Pest Management in Agriculture: Climate Change Perspective

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The Inter-Governmental Panel on Climate Change (IPCC), in its 6th Assessment Report (2021, 2022), reiterated that the warming of the climate system is widespread, unequivocal and intensifying. Rainfall variability and intensity increasing, sea level rising and cyclones are becoming fiercer and recurrent. Extreme weather events have caused severe crop losses and have taken heavy economic toll from farmers across the world. The climate sensitivity of agriculture is uncertain, as there is regional variation in rainfall, temperature, crops and cropping systems, soils and management practices. Climate change impacts on pest may include shifts in species distributions, changes in phenology, increase in number of generations, change in migratory behaviour, alteration in crop-pest synchrony and changes in interspecific interactions. Coincidence of susceptible host, virulent pathogen and congenial environment result to disease occurrence. Climate has profound effects on populations of invertebrate pest like insects, mites and others affecting their development, reproduction and dispersal.

A thorough knowledge of the link between the changes in environmental conditions and pest population can assist in predicting the pest damage to crops and preventing it through timely pest management techniques. It is very crucial to understand abiotic stress impacts on plant diseases as well as insect pests and physiological and molecular responses generated by host plant. Research is needed for development of adaptation and mitigation strategies against multi-stress combinations. Emphasis on tolerant varieties and improved integrated disease and pest management tactics are highly required. For sustainable and secured food production, existing management strategies can be re-oriented and new tools and tactics best fitted in multi-stress events should be developed.

Besides, effectiveness of pest management strategies such as host-plant resistance, bio-pesticides, natural enemies and synthetic chemicals is liable to change as a result of global warming. For ensuring food and nutritional security for ever increasing population *sans* environmental degradation, formulation and adoption of climate change mitigation and adaptation strategies for crop management and crop health management are indispensable. Such strategies may comprise breeding of short duration and drought tolerant cultivars, changing in sowing time, crop diversification including establishing agri-horticulture and agro-forestry systems, conservation agriculture, balanced use of fertilizers with emphasis on bio fertilizers, increased use of renewable energy sources, rain water harvesting and micro irrigation, etc. Bio-intensive pest management based on robust surveillance and forewarning techniques thermo-stable sources of host plant resistance, effective bio control agents and bio pesticides, and bio rational chemicals needs to be promoted. Entrepreneurship development in rural youth and farm women in the area of agro-based enterprises, food processing and bio pesticides would ensure livelihood security.