Uttar Pradesh J. Zool. 30(1) : 133-134 2010 *ISSN 0256-971X*

GLOBAL WARMING AND INSECTS : A BRIEF

S.C. GOEL
UTTAR PRADESH ZOOLOGICAL SOCIETY
MUZAFFARNAGAR-251001
(e-mail : upzsdrscg@yahoo.co.in)

Because of high adaptability and diversity, the insects are categorized as the remarkable organisms in animal kingdom. Till now approximately 9,25,000 insect species have been described but the real number is yet to describe estimated three times higher. Hence, their adaptability characterize them to accept many environmental changes due to global warming including the recent shifts in climatic conditions. Warm climate means as the temperature increases, the insect species with warmer environment enhances the population growth and the reproductive rate by multiplying faster. Subsequently, the global warming leads to a faster growth in insects which will have a wide spread influence on agriculture, public health and conservation.

Key words : Climatic change, insects.

Introduction : An analysis has shown that insects quickly adapt to the environmental temperature. Those living in desert easily tolerate high temperature, but are intolerant to cold than mountain insects. It is now established that insects that are adapted to warmer climates have faster population growth rates, meaning thereby that warmth is better for insects said Melanie Frazier, a biology student at University of Washington.

Population growth **:** Experiments further show that higher population growth rates for butterflies might be a good thing but enhanced growth rates for mosquitoes or pest insects like termites and caterpillars population is much more doubtful. According to Canlyme Disease Foundation, the termites remain for 10 to 12 years before a swarm becomes visible. They cause more than 2.5 billions in damage to US homes each year. A colony of 60,000 termites can eat a linear 2-by-4 in about five months. Termites damage has been estimated so dreaded that house Owners Insurance does not cover termite damage.

Ecological impact **:** The shift in population growth rates among insect species will have profound ecological effect by altering species composition and disrupting food webs *i.e.* some species will flourish other will go extinct. In other words, the evolutionary adaptation to climate warming has profound ecological effects because rate of population growth eventually will alter entire ecosystems.

The web relationship inside the ecosystems are very sensitive to the population rates of the species, that are part of the nutritional chains. Insects adapt to warmer climate using biochemical adaptation or behaviour shifts (they can change seasonal activity pattern), but may also avoid warmer temperatures moving to cooler habitats. According to Frazier that no matter which scenario plays out for a given species, local ecosystem will be profoundly altered.

Food crops **:** When crop production will have to be boosted to feed an extra three billion people living at the end of 21st century, the number of leaf-eating insects are likely to over crowd as a result of rising levels in CO_2. Caused by rising global temperature, the food crops could be destroyed this century by growth rates in the number of insect pests.

Fossil record : About 55.8 million years ago, during one of the last great episodes of global warming, a significant increase in both the amount of damage caused by the leaf-eating insects and the variety of injuries they inflicted on plants was established. During the Palaeocene-eocene thermal maximum (PETM) period, the 5^0C rise in temperature caused by thripling of CO_2 levels. The percentage of levels that suffered extensive insect damage rose (Dramatically during the PETM) as foraging became more intensive. The same effect might be seen during the present period of global warming caused by man made emissions of CO_2, which could double the pre-industrial concentration of the gas by the end of the century.

Biochemical record : Ellen Currano of Pennsylvania State University said that by looking at the fossil record, the long term response of ecosystems can be observed as the effect full of global warming and atmospheric CO_2. In other words, when temperature increases, the diversity of insect-feeding damage on plant species also increases. Furthermore, warming also allowed the insect species to migrate from tropics to the north. Subsequently, the migration from tropical regions, insect had to eat more in the rising concentration of CO_2 in atmosphere which made leaves less nutritious because they contained relatively smaller concentration of nitrogen. Hence, with more concentration available to plants, photosynthesis is easier and plants can make the same amount of food for themselves without having to put so much protein in their leaves. When CO_2 increases, leaves have less protein and consequently, insects need to eat more to acquire the nutrients they need. Plants grow faster when CO_2 levels rise, but they suffer from a disproportionate increase in damage.

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Book Review

Emerging Trends of Researches in
Insect Pest Management & Environmental Safety, Suppl. 4, Vol. I (2008) (Goel, S.C.)
Published by Uttar Pradesh Zoological Society, 97-B Sriramkrupa, PO Box 296. New Mandi, Muzaffarnagar-251 001 (India): Hard Bound, Size 18 x 25cm. Paper sunshine offset; Cost Rs. 950, US $ 40 (Postage inclusive);

It is not often that we come across a publication which integrates diverse aspects of research in Insect Pest Management. The diversity of topics included in this worthwhile volume range from crop protection, insect biodiversity and bioecology to more recent trends such as insect resistant transgenic crops and DNA-Barcoding and species identification. Current crop protection strategies find a place, notably the diversity of strategies involved. The capter on insect diversity and conservation is very recalling and emphasis is laid on biodiversity of Western Ghats and the impact of climate change affecting trophic interactions, with emphasis on synergsim between climate change and habitat loss. Equal emphasis has been laid on the maintainence of natural reserves, habitat heterogeneity, besides strenthening the need to maintain corridors or linkages which connect habitats. Under toxicology, provide residues and application of *in vitro* toxicology are suggested for environmental safety. Exploiting insect hormones for insecticide development has been discussed and the *pros and cons* indicated besides discussing the role of botanical pesticides. The management of Lac insects production, as well as seasonal variation of mulberry plants, control of while fly in mulberry breeding, besides phytoextracts in the control of virosis in Tasar silkworm add to the diversity of topics discussed.

Needless to emphasize that it is a very unique, useful volume comprising diverse application to Insect Pest Management and Environmental safety and goes a long way in meeting the demand of entomologists who are interested in the diversity of approaches to IPM. The editor needs to be congratulated on having chosen very relevant papers for inclusion in this very useful volume which meets the need of entomologists with diverse specialization.

T.N. Ananthakrishnan, Ex-Director
Entomology Research Institute, Loyola College, Chennai (T.N.)