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

**Impact of climate change on Cotton productivity**

The earth temperature has increased by 0.74°C during the last century (1906 to 2005) due to increase in greenhouse gases through anthropogenic emissions as reported by IPCC-2007. Thus, the increase in temperature is likely to be 1.8–4.0°C by the turn of 21st century resulting in anticipated greater instability in food, feed and fiber production. Increase in temperature can reduce crop duration, change pest populations, hasten mineralization in soils (**Mineralization** in **soil** science is the decomposition (i.e., oxidation) of the chemical compounds in organic matter, by which the nutrients in those compounds are released in soluble inorganic forms that may be available to plants. Mineralization is the opposite of immobilization) and increase evapotranspiration. However, increase in atmospheric CO2 increases the quantum of yield produced photo-synthetically, net photosynthesis, biomass production and ultimate output. Besides higher output, increasing inputs-use efficiency in cultivated crops is also realized and the same at much greater pace in C3 plants (cotton). Compared with other field crops however, its growth and development is complex. Vegetative and reproductive growth occur simultaneously making interpretation of the crop’s response to climate and management sometimes difficult. Climate change impacts on cotton growth and development that influence yield and fibre quality will most likely be a result of the net effects of:

Increases in CO2 concentration;

Reduced water availability and increased atmospheric evaporative

demand as a result of lower rainfall and relative humidity; and,

Increases in temperature.

These effects are discussed in more detail below.

 Study showed that increase in seed cotton yield up to 43% was realized at elevated CO2 of 550 ppm throughout the crop-growing period. Severe sucking pest problem and dominance of weeds are expected in cotton. Thus, in total, elevated CO2 favors cotton growth and yield but higher temperature influences these negatively. The Effect of climate change on national cotton production system interpreted that increasing CO2 concentration could help to increase cotton production. However, increasing precipitation with decreasing temperature may prolong the vegetative growth and extend the crop duration, which pose difficulties in timely sowing of succeeding *rabi* crops in north zone. The expected increasing of temperature, decreasing rainfall with erratic distribution in central and south zone leads to frequent wet and dry spell with high evapotranspiration demands. Prolonged dry spell during critical crop growth periods may affect yield.

Cotton requires warm days and relatively cool nights for optimum growth and development. Temperature significantly affects phenology, leaf expansion, internodes elongation, biomass production and the partitioning of assimilates to

different plant parts. Study showed that increase in seed cotton yield up to 43% was realized at elevated CO2 of 550 ppm throughout the crop-growing period. Severe sucking pest problem and dominance of weeds are expected in cotton. Thus, in total, elevated CO2 favors cotton growth and yield but higher temperature influences these negatively. Less water for irrigation will mean lower cotton yields unless farm and agronomic water use efficiencies can improve. Water stress in cotton restricts both vegetative and fruit growth. Cotton’s response to stress varies on the stage of growth, the degree of stress, and the length of time imposed. In situations where water is limited and there is high evaporative demand, crops will struggle to transpire enough to keep the canopies cool. Leaf temperatures are then increased to a point where photosynthesis and growth are impaired. Increasing precipitation and decreasing of temperature may prolong the vegetative growth and extend the crop duration, which pose difficulties in timely sowing of succeeding *rabi* season crops in cotton-based cropping systems.