production. The percentages of irrigated lands of the total cultivated area are 44 percent in USA, 36 percent in India, 25 percent in Pakistan, 18 percent in USSR and 17 percent in China. But, irrigated lands have been seriously threatened due to salinization, weak management and poor drainage. Irrigated land from the above top five countries have been damaged through salinization. The cropping intensity of the arable lands could be increased by converting them from rainfed to irrigated. If we bring under cultivation the one ha of new land, we will be able to produce an additional 0.9 tonnes of cereal grain which would be sufficient to feed five persons per year. If that land is brought under irrigation, the additional production would be four times more i.e. 3.5 tonnes. If the irrigated area on this earth is raised at this rate, in the future, projected increase in production would be 1.0 billion ha, a food quantity enough to feed 10 billion people, the expected population.

An expansion by 32 million ha of irrigated lands would be required mostly in developing countries. Although, as a consequence of improved water use efficiencies, and declined areas of rice cultivation, there would be not much higher increase in water use, yet water withdrawals will increase to 286 cubic km in 2050, about 11 percent higher than the present withdrawals. Due to uneven distribution of fresh water on earth and increasing number of water scarce regions, there is still need to increase water use efficiencies through technology development keeping in view the prevailing agro-climatic and socio-economic conditions of the area under consideration.

1.5.4 Towards the 21st Century:

According to the report of World Bank, the global population of human beings would be up to about 10 billion by the end of twenty first century. Almost, all the population increase (95%) would happen in the today's developing countries, which already have lower per capita food intake. To fulfill the food and other agricultural produce demands of population at that time, nearly whole of cultivable land need to be brought under cultivation. This in turn would need the use of more advanced and innovative agricultural technologies and scientific research and extension activities.

Salient Features of Pakistan Agriculture:

1.6 Agriculture in National Economy

Agriculture is considered to be the pillar of economy of Pakistan. It shares 19.5 percent to gross domestic product, source of 42.3 percent employment for country's labour (36 percent males and 64 percent females), livelihood to 62% of rural population, and provides raw material to local industry. Despite the significant industrial growth in the country, the role of agriculture could not be undermined. With the rapid population growth, the demand for basic diet, vegetables, fruits, meat and dairy products is also

increasing day by day. Among all sectors, agriculture is the largest mean of earnings in Pakistan. The China-Pakistan Economic Corridor (CPEC) will play a major role in the strengthening the agricultural industry by providing infrastructure, drawing benefits of value-addition and innovation. The largest share in agriculture is brought about by livestock that solely accounts 58.3 percent share in it, the remaining share by other sub-sectors i.e. crops, forestry and fisheries, 23.85 percent by major crops, 11.03% by the minor crops, 2.12 percent by fisheries, and 2.33 percent by forestry. The corresponding shares of livestock, main crops, other crops, forestry and fisheries sub-sectors in gross domestic product are 11.4, 4.66, 2.15, 0.46 and 0.41 percent, respectively.

Livestock, the largest agricultural sector is considered to be the most important in the economy of rural areas of Pakistan. About 8 million families in rural areas are dependent upon livestock for their livelihood as they derive a higher than 35 percent of their income from livestock and its products. Livestock is pivotal to alleviate poverty in rural areas of the country. Poultry has been arisen as one of the most dynamic parts of livestock sector in Pakistan. This sector is offering employment to more than 1.5 million people in the country. An investment of beyond Rs.700 billion has been recorded in poultry industry. It not only provides 31 percent of the total meat in Pakistan but is also a big user of more than 7 million metric tonnes of residues derived from various agro industries working in the country. The contribution of poultry sector in GDP is 1.4 percent

The role of agriculture in national economy can be ascribed from following perspectives:

1) It is the only segment that supplies food to population and raw material to various domestic industries.

2) It the largest source of foreign exchange earnings.

3) It supplies goods and services to domestic industry and international market.

4) It is the source of employment for a larger part of population in the country.

5) According to World Health Organization (WHO), the health of people in a country depends upon supply of nutritional food items, fresh vegetables and fruits and hygienic meat, the all things depend upon agriculture.

1.7. Food Problem in Pakistan

Food security is not only the issue of Pakistan but has become a worldwide problem. It is an extremely complicated issue covering several causal factors of social,

monetary and ecological nature. It encompasses all the segments of food production system starting from crop and animal production, harvesting, processing, marketing, preservation and storage. Food security takes its part in benefiting the society and environment. Food security means state of food availability to all the people, throughout the year, in sufficient quantity, and qualifying the basic standards of hygiene and nutrition to meet their dietary needs for dynamic life. Its main segments are:

a) Food availability

b) Food accessibility

c) Food utilization

Albeit, agricultural innovations are one of the main considerations in guaranteeing food security at individual and national level, it isn't the main factor. The diverse farming practices (organic and intensive), and their effects on ecosystem give a theoretical learning of agro ecosystem. Agro ecosystem gives an idea of sustainable agriculture. Agricultural sustainability recommends an emphasis on both genotype enhancements through the full scope of present day biological approaches, and also enhanced comprehension of the advantages of environmental and agronomic management, control and upgrade. Agriculture is the major sector satisfying the food requirements of expanding population. As the growth rate of Pakistan is raising at the rate of 2.1% per annum, thusly the production of food is raising and the percent contribution of agriculture sector in GDP has raised up to 21 percent. This sector is engaging 45% labor power of the country. On account of considerable chasm between food demand and supply, the maintenance of food supply to the expanding population is getting to be the burning issue. Pakistan is blessed with diverse climatic and ecological zones and therefore supports the production of food with diverse nature and classes. The four pillars of agricultural production system of Pakistan are livestock, major crops, minor crops (oilseeds, pulses, onion, potato and chilies), and fisheries. Despite the availability of greater diversity of crops and potentially efficient food production system, we are still far below than world’s production level in almost all crops. The reason is the presence of certain technological and socioeconomic constraints that are great hindrance in efficiency of food production system. That is why, there is always remain a threat to continued food availability in the country.

1.7.1 Role of sustainable agriculture in food supply:

The idea of sustainable agriculture means utilizing innovations and technologies that can boost up the yields without damaging nature. The key rationales for maintaining sustainability in agriculture are to incorporate natural ecological phenomena such as biogeochemical cycling, nitrogen fixation, soil recovery into the present food production system. In other words, we can say that dealing the agriculture