**Agro-7117 3(3-0), (Climate Change and Agriculture), Dr. Amjed Ali**

**Impact of Climate Change on wheat crop**

Atmospheric condition which remains for some days is called weather, whereas, if such condition prevails for a season, decade or a century, it is termed as climate. To keep the pace of growth fossil fuel has been used in order to meet the energy requirement. However, fossil fuel adds some gases in the atmosphere which are altering the climate with the passage of time. Although the climate change in some areas of the world, particularly the areas located within the northern widths above 55 , will have positive effects on agricultural production , but the negative impacts of these changes will be so severe in hot and dry areas , so in developing countries the rise in temperature and the decrease in rainfall have been more severe.

Higher temperatures, and to a lesser extent declining rainfall, will hasten development times and reduce the flowering period.

Production risks associated with climate variability in drier, marginal areas are projected to increase.

Increased atmospheric carbon dioxide concentration offsets a small percentage of the negative effects of decreased rainfall and increased temperatures. Integrated impact of a rise in temperature and CO2 concentration on yield of crops may be negative. Further, a 0.5 C increase in winter temperature would reduce wheat crop duration by seven days and reduce upto 10 per cent.

In Pakistan wheat is sown in winter season, preferably in November. Estimated land, on which wheat is cultivated in Pakistan, is 9045 thousand hectare and per hectare wheat yield is 2657 kg. (Zia Khan et al). Per head consumption of wheat in Pakistan is about 120 kg which makes the importance of this food crop. The water available for the cultivation of wheat in Pakistan is 26 MAF (million acre feet) which is still 28.6% lower than the normal requirement of water. Almost all the models predict that climate change will stress the wheat yield in South Asia region. According to the 4th IPCC report cereal yield could decrease up to 30 percent by 2050 in South Asia along with the decline of gross per capita water availability for South Asia from 1820m3 in 2001 to 1140m3 in 2050. Water supply is scarce in many part of the country. In near future a dramatic decline in the water availability would cast a sharp decline towards the production of agricultural productivity. Wheat is main food crop of Pakistan. The newly emerging threat of climatic change may influence the level of wheat production in Pakistan. Being an agricultural country we should be capable to secure domestic consumption by increasing the level of wheat production and the surplus production can be exported abroad to earn foreign exchange. In order to cope with any type of emerging hazard of climate change the agriculture sector in Pakistan needs some adaptation strategies. In this regard some strategic measures are given below:

1) Main issue of climate change is global warming. Therefore, researchers have to produce heat resistant seeds.

2) Climate change may change the level of precipitation as well as pattern and directions of rainfall. Therefore, drought resistant seeds have to be developed in time.

3) The increasing population requires more cultivable land for wheat production.

4) Water conservation management and the irrigation system have to be improved.

5) Increasing temperature may shorten the period of growth for wheat canopy. Therefore, time of wheat cultivation shall be adjusted accordingly.

**Future Research strategies**

The identification of suitable response strategies is key to sustainable agriculture. The important mitigation and adaptation strategies required to cope with anticipated climate change impacts include adjustment in sowing dates, breeding of plants that are more resilient to variability of climate, and improvement in agronomic practices. As the wheat cultivars are also sensitive to physico-chemical characteristics of the soil, the varieties prevalent in central India cultivated on vertisols do not yield optimally in north India where the soils are entisols. Therefore, the increase in temperature limits indicative of environmental suitability of sowing of cultivars in the northern plains of central India will not be useful owing to the genetic characteristics of the genotypes suitable for the particular soils and uncertain water supply.Adaptation assessments suggest that the possible changes in sowing dates and hybrid selection can reduce the negative impact of projected potential warming in the current century. It should be noted that shifting of sowing dates is a no-cost decision that can be taken at the farm level; a large shift in sowing dates probably would interfere with the agro-technological management of other crops, grown during the remaining part of the year.

Changes in the cropping mixtures, irrigation and agriculture land use can be additional alternative option for adaptation in agriculture.

The major root cause of the climate change is increase in GHS's leading to increase in temperature. Therefore, to reduce the level of GHS's in the environment following research strategies are suggested:

D e t a i l e d i n v e s t i g a t i o n s o n phonological phases in different climate region need to carry out for regeneration and multiplication of tree species.

Studies on Pollen biology of flora need to make to ensure the production of seed. Pathological survey need to done frequently to see the appearance of diseases on crops under agroforestry and selection of tree species be made keeping in view the pathogen surveillance in the area and resistance in crop genotypes need to be evaluated.

Carbon sequestration potential of various multipurpose trees and crops n e e d s t o b e s t u d i e d a n d quantification of area to bring under agroforestry for lowering the level of GHGs.

Value addition of wood obtained from agroforestry tree species for ensuring the good return to farmers.

Simplifying the procedure of carbon credits purchase and selling