

## Editorial

### **Effect of Climate Change on Agriculture**

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### **Background**

Climate change refers to significant, long-term changes in the global climate which is more than the “average” of the climates of specific places. Climate is the primary determinant of agricultural productivity, it affects crop productivity and livestock production, which are important components of food security in the world. It also affects available water resources and soil properties, so this brief review is presenting some of the themes or findings regarding of the climate changes on agriculture, the possible regional impacts of climate change to agricultural systems and some adaptation procedures.

Today, the problem is not that too little sun warmth is reaching the earth, but that too much is being trapped in our atmosphere, this is why scientists have stopped focusing just on global warming and now focus on the larger topic of climate change.

Agricultural sector is considered the first as a result of climate changes, the increases in temperature coupled with more variable precipitation will reduce productivity of crops, and these effects will outweigh the benefits of increasing carbon dioxide.

Climate change poses unprecedented challenges to agriculture because of the sensitivity of agricultural productivity and costs to changing climate conditions.

### **Effect of climate change on agriculture**

Extreme climate conditions, such as dry spells, sustained drought, and heat waves can have large effects on crops and livestock. Although climate models are limited in their ability to accurately project the occurrence and timing of individual extreme events, but some emerging patterns project increased incidence of areas experiencing droughts and periods of more intense precipitation. The occurrence of very hot nights and the duration of very low (agriculturally insignificant) rainfall events are projected to increase by the end of the 21<sup>st</sup> century.

An animal's ability to adjust its metabolic rate to cope with temperature extremes can lead to reduced productivity and in extreme cases death. Prolonged exposure to extreme temperatures will also further increase production costs and productivity losses associated with all animal products, e.g., meat, eggs, and milk.

The continued degree of change in the climate by midcentury and beyond is expected to have overall detrimental effects on most crops and livestock.

The climate change will change the pressures associated with weeds, diseases, and insect pests, together with potential changes in timing and coincidence of pollinator lifecycles, will affect growth and yields.

The potential magnitude of these effects is not yet well understood. For example, while some pest insects will thrive under increasing air temperatures, warming temperatures may force others out of their current geographical ranges.

Key near-term climate change effects on agricultural soil and water resources include the potential for increased soil erosion through extreme precipitation events, as well as regional and seasonal changes in the availability of water resources for both rain-fed and irrigated agriculture.

The predicted higher incidence of extreme weather events will have an increasing influence on agricultural productivity, because agricultural productivity is driven largely by environmental conditions during critical threshold periods of crop and livestock development.

### **Adaptation of effective planning to get over climate change**

Because agricultural systems are human-dominated ecosystems, the vulnerability of agriculture to climatic change is strongly dependent not just on the biophysical effects of climate change, but also on the responses taken by humans to moderate those effects worldwide.

Worldwide should set an effective adaptation planning and assessment strategies; and soil, crop and livestock management practices that enhance agricultural production system resilience to climatic variability and extremes.

Anticipated adaptation to climate change in production agriculture includes adjustments to production system inputs, tillage, crop species, crop rotations, and harvest strategies.

New research and development in new crop varieties that are more resistant to drought, disease, and heat stress will increase the resilience of agronomic systems to climate change and will enable exploitation of opportunities that may arise.

Also, potential adaptive behavior can occur at multiple levels in a highly diverse international agricultural system including production, consumption, education, research, services, and governance. Also, understanding the complexity of such interactions is critical for developing effective adaptive strategies.

Adaptation measures such as developing drought, pest, and heat stress resistance in crops and animals, diversifying crop rotations, integrating livestock with crop production systems, improving soil quality, minimizing off-farm flow of nutrients and pesticides, and other practices typically associated with sustainable agriculture are actions that may increase the capacity of the agricultural system to minimize the effects of climate change on productivity.

### **Some points that research must contain to overcome climate change**

Some broad research needs must include the following:

- i. Attention to these research needs will enhance the ability of the agriculture sector to anticipate and respond to the challenges presented by changing climate conditions.
- ii. Improve projections of future climate conditions enable more precise projections of the changes and durations of average and extreme temperatures, precipitation, and related variables (e.g., evapotranspiration, soil moisture).
- iii. Evaluate and develop process-level understanding of the sensitivity of plant and animal production systems, including insect, weed, pathogen, soil and water components, to key direct, indirect and interacting effects of climate change effects.
- iv. Develop and extend the knowledge, management strategies and tools needed by agricultural stakeholders to enhance the adaptive capacity of plant and animal production systems to climate variability and extremes.

### **Conclusion**

Climate change presents an unprecedented challenge to the adaptive capacity of world agriculture. High adaptive capacity does not guarantee successful adaptation to climate change. Adaptation assessment and planning efforts routinely encounter conditions that limit adaptive action regardless of the adaptive capacity of the system under study.

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