



Global Warming: Agricultural Pests and Diseases

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Global warming or climatic change in these days is one of the major debates worldwide. Generally, climatic change needs several decades to millions of years to quantify the lifelong significant change in weather patterns statistically. Usually, it is an average change of weather conditions or sometime change of various events of average weather conditions. It would be limited to a specific region of earth or may occur across the whole Earth. However, it is believed that the increase in earth average temperature, alteration in the intensity and distribution of rainfall, frequent cyclonic activities on the surface of sea, frequent floods and droughts, increased CO₂ in atmosphere and ozone levels are happened due to global warming. All these parameters got change over a period of time are being attributed to climate change. In the alternation of all these attributes, human activities had led major impact due their direct or indirect influences.

Simultaneously, climatic change is also greatly influencing the biology and ecology various pests and diseases. New emerging pests and diseases particularly the causal pathogens, which were not been reported before; however, could become serious threat to agro-ecosystem due to different variables, probably, the most notable among these is a climate change. Currently, in many countries the largely ongoing debate is to know the actual interaction between plant pathogen and its impact on optimum production that is really a challenging issue for future plant disease management under global warming and ultimately for food security. Moreover, it has also been reported in various disciplines that increase in temperature and CO₂ levels greatly affecting physiological changes and crop produces. While, regarding the plant disease epidemiology and management has recently been focused by the scientists.

Thus, it is obvious that development of plant disease can be impacted any change in agro-ecosystem, because in actual the development of plant disease is the interaction of disease triangle including conducive environment, virulent pathogen and sensitive host plant. Some factors relating to global warming including rise

in temperature, variability in moisture level and precipitation ratio may have impact on the biology of plant pathogens particularly the life span, reproductive cycle and transmission process. Several reports are available in literature about the impact of increased temperature on the virulence and aggressiveness of pathogens. Sometime pathogen can resist the higher temperature regimes and can survive for their own benefit, ultimately may cause severe plant disease. For example, in the last decade the mango industry suffered harshly in many mango growing countries of the world including Pakistan; due to serious situation of mango disease problem, commonly referred as mango sudden death syndrome (MSDS). It has been studied that combine attack of different pathogenic diseases cause MSDS, others believed over stress factors that may be due to increase in temperature, disorders and insects as cause. However, that all were happened due to climatic change, become conducive for such complex problem.

Temperature rise causes migration of pest's species sometime towards higher or lower latitudes, while in the tropics higher temperatures might adversely affect specific pest species. Likely impacts of any change in climate on population of pests are manifold. They range from expansion in the geographical range, increased risk of invasion in new area, change in overwintering patterns, change in crop pest synchrony. It has also been noticed that some time there is no any effect of climatic change on plant diseases and pest's population; however, it may also be positively or negatively correlated, depends on the geographical locations or time period. In case of *Helicoverpa armigera*, egg period was observed 7.9 days at 28°C but extended 10.4 days at 25°C. The rise of temperature ranged from 10 to 27°C has negative correlation on degree days of hatching. Banana Fusarium wilt (*Fusarium oxysporum* f. sp. cubense) commonly referred as panama disease. It was first reported in Australia but, throughout the world, this major epidemic was first time recorded from Panama. It has been mentioned that around 30, 000 ha were lost during the period of 1940 to 1960 in

Honduras specifically in Ulua valley. Moreover, around 4,000 ha in Suriname and 6,000 ha in Quepos, Costa Rica were completely lost. That results about the losses of \$ 400,000,000 due to this disease. Since then, it is considered now as one of the most destructive diseases in Pakistan; that probably due to change in climate and other factors that need to be explored. It has been noticed that pinewood nematode, gypsy moth and Asian longhorn beetle, southern pine beetle, three exotic pests, which are in actual non-native to southern Britain, have been recently observed.

In addition, different kind of diseases, pests and weeds which are currently being considered as minor; however, later can be the major or key species has been mentioned in the report of UN's Intergovernmental Panel on Climate Change entitled Climate Change 2001: Working Group II: Impacts, Adaptation and Vulnerability. The dissemination and severity of currently available major diseases, key pests and weeds may also be impacted; resulting significant effect on optimum production and integrated pest and disease management.

In such scenario plant pests and pathogens are the major constraint to future food security consequently of increasing population of the world. It needs serious attentions to develop multidisciplinary approaches for prediction, ecological interactions and integrated pest and disease management for sustainable production to increasing population of the world [1-4].

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