

**Ecology and Evolution of Plant – Feeding Insects in Natural and Man-made Environments.** 50B Pocket, Siddhartha Extension, New Delhi 110 014, International Scientific Publications, Raman, A. ed. 1997, 245 pp. Price not given.

This book has come at an appropriate time when natural environments are being constantly intruded by man. Man-made environments, especially agroecosystems, are coming up very rapidly. The principles and theories in insect ecology which have arisen mainly from studies made in natural ecosystems, may change in man-made environments, as the latter is subjected to human pressures in the form of mechanization, fertilization, pesticides, irrigation, introduction of crop hybrids and varieties, etc. These pressures come in varied forms and frequencies, that on a far shorter temporal scale (as compared to natural environments), insects are subjected to manifold changes. In this 'melee' both insects and their host plants do evolve adaptive strategies, which form the main thrust of the 18 articles in this book. A fairly good representation of articles affecting ecology of phytophagous insects in natural and artificial environments gives the reader adequate leverage to compare the effects of man-induced changes in insects.

It is well known that insects form the largest group of animals and therefore, it is only natural to suppose they influence the food web, and in turn are also most influenced by ecological changes (including man-induced). While insects have a wide adaptation, the emphasis in this book is on plant-feeding insects. Inevitably, therefore, the core areas of the book have bearing on agro-ecosystems, and thus the findings of the book have added value in pest management sciences.

The first article on 'Ecology and evolution of plant-feeding insects in natural and man-made environments: An introduction' is by the Editor, A. Raman, which sets the tone for the whole book. He takes pain to summarize the themes of the book, viz. host finding and quality, host plant resistance, community structure and behaviour, mutualism and disease agent, and evolution. The book offers useful pointers on these.

For instance, L. A. Mound discusses the relationship between gall-forming

thrips and plants. Two examples quoted are the relationship between gall formation and low nutrient status; and, shedding of damaged leaves being less expensive energetically than retaining damaged leaves and producing new ones. Such instances will motivate readers to study insect-plant (crop) interaction in nutrient-depleted zones, which is a phenomenon in agro-ecosystems, while keeping energetics also in focus.

The cue can perhaps be taken from G. S. Taylor's article on lerp insects in the article on the development and survival of insects after manipulating levels of nitrogen in leaves of *Eucalyptus*. Taylor's study showed that nitrogen affects growth rate, survival and fecundity of insects.

The influence of environmental factors on insect-plant resistance needs parallel laboratory investigations too, as demonstrated by Juenger *et al.* in their article on gall wasp. Further, Dankert *et al.* in an interesting, controlled field study, showed the potential of forest tent caterpillar defoliation to have negative indirect effects on gypsy moth performance that are both immediate and delayed. They infer that change in host quality, due to the attack of a defoliator, will increase the susceptibility of low-density species (*sic*) to natural enemies. That is an interesting dimension to tri-trophic inter-specific relationship.

Against this backdrop, an interesting article on a chalcid gall wasp, lowbush blucherry (a koinobiont) and a parasitoid inter-relationships by Bagatto and Short-house is quite exciting under the section 'Community structure and behaviour'. A few more such articles under this section would have been a real treat for insect ecologists.

The two articles on mutualism would have been more relevant under the topic, evolution. The article on mites as vectors of plant pathogens by Karl Maramorosch, is the only article appropriate to disease agents. Maramorosch's article highlights the emergence of viroids, phytoplasmas, spiroplasmas and double membrane bound (DMB) bodies in the last 25 years. I rate the paper, though the shortest, as the most useful and informative, especially in the Indian context, when new diseases are emerging at a regular pace.

The article under evolution, and the article on evolutionary constraints and

adaptive paths leading to mutualistic interactions between plants and insects by Ganeshaiah *et al.* would interest evolutionary biologists. Ideas like 'strategies that seem to benefit the partners would only evolve once the incidental benefits of their selfish strategies catalyse the system towards mutualism' should excite scientists. In a changed environmental condition, the natural food available will be limited. This is bound to put pressure on insects. Thus, for entomologists, it will be worthwhile investigating whether herbivores change their dietary pattern from monophagy to oligophagy and polyphagy, for example. Or still, from herbivory to carnivory (facultative or obligatory), as reasoned in the article by C. W. Schaefer on origin of secondary carnivory from herbivory. This last article, perhaps, is the best icing to a collection of scientific papers on plant-feeding insects in natural and man-made environments.

The book enjoys intellectual inputs of 44 distinguished contributors from all over the world, of which 15 are from India.

A chapter on insecticide resistance and insect resistance management (IRM) would have done justice to the title of the book. Undoubtedly, insecticides as a group is the most dominant of man-induced factors that is affecting insects. But for this deficiency, I rate the book contributive and stimulative. With hard-bound cover running into 245 pages the book is attractive and easy to handle. The printer's devil is hardly evident and editing is adequate. Therefore, the book as a whole is recommended both for entomologist and natural biologists.

Lastly (certainly not the least), the book assumes a special place in the hearts of entomologists simply because it is dedicated to the doyen of Indian entomology, Dr T. N. Ananthkrishnan. He has delved into the complexities of insect-plant relationship, now for five decades. I wish him the best for his future and long to see more entomological treatises coming from his dynamic mind and ceaseless pen.

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