

Preface

In recent decades, entomologists have expanded their analytical tools to improve the interface between population theory and ways to analyse and interpret results in research programs that emphasise mathematical modelling. Entomology is a fruitful area for investigating complex processes and dynamic systems due to the biological characteristics exhibited by insects. They experience different life phases, frequent notable interactions, and are classified by intraspecific to trophic relationships with different degrees of association. The Neotropical ecozone is one of the eight major zoogeographical areas of the world, which contains about a third of the world's insects that live in complex topographical environments. This condition likely allowed these organisms to experience different levels of adaptation to face the diversity of factors influencing their demography. The changes that occurred in these environments have substantially altered the resource sources for insects, especially food availability. The predominance of monocultures in Neotropical areas has remarkably impacted the environment and substantially changed the structure of insect fauna by providing suitable conditions for infestation by pests. Accelerated urbanisation processes have also negatively impacted the urban scenarios, including giving rise to the emergence of infra-structural problems in the metropolis and inducing the proliferation of vector insects of serious diseases. Given the extensive problems facing humanity, we live in what could be called the era of challenge and exploding information. Concurrently, thanks to growing interest in developing models, ample opportunities to generate and explore data have quickly been created by theorists, statisticians and entomologists, who can analyse data with precise tools, particularly when ecological methodologies are applied to entomology. The computational resources currently available are far superior to what was available in the past, thus allowing bold designs that can consider space and time simultaneously, especially in interface areas such as ecological modelling. The use of mathematical models to describe ecological processes and predict tendencies has been increasing in the last decades in response to growing demand for analytical tools that are compatible with emerging issues in the previous

and current centuries. Comprehending basic population or community functions using ecological formalism can lead to useful models embedded in ecological theory that are capable of covering a wide spectrum of issues, ranging from spatio-temporal ecological patterns of populations and/or communities to epidemiological aspects or trophic webs. This is a pioneering work in a specific area with interesting interfaces for people interested in interdisciplinary studies. We hope that it will be useful for a significant number of researchers and students involved with insect population dynamics emphasising pest management and conservation. The authors of this book thank Fundação de Amparo à Pesquisa do Estado de São Paulo FAPESP and Conselho Nacional de Desenvolvimento Científico e Tecnológico CNPq for the support with the research projects.

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