

## TROPICAL PLANT REPRODUCTIVE ECOLOGY

Bawa, K. S., and M. Hadley (eds.). 1990. **Reproductive ecology of tropical forest plants.** Man and the Biosphere Series. Volume 7. The Unesco Press, Paris, France, and The Parthenon Publishing Group, Inc., Park Ridge, New Jersey. xxv + 421 p. \$65.00, ISBN: 0-929858-22-0.

This impressive volume, the written result of an international workshop held in 1987 in Bangi, Malaysia, contains a broad spectrum of papers in the realm of tropical forest plant reproductive ecology, skillfully arranged in sections of related topics and woven together with thought-provoking introductory commentaries. The editors have included 28 invited and contributed papers and commentaries by 46 scientists from many countries, and have worked to insure clarity and evenness in the chapters.

The aspects of reproductive ecology relevant to management issues are introduced in the first chapter, and the book is organized into sections accordingly. However, few of the relevant aspects are thoroughly covered in the book. This is not only because of limited space and the inevitable lack of participation of some current researchers, but also because more research is urgently needed in all these areas.

Phenology is the first topic covered, discussed in three papers from diverse forests: wet forests of peninsular Malaysia (Yap and Chan), dry forest of Costa Rica (Frankie et al.), and lowland moist forest in Panama (Wright and Cornejo). The Malaysian contribution is full of original observations on *Shorea*. The Costa Rican paper in an overview of many years of research by this team, primarily citations of published work rather than substantive information. Irrigation experiments in Panama show that moisture availability is not the proximal cue for dry season flowering for most tropical moist forest species.

Pollination merits six papers, evidence of the research activity in this field in many countries. Appanah describes many bizarre pollination interactions in Malaysian rain forests. Dyanandan et al. report a careful and complete study of floral morphology, phenology, and pollination of Dipterocarps in Sri Lanka. Three of the six papers (Irvine and Armstrong; Schatz; and Young) emphasize the previously underrated importance of beetles as pollinators in tropical forest plants. Readers can compare pollination biology among Central American forests (Schatz), Malaysian rain forests, Sri Lankan

Dipterocarp forests, and tropical Australian forests (Irvine and Armstrong).

There are fewer papers on seed dispersal. Howe uses his experience with two neotropical trees to compare the effects of mammal and bird dispersers on the population biology of the trees. This paper contains new data that demonstrate how the two extreme dispersal strategies of the trees lead to differential benefit from each type of dispersal agent. Gautier-Hion focuses on the community of dispersers in Gabon, and how the mode of dispersal relates to fruit characteristics of the plant.

Seedling biology is considered by three authors. Augspurger reviews the impact of fungal pathogens on tropical plant flowers, fruit, and especially seeds and seedlings. Vázquez-Yanes and Orozco-Segovia discuss their data and review dormancy and water content in seeds of rain forest plants. Hladik and Miquel compare seedling type and dispersal mode for African rainforest plants.

Forest diversity is considered in two papers. Clark reviews the role of disturbance. Hubbell and Foster use their primary census data to evaluate equilibrium vs. non-equilibrium hypotheses in community dynamics, and find that negative conspecific effects may influence tree recruitment, growth, and mortality, but only in some species.

The final section deals solely with applied forestry research. Despite the editors' initial statement of the importance of genetic studies, it is only in this section that this subject appears. Kageyama considers the quantitative genetics of Brazilian trees, using morphological data from field trials. None of the authors considers variability in isoenzymes. Longman et al. describe neat methods for studying factors influencing tropical tree flowering by using small plants cloned from reproductive adults in controlled environments. This methodology could be used more widely to reveal many important things.

Most of the authors address management issues in their papers. Ashton and Bawa comment that interdisciplinary collaboration is crucial among tree biologists of all types, and that tree improvement must go hand-in-hand with better funded basic research on tropical trees in nature.

This book will be useful to anyone working with or interested in tropical plants, from academic research biologists to foresters and wildlands managers. Those with a temperate orientation can easily expand their horizons with this single

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volume. It will allow easy access to some of the important recent research in tropical forest plant reproductive ecology. It may also spur more researchers to work toward greater international sharing of expertise and knowledge.

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