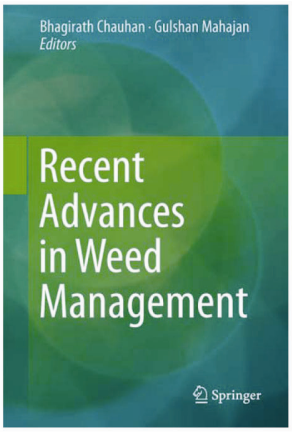

Recent Advances in Weed Management, Vol. 1. Bhagirath S. Chauhan and Gulshan Mahajan (eds). Springer-Verlag, New York. 2014. 411 pp. Price: €176.79, ISBN: 978-1-4939-1018-2 (Print), 978-1-4939-1019-9 (Online).

This book provides a comprehensive study and discussion about ecologically based weed management practices for sustainable agriculture. The main aim of the book is to make the integrated weed management programme a success, by providing information and technical assistance to growers in choosing correct methods for controlling the complexes of weeds. The book provides comprehensive knowledge that will enable weed scientists and policy makers in the careful planning, design and orientation of research and development of weed management – to ensure sustainability in the agricultural system.

Weeds are probably the most widespread class of pests in croplands and are responsible for marked losses (about 30–35%) in crop yield because large fractions of resources are used up by weed plants resulting in high crop–weed competition. Therefore, management of weeds in croplands is important to sustain productivity and food security. Succession, evolution and interference (mainly competition) are important processes affecting weed populations that are related to farming practices. Martinez-Ghersa *et al*. have modelled the development of agroecosystems by conversion from natural ecosystems and the associated ecological processes related to crop–weed interaction. Weeds have evolved in response to cropping system practices by adapting to and occupying niches left available in the agroecosystems. Their success depends upon their adaptation and occupation of the available niches in the agroecosystems at all levels of organization. The monoculture crops lack diversity, leaving considerable unutilized resources in the field and the diversified weeds successfully exploit these resources. Competition between weeds and crops affects the adjustment of weeds with crops. Changes in traits related to seed germination, leaf shape, flowering pattern, seed dispersal and seed size/shape are just some of the well-documented evolutionary changes observed in weeds as a consequence of cropping practices. Understanding of weed persistence in different agroecosystems and the response of weeds to changes in the system can help in the prediction of future weeds and also in designing appropriate management practices. Under different agroecosystem conditions, floristic composition of the weed community gets altered and follows the temporal pattern of environmental change. Factors such as season, weed control and depth of soil cultivation affect the composition and abundance of weeds and their seed banks. A better understanding of the potential changes in weed population dynamics due to different crop production practices is necessary with a view to evolving new management approaches. An understanding of phenological stages of weed species could be used in making weed management decisions focusing on cultural practices. Such information can also be used to predict the timing of chemical control practices. Documentation of the effect of changing environment on the life-history strategies, growth and competition of weeds and crops may help in weed management, particularly the ability to predict weed population changes in future. Thus, weed management should be based on sound knowledge of weed ecology, especially the understanding of strategies enabling the establishment of plant populations.

Therefore, understanding of micro-evolutionary forces occurring in changing landscape, limitations of herbicide use, role of allelopathy, crop–weed competition, weed shift, climate change and weed, herbicide resistance, etc. are much useful in weed management. The above concerns will motivate one to read this book, since the reader will expect that the book may be having some novel and simple ideas to enhance the sustainable agriculture production by reducing weed population and weed invasion. In this book, emphasis has been given to the biology and ecology of weeds, new challenges in weed science and research priorities, development of herbicide resistance in weeds, control of aquatic and parasitic weeds, weed management in conservation agriculture, role of allelopathy in weed management, and integrated approaches for weed management in important crops like rice, wheat, maize and soybean. The editors have attempted to integrate all such knowledge that highlights the emerging weed management issues and to suggest measures to tackle them through advanced methods of weed control and better understanding of the ecology and biology of weeds. The book presents 17 papers on different topics related to weed management. Chapter 1 provides an introduction emphasizes that complete reliance on chemical herbicides is not necessary for weed control, but it can be done by sound knowledge of weed ecology and biology for ecologically based weed management programmes. Chapter 2 includes a study of weeds and their management in different climatic region like North America, Europe, Asia, Africa and South America. It also discusses the effect of climate change on weed competition in cropping systems, increasing levels of CO_2 on biological and evolutionary processes of weeds, and actual and predicted evolutionary adaptation by weeds under climate change. In chapter 3, the emphasis is on potential application of allelopathy for weed management and the role of conventional breeding and biotechnology in improving the allelopathic activity of crop genotypes. Chapter 4 is on weed management under organic farming by manipulating soil seed bank. Conventional agriculture is facing serious problems due to land degradation and increasingly unreliable climatic condition. Chapter 5 discusses weed management through conservational agricultural practices. Chapters 6–12 are on management of weeds under different cropping systems like rice, wheat, maize, cotton, soybean, horticultural and plantation crops. Chapter 13 is on management of aquatic weeds. Ponds are an ideal habitat for aquatic plants because they provide oxygen by the process of photosynthesis to aquatic organisms. But high density of weeds (like algal bloom) causes a deleterious effect on aquatic ecosystems; so weed management is necessary here. The next two chapters are on

parasitic weeds, and challenges and opportunities in weed management under changing agricultural scenario. The last chapter is informative and discusses about strengthening the farmer's knowledge for better weed management in developing countries.

