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Book review

R. A. Robinson: Plant pathosystems. Springer Verlag, Berlin, Heidelberg, New York, 1976. 184 pp; 15 figures; 4 pp. of references; subject index. Price DM 48, or US \$ 19.70, clothbound.

In his career of more than twenty years in crop protection in Africa, Dr Robinson has been mainly concerned with breeding for resistance. His present book describes the dynamic host/parasite interaction as a pathosystem, which is part of the entire crop ecosystem. The author now defines crop protection in terms of pathosystems management. Its methods aim at breeding for high levels of permanent resistance to all locally important parasites to avoid the repetitive plant breeding of the 'boom and bust cycle' due to vertical or race-specific resistance.

Chapter 1 describes the systems concept, and properties, analysis and management of systems, and the multidisciplinary approach. Chapter 2 discusses plant pathosystems in their various contexts, such as agriculture, genetics, epidemiology, histology, zoology and pathology. Later chapters deal with an analysis of vertical (Chap. 3) and horizontal pathosystems (Chap. 5) and their respective management (Chaps. 4 and 6), polyphyletic pathosystems (Chap. 7), crop vulnerability (Chap. 8), and final evaluations (Chap. 9). An extensive glossary (Chap. 10) lists the many terms used in the book alphabetically and defines them.

The author claims his approach to be 'holistic', "emphasizing the entire system rather than its components" (definition on p. 156). This leads us to the philosophical core of the problem: the

feasibility of a strategy for human culture, and for human interference with nature in general. Culture has reached a crisis because of overemphasis of natural sciences, within which separate factors are overemphasised. Under experimental conditions, all or nearly all factors are kept constant and single ones to be studied are varied at will. Thus, almost implicitly, natural sciences are analytic rather than holistic. Plants are grown in greenhouse and phytotron, pathogens on artificial media, and hexapods in the insectary far from their multifactorial natural habitat. In doing so, mycology, entomology and other specialized disciplines have soared high. Disease control has long been aiming at eradicating the parasite. But the natural self-controlling mechanisms were ignored and use of pesticides frequently led to secondary pests and diseases. Crops were usually bred for simply inherited (monofactorial) resistance to races of pathogens (vertical resistance). Such resistance often rapidly breaks down by pathogen evolution. Robinson's book is one of the signs of increasing human awareness of failing nature management.

Without specifically saying so, Robinson is justly arguing against the ontological approach. After the 'primitive' mythical phase of human culture, when man knew himself to be part of total reality, the ontological approach led him to understand the existence of objects and to identify them apart from others. However, this phase often derailed into substantialism merely describing objects as such, ignoring their interrelationships. Nowadays, man is increasingly confronted with the overwhelming complexity of life and with the shocking consequences of unbalanced human interference with nature. As a reaction, a functional phase is now booming, emphasizing functional relationships and concentrating on natural and ecological systems and equilibria. The present 'holistic' book may serve as an example. However in the functional phase, the tendency to ignore components and single factors is prevalent. Often, there even is a reaction towards the mythical way of thinking, even perceptible in Robinson's book (as on p. 143, last but one paragraph).

To support these conclusions, one may notice that Robinson ignores the importance of knowing the pathogens or parasites occurring in a certain region, their economic importance and how to handle them. Hardly a word is said about nematodes and viruses. One is left with the impression that breeding under natural conditions almost automatically leads to (horizontal) resistance to the parasites that are endemic in a region without concern about the parasites themselves. Such an approach ignores the often haphazard occurrence of such parasites and, consequently, the frequent inefficiency of merely natural submission to infection or infestation. "The screening location must be closely similar to the environment in which the final selections are to be cultivated" (p. 108). For economic reasons, however, breeding programmes tend to serve wide geographic areas. Each area is supposed to have "its own pathosystem and the final selection must be in balance with it" (p. 108). But international trade, traffic and transfer of germ plasm for breeding programmes are continuously introducing new parasites (and viruses) in spite of phytosanitation and quarantine, and these subjects are too briefly dealt with on a page and a half (p. 137 and 138). Hence, stable natural equilibria may never develop. Moreover, how can resistance to all important adverse factors be combined with all other desired characters in a single genotype? There are examples of resistance to one pathogen being linked to susceptibility to another.

I wholeheartedly agree with the author that "good science is impossible without sound logic, and sound logic is impossible without precise terms" (p. 147). However, the glossary seems unnecessarily lengthy and is often used rather to rediscuss problems, than to simply and concisely define terms. Moreover, in scientific terminology consensus is essential and the author should not have ignored the authorized 'Guide to the use of terms in plant pathology' by the Terminology Subcommittee of the Federation of British Plant Pathologists (Commonwealth Mycological Institute, Kew, *Phytopath. Papers* No. 17, 1973). Its criticism of some terms he has used earlier should have been considered and at least discussed. Many terms now listed as 'scientific' terms are plain words not needing extensive sometimes complicated explanation, such as breakdown, colonization, extinction, cultivar, and 'complete' in the term 'complete pathosystems management'. Raising the status of certain expressions like 'disease triangle' and 'disease square' to scientific terms makes scientific communication hard. Such terms are clear in a certain context and then serve their purpose.

Despite some shortcomings, the book has been clearly and appealingly written. It is thought-provoking and, since it will be controversial to some readers, will encourage debate. It should be read by all scientists interested in epidemiology of plant diseases and pests and in plant breeding. Thus, it will certainly further help in developing a strategy to manage crop pathosystems, not by mere submission to nature but by cautious interference with nature based on factual knowledge.

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