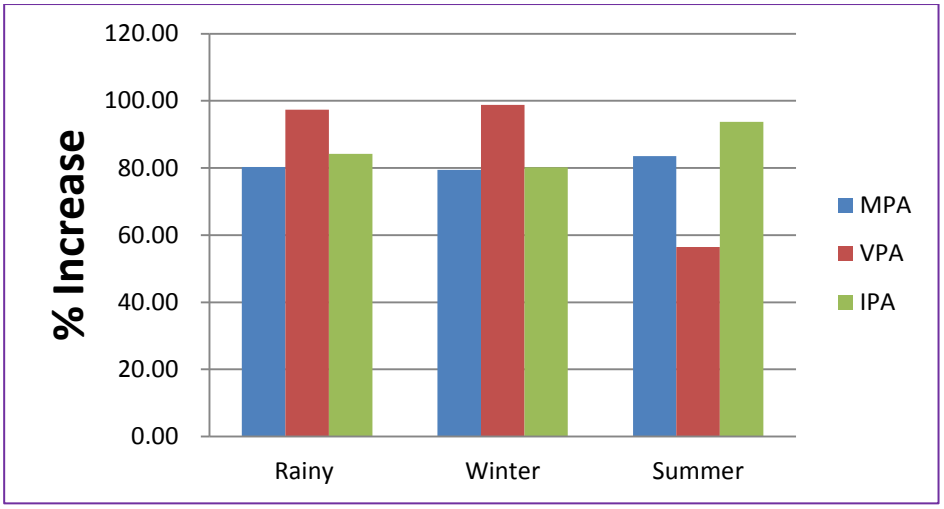

Fig. 2 Showing Seasonal % increase in sulphate accumulation over LPA in bark extract of Mangifera indica

Table no. 4 Nitrate accumulation in bark extract of Mangifera indica growing in different Pollution areas of Indore city in different seasons (mg kg^{-1} dry weight)

AREA	**LPA**			**MPA**			**VPA**			**IPA**		
Season	*R	**W	***S	R	W	S	R	W	S	R	W	S
Year												
2015	9.9	5.5	11.3	20.6	10.8	23.8	23.5	15	24.1	18.7	11	23.2
2016	12.1	9.3	13.9	21.3	14.7	23.9	18.9	13.1	20.5	20.7	14.9	25.5
AV ± SD	11 ± 1.6	7.4 ± 2.7	12.5 ± 1.8	21.0 ±0.2	12.8 ± 1.4	23.9 ± 0.0	21.2 ± 3.3	14.1 ± 1.3	22.3 ± 2.5	19.7 ± 1.4	13.0 ± 2.8	**24.4 ± 1.6**

***R –Rainy season, **W –Winter season , ***S – Summer season**

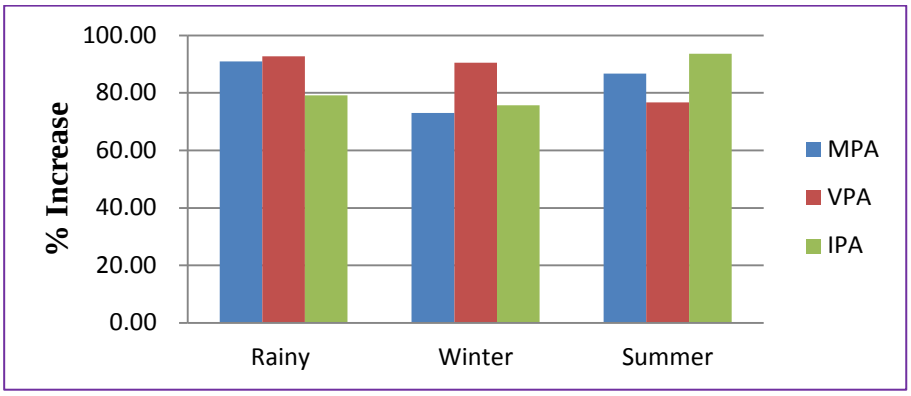

Fig. 3 Showing Seasonal % Increase in nitrate accumulation over LPA in bark extract of Mangifera indica