Although the book has many illustrations (in colour as well), most of them do not convey the intended theme. In general, the book is suitable for researchers, scientists and policy makers for integrated weed management. The editors have provided a roadmap regarding ecologically based weed management for sustainable agriculture. This book would be useful to the researchers, scientists, policy makers and students working on different aspects of weeds.

RAJANI SRIVASTAVA

Environmental Science and Technology,
Institute of Environment and Sustainable Development,
Rajiv Gandhi South Campus,
Banaras Hindu University,
Mirzapur 231 001, India
e-mail: srivastava_252003@yahoo.com

Annual Review of Entomology, 2015. May R. Berenbaum, Ring T. Cardé and Gene E. Robinson (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, CA 94303-0139, USA. Vol. 60. xii + 667 pp. Price: US$ 99.

This volume that marks the 60th anniversary of the *Annual Review of Entomology* communicates one message loud and clear to the Indian scientific community that 'there is no escape from collaborative research and holistic approach to a scientific problem'. The collection of reviews starts with recapitulating the life of John H. Law and thus the growth of entomology as a scientific discipline. This singular article tells us why one should not compartmentalize scientific areas. A reducto-deductive method should be followed to understand a problem but not to compartmentalize science. It is time to put back the puzzle pieces of reducto-deductive method and appreciate the beauty of biological problems in their entirety.

The reviews cover diverse topics such as genetics, epigenetics, development, physiology, behaviour, inter-species interactions, biological diversity and pest management. The 21st century would perhaps be the era of the microbiome of insects and other living beings. Many research groups are engaged in understanding the role of specific microorganisms in the biology of specific insect hosts. Unfortunately, the review on diversity and function of microorganisms in insects by Douglas is grossly incomplete. For example, a scientific paper that has established the possible role of *Arsenophonus* GroEL protein in protecting the geminivirus degradation in the insect gut and thus facilitating the pathogenecity[1] has been left out. Such gross omissions and commissions are unacceptable from Annual Reviews.

The collection also contains articles on crop domestication, and insect heat-shock proteins that do not convey any future line of work that should/can be pursued, perhaps suggesting that they are just filling material used to make up the bulk. On the other hand, exploitation of the omics technologies is suggested to be gainfully employed for the understanding of not only the basic biology of termites, but termite control biotechnology and termite-modelled biotechnology. Scharf has suggested the use of termite-modelled biotechnology to recycle the large amount of bio-energy present in the form of lignocellulose.

An interesting review on small insects and limits to miniaturization by Polilov succinctly brings out the resistance of the nervous and reproductive systems to reduction in size and/or volume. This resistance by the two systems is not surprising as the 'Darwinian fitness' perhaps is critically dependent on the two, besides the digestive system. However, the review ends with a tall order of the possibility of the 'effects of miniaturization on animal physiology and ecology being used in the search for new biotechnological solutions'.

Understanding developmental mechanisms will continue to be an important research area as it holds the key to many biological concepts as well as processes. Every species has to attain a specific size to be evolutionarily successful and this size is regulated by the developmental mechanisms. It is suggested by Nijhout and Callier that minimum size of insects is limited by the needs of a fully functional multicellular body and hence every species has a lower limit beyond which reduction is not possible without compromising fitness. Unfortunately, there is no study that assesses the size ranges of any known biological species and these data need to be generated with urgency as I believe many a (static) theories relating to development will tumble out of the archaic cupboards and be replaced by some interesting and dynamic theories. In *Drosophila*, reducing amino acid transporter in fat body slows down growth and thus reduces body size. However, many studies that selected for faster pre-adult development in *D. melanogaster* reported a reduction in body size as a correlated response[2–5]. It would be interesting to understand if the same mechanism of reduced amino acid transporter is responsible for reduction in size in such cases too, as faster development means completion of protein synthesis in a short time that necessitates the faster delivery of amino acids. Further, the reduction in terminal growth phase and acceleration in metamorphosis timing due to lack of nutrition post-attainment of critical weight, I suspect will not be a general developmental phenomenon.

A review by Papantonis *et al.* on the landscape of the evolution, structure and function of chorion genes harps on the importance of insect systems as suitable model systems to understand the molecular basis of signalling-directed differential gene expression with a potential for insect population control. The importance of insects as research models is highlighted as they are relieved of the ethical issues that apply to mammals. Unfortunately, this is true only for the Western world, as the use of any life form either for teaching and/or research is not permitted in India (UGC Notification No. 14-6/2014(CPP-II), dated 1 August 2014), a decision being forced down the throat of unsuspecting academicians by ill-informed and half-baked academicians, policy makers and news mongers. The well-meaning academicians should rise to the occasion, unite and fight to protect the interests of the future generations of biology students. Policy matters aside, the understanding of the signalling-directed differential expression of the genes intricately linked to the embryo would not only help in designing ways of regulating economically harmful insect populations, but also in the effective management of beneficial insect, bird and animal species, and address issues related to human fertility dysfunction.