Rashtriya Krishi, Vol. 6 No. 1 (June, 2011) : 76-76

CLIMATE CHANGE – A CLEAR AND PRESENT DANGER ON INSECT PEST OF CROPS

P. THILAGAM AND R. ARULMOZHIYAN

Horticulture Research Station, YERCAUD (T.N.) INDIA (Email : hrsycd@tnau.ac.in)

Climate change threatens all elements essential for life, water, food, health, land and the environment. In order to feed the overall population, the world faces the daunting task of having to double its rate of agricultural production over the next 25 years, having already quadrupled it in the last 50 years. There is no doubt that the changing metereological conditions associated with climate change will have an impact on agricultural yields. Climate is an important factor of agricultural productivity. The fundamental role of agriculture in human welfare, concern has been expressed by many organizations and others regarding the potential effects of climate change on agricultural productivity.

Climate change is caused by the release of 'green house gases' in to the atmosphere. These gases accumulate in the atmosphere, which results in global warming. Global average surface temperature has increased by around 0.6^0C during the past century, with the 1990's being the warmest decade. The Third International Panel on Climate change (IPCC) report predicts that temperatures will continue to rise during this century, which increases upto 5.8^0C by the year 2100.

Why should we expect an effect of climate change on insects?: Insects are among the group of organisms most likely to be affected by climate change because climate has a strong direct influence on their development, reproduction and survival. Moreover, insects have short generation times and high reproductive rates, so they are more likely to respond quicker to climate change than long- lived organisms, such as plants and vertebrates. Warming can potentially affect several aspects of insect life-cycle and ecology, especially those directly controlled by energy variables such as degree-day (accumulative temperature needed for development).

Fast growing, non-diapausing species or those which are not dependant on low temperature to induce diapause, will respond to warming by expanding their distributions. In contrast, slow growing species which need low temperatures to induce diapause will suffer range contractions. Thus, climate change will affect species range, with expansion in some species and contractions in others, which in turn will lead to changes in regional and local diversity.

Under a rise in temperature insects will pass through their larval stages faster and will become adults earlier. Thus, observed responses include both an advance in the timing of adult emergence and an increase in the length of the flight period. Increasing climatic variability reduced the level of parasitism of caterpillars, which in turn may increase the frequency and intensity of herbivore outbreaks.

How rising temperature affects insects?:

Increased temperature could increase insect population:

– Increased temperature can potentially affect insect survival, development, geographic range and population size.

– Temperature can impact insect physiology and development directly or indirectly through the physiology or existence host.

– Natural enemy and host insect populations may respond differently to changes in temperature.

– Parasitism could be reduced if host populations emerge and pass through vulnerable life stages before parasitoids emerge.

– May change gender ratios of some pest species

– Insects that spend important parts of their life histories in the soil may be more gradually affected by temperature changes than those that are above ground, because soil provides an insulating medium

Increased temperature could decrease insect populations:

– Temperature increase that causes farmers not to grow the host crop any longer would decrease the population of insect pests specific to those crops.

– Environmental factors that impact pest insects can impact their insect predators and parasites as well as the disease organism, thus resulting in increased attack on insect population. Aphids have been shown to be less responsive to the aphid alarm pheromone at higher temperature.

How changes in precipitation will affect insects?:

– Some insects are sensitive to precipitation and are killed or removed from crops by heavy rains. One would expect the predicted more frequent and intense precipitation events forecasted with climate change to negatively impact these insects.

– Precipitation changes can impact insect pest predators, parasites and diseases resulting in a complex dynamic.

Contd.... p. 80