RESULT AND DISCUSSION :-Among three polluted areas season wise mixed results were obtained in all the four parameters. Lowest pH value 5.0 (more acidic) was found at VPA in rainy season in comparison to winter and summer season. The increase trend of bark extract pH at VPA clearly indicates the nature of pollutants predominating in the study areas. Increased acidity of bark pH in vehicular polluted area can be linked with high sulphation rates.

Conductivity is a far more sensitive indicator of contamination than pH of bark. It changes even at small emission of SO_2 which normally do not produce changes of bark pH. Higher values for E. conductivity was recorded in rainy and summer season at all pollution areas in comparison to winter season. **Hartel (1982**) noticed that dry bark absorbs more SO_2 than moist which result in acidic nature of bark. Hence it is possible that in summer season dry bark has absorbed more SO_2 and become acidic and this acidity was recorded in rainy season. It was also reported by **Kuang (2007)** that bark is permanently leached by stem flow during rainfall which makes them acidic. The observation by Kung supports our present study. Maximum % value increase (40.53%) was found at IPA in rainy season. Higher conductivity might be due to presence of large amount of salts like suphates and other derivatives. Recently, **Stenidor (2011)** have also reported that pollutants released from industries & vehicles in the atmosphere has an impact on tree bark. The study of pH & electrical conductivity values of the mango bark (Mangifera indica) was conducted during November 2000 to February 2001 in Chiang Mai city of China & its surrounding by **Subsri and Saipunkaew.** The result concluded that the pH values were significantly increased when distances between the sampling trees and the roads decreased. The EC values were not correlated to distance between the sampling trees and the roads but related to the bark type. In another study **Barki et al. (2017)** of Nigeria worked on Mango bark based Nanofluid, (a dilute suspension of nanometer size particles and fibres dispersed in a liquid) and investigated pH & electrical conductivity, pH values were between 5.28 to 5.44 and 927.1 to 1143.2 µmohs/cm for conductivity of Mango bark. The result showed that pH and electrical conductivity of the nanofluid increased with the increase in concentration of sap.

The air of urban & industrial areas carries an appreciable amount of particulates along with a complex mixture of gaseous pollutants. When particulates are present in higher concentration they could potentiate the harmful effects of gaseous pollutants to a greater degree.

Increasing trend in sulphate and nitrate accumulation as observed at all MPA, VPA and IPA over LPA in Mangifera indica might be due to presence of SO_2 at pollution areas emitted by industrialization, urbanization and increase traffic density (Wotlerbeek et al. 1996). In present work maximum sulphate and nitrate accumulation in Mangifera indica at all polluted area may be due to thick and more cracked bark, which provide large surface area for absorption of the pollutants. In polluted areas the plants are reported to have higher sulphate content (Reddy and Dubey, 2002),

though in leaves but it is in conformation with our findings. Manninen and Hultlumen (2000) also reported higher sulphate concentrations in both Scotpine and Norway spruce needles when exposed to SO_2 gas. SO_2 once absorbed by foliage is oxidised to sulphite & sulphates and its subsequent solubilization produce sulphate and hydrogen ions (Decronis, 1969, Ziegler, 1975). This mechanism of foliage may also be possible in barks for increased sulphate accumulations. SO_2 and suspended particulate matter are reported to be major air pollutants in India **(Agrawal & Sharma, 1984).**

In case of bark pH, electrical conductivity, sulphate and nitrate content has been found to be changed. Out of three polluted areas selected for research vehicular pollution area was noted to be the most polluted region of the Indore city. The study suggests that gaseous as well as particulate pollution can be monitored by Mangifera indica species and its bark can be used as bio - indicator of air pollution specially for SO_2 and NO_X.

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