Anthony G. Pakes R. A. Maller

Cambridge Studies in Mathematical Stology

# Mathematical ecology of plant species competition



# **Mathematical Ecology Of Plant Species Competition**

Frank C. Hoppensteadt, F. C. Hoppensteadt

# **Mathematical Ecology Of Plant Species Competition:**

Mathematical Ecology of Plant Species Competition Anthony G. Pakes, Ross A. Maller, 1990 Presented in this document is a class of deterministic models describing the dynamics of two plant species whose characteristics are common to the majority of annual plants that have a seedbank Formulated in terms of elementary dynamical systems these models were developed in response to four major questions on the long term outcomes of binary mixtures of plant species Is ultimate coexistence possible If not which strain will win Does the mixture approach an equilibrium If so how long does the mixture take to attain it The book gives a detailed account of model construction analysis and application to field data obtained from long term trials In the particular case study modelled the species involved are two pastural strains whose dynamics have critical agricultural and economic implications for the areas in which they are found including North America the Mediterranean region and Australia This study will be valuable to researchers and students in mathematical biology and to agronomists and botanists interested in population dynamics Differential Equations with Applications to Biology Shigui Ruan, Gail Susan Kohl Wolkowicz, Jianhong Wu, Modelling Biological Populations in Space and Time Eric Renshaw, 1993-08-26 This volume develops a unifying approach to population studies emphasising the interplay between modelling and experimentation Throughout mathematicians and biologists are provided with a framework within which population dynamics can be fully explored and understood Aspects of population dynamics covered include birth death and logistic processes competition and predator prey relationships chaos reaction time delays fluctuating environments spatial systems velocities of spread epidemics and spatial branching structures Both deterministic and stochastic models are considered Whilst the more theoretically orientated sections will appeal to mathematical biologists the material is presented so that readers with little mathematical expertise can bypass these without losing the main flow of the text Mathematical *Ecology* Thomas G. Hallam, Simon A. Levin, 2012-12-06 There is probably no more appropriate location to hold a course on mathematical ecology than Italy the country of Vito Volterra a founding father of the subject The Trieste 1982 Autumn Course on Mathematical Ecology consisted of four weeksofvery concentrated scholasticism and aestheticism The first weeks were devoted to fundamentals and principles of mathematical ecology A nucleus of the material from the lectures presented during this period constitutes this book The final week and a half of the Course was apportioned to the Trieste Research Conference on Mathematical Ecology whose proceedings have been published as Volume 54 Lecture Notes in Biomathematics Springer Verlag The objectivesofthe first portionofthe course wereambitious and probably unattainable Basic principles of the areas of physiological population com munitY and ecosystem ecology that have solid ecological and mathematical foundations were to be presented Classical terminology was to be introduced important fundamental topics were to be developed some past and some current problems of interest were to be presented and directions for possible research were to be provided Due to time constraints the coverage could not be encyclopedic many areas covered already have merited treatises of book length

Consequently preliminary foundation material was covered in some detail but subject overviews and area syntheses were presented when research frontiers were being discussed These lecture notes reflect this course philosophy

The Theory of the Chemostat Hal L. Smith, Paul Waltman, 1995-01-27 Basic modelling analysis and simulation of systems that have proven effective in real ecological applications Math and Bio 2010 Lynn Arthur Steen, 2005 Math and bio 2010 grew out of Meeting the Challenges Education across the Biological Mathematical and Computer Sciences a joint project of the Mathematical Association of America MAA the National Science Foundation Division of Undergraduate Education NSF DUE the National Institute of General Medical Sciences NIGMS the American Association for the Advancement of Science AAAS and the American Society for Microbiology ASM Foreword p vi Chaos in Agricultural Systems K. Sakai, 2001-06-21 An introduction to the analysis of chaos for readers majoring in agricultural science and an introduction to agricultural science for readers majoring in mathematical science and other fields Hopes some readers will pursue further studies on the chaos of arable land Pref Epidemic Modelling Daryl J. Daley, Joseph Mark Gani, 1999 This is a general introduction to the mathematical techniques needed to understand epidemiology It begins with an historical outline of some disease statistics before describing simple deterministic and stochastic models Mathematics of Genome Analysis Jerome K. Percus, 2002 The massive research effort known as the Human Genome Project is an attempt to record the sequence of the three trillion nucleotides that make up the human genome and to identify individual genes within this sequence While the basic effort is of course a biological one the description and classification of sequences also lend themselves naturally to mathematical and statistical modeling This short textbook on the mathematics of genome analysis presents a brief description of several ways in which mathematics and statistics are being used in genome analysis and sequencing It will be of interest not only to students but also to professional mathematicians curious about the subject An Introduction to the Mathematics of Neurons Frank C. Hoppensteadt, F. C. Hoppensteadt, 1997-06-28 This book describes the signal processing aspects of neural networks It begins with a presentation of the necessary background material in electronic circuits mathematical modeling and analysis signal processing and neurosciences and then proceeds to applications These applications include small networks of neurons such as those used in control of warm up and flight in moths and control of respiration during exercise in humans Next a theory of mnemonic surfaces is developed and studied and material on pattern formation and cellular automata is presented Finally large networks are studied such as the thalamus reticular complex circuit believed to be involved in focusing attention and the development of connections in the visual cortex Additional material is also provided about nonlinear wave propagation in networks This book will serve as an excellent text for advanced undergraduates and graduates in the physical sciences mathematics engineering medicine and life sciences

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