

Plants and pathogens

Plant Pathosystems. R. A. Robinson. Pp. x+184 (Springer: Berlin, Heidelberg and New York, 1976.) DM48; \$19.70.

MR ROBINSON is a plant pathologist who has been much involved over many years in breeding crop plants for resistance to important pathogens in a number of developing countries. It is therefore not surprising when he states in his preface that this book was written in remote places far from good library facilities. This being so, one asks what would have been the difference had this been otherwise, because *Plant Pathosystems* is already a very good book and unique in many ways. The text is based on long and varied experience of field plant pathology in Africa and essentially is a series of perceptive analyses of interactions between populations of host plants and populations of pathogens, and of assessments of what such analyses teach about the management of crops so as to decrease losses caused by plant pathogens to economically low levels and, in agricultural terms, more or less permanently.

The book begins with a short account of the systems concept and of the properties, analysis and management of systems. This is useful and interesting to the uninitiated such as the reviewer. The main substance of the book starts with chapter 2, which first describes plant pathosystems, defined as any subsystem of an ecosystem which involves parasitism. It then characterises the "esodemic" and the "exodemic" as parts of epidemics that depend, respectively, on infection from within (auto-), and from outside (allo-) crops and which are therefore of quite different significance in the development of epidemics especially in relation to the type of disease resistance that controls infection.

Chapters 3-6, as the core of the book, deal in depth with analysis and management of pathosystems comprising either interactions between vertical resistance and vertical pathogenicity, or between horizontal resistance and horizontal pathogenicity. Subjects discussed include the properties of vertical and horizontal resistance in genetic and epidemiological terms, the nature and role in disease of gene-for-gene relationships and of strong genes, genetic flexibility of host and pathogen in relation to the origin and developments of epidemics, and the paramount importance of horizontal resistance in crop management both generally and as illustrated by many well-chosen examples of important diseases of crops of different types, and especially of maize and sugar-cane.

Chapter 7 is concerned with the operation of some of these factors in polyphyletic crops, again illustrated with examples, and chapter 8 is a short review of the nature and assessment of the vulnerability of crops to serious damage by pathogens, and how vulnerability can be decreased by various measures which prevent, or prepare for, the exposure of crops to virulent pathogens.

Chapter 8 contains a series of conclusions which emphasise the value of the systems concept and of well conceived programs of domestication of crop plants which exploit the superior qualities of horizontal resistance. A last chapter on terminology defines or describes, often at some length, no fewer than about 300 words, terms and concepts in some 24 pages. This is a particularly valuable and essential part of the book. There are about 100 references, a small number in relation to the scope of the book; even so, a few are unexpected. The shortness of the list is explained by the circumstances and style in which the book was written. In contrast, there is an extensive index of about 1,000 entries.

Mr Robinson states in his Preface that his book is theoretical and speculative. But much of it is a good deal more than theoretical, as would be expected from Mr Robinson's background; and the speculation is reasoned and not unrealistic. Quite a lot of the book is controversial. Thus, Mr Robin-

son's concept of vertical and horizontal resistance will be regarded as oversimplified by plant pathologists who have studied resistance at the cellular and molecular levels. Also, Mr Robinson does not like the extensive use of vertical resistance in plant breeding and says so very plainly. But he is an enthusiast for the use of horizontal resistance whenever possible and that, in his opinion, should be almost always.

Some plant breeders will not agree with the extremities of his approach. The writing from time to time is forthright and provocative but attractively so and certainly should not offend those against which it is sometimes quite pointedly directed. The book is well and clearly written but must be taken slowly because almost each paragraph on each page contains one or more substantial points which must be understood if the main themes which are propounded are to have their full impact. But the effort called for is very well rewarded because few books published on plant pathology during the past three decades are so stimulating, challenging, and have been written with such worthy objectives. *Plant Pathosystems* will undoubtedly cause quite a stir among plant pathologists and plant breeders, for most of whom it must be regarded as compulsory reading.

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Laser physics

Principles of Lasers. By O. Svelto. Pp. x+376. (Plenum: New York and London, 1976.) \$30.00.

THERE is light, and light. Or as Svelto might put it, the properties and quality of radiation can be defined and quantified by the first, and higher-order, correlation functions of the electromagnetic field. Thus, to first-order the coherence of laser light is revealed in its exceptional brightness and monochromaticity. The unique spatial and temporal coherence of such sources has already led to a number of practical applications, and largely accounts for the current scientific interest in this subject.

This book develops the theory and techniques of laser physics from first principles (quantum mechanics and electromagnetism), is completely self-contained, and should prove of particular value to the undergraduate reader. The text is well illustrated, very carefully referenced, and includes imaginatively chosen questions at the close of each of its nine chapters. (Problems in the introductory chapters,

for example, range from black-body radiation to practical design problems of ruby, dye, He-Ne and CO₂ lasers.) Pumping processes, passive optical resonators, continuous and transient energy extraction (including the semi-classical treatment of π pulses, photon echoes and passive-mode-locking) are treated in detail; illustrative applications, including holography and optical data-processing, are treated more generally. Topics involving quantisation of the electromagnetic field (such as laser noise) are not discussed.

In my opinion, unstable optical resonators warranted a more extensive discussion: for example, the importance of diffuse apertures was not considered, and Anan'ev's work was not referenced. Surprisingly, the highly efficient CO laser and recent Kr₂* and Ar₂* excimer (and halide exciplex) lasers receive no mention. These are, however, minor criticisms of a book which has been carefully translated and which makes excellent reading.

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