

Pollution Control in the South and North. A Comparative Assessment of Environmental Policy Approaches in India and the Netherlands. O. J. Kuik, M. V. Nadkarni, F. H. Oosterhuis, G. S. Sastry and A. E. Akkerman. Sage Publications (India) Pvt. Ltd., 132, Market, Greater Kailash I, New Delhi 110 048. 1997. 251 pp. Price: Rs. 350.

The book presents the practices for environmental management in India (with specific reference to the state of Karnataka), and the Netherlands with a view to highlighting the role of economic instruments. Three case studies dealing with textile, cement and fertilizer industries, have been presented to compare the command and control practices *vis-à-vis* the economic instruments for effective pollution abatement and control. The book also examines the paradigm of sustainable development in the context of its operationalization.

The book was published in 1997, although the information on the instruments used and environmental quality data in the two countries is restricted to 1994/95. It deals with the environment as an individual sector, although there is an attempt to delineate the changes that have occurred in policy setting in India and the Netherlands on the integration of environmental sector with the sectors of socio-economic development.

The technical issues related to pollution abatement and control have not been handled adequately in the book. There are glaring shortcomings on this account, starting from the variance in the terminology used in the book *vis-à-vis* that accepted in technical literature. The background of the writers seems responsible for this limitation in the book. The case studies are also not selected based on the industrial development scenario in the State of Karnataka, e.g. distillery sector might have served as a case study of relevance instead of the fertilizer sector. Also, there are statements on the non-availability of cost-effective technologies for pollution control arising out of the lack of knowledge on technical issues. The achievements of the Ministry of Environment & Forests, and the Karnataka State Pollution Control Board are reproduced based on the annual reports of the respective agencies without any attempt to conduct an enquiry into the matter. The

fact that wastewater has achieved the status of a dependable renewable resource of water, at least in India, is conspicuous by its absence in the book.

While the issues like laxity in implementation and rampant corruption are highlighted as reasons for failure of environmental policy in India, the issues of accountability on the part of environment administrators do not find their place in the book. The issues of public concerns and critical environmental problems in the two countries are different, and are not adequately dealt with in the book. The issue of resource conservation, particularly non-renewables, in the production processes is extremely relevant in a developing country context, and should have been dealt with by a description of cleaner production options. The issue of assimilative capacity-based environmental standards, which falls in the mandate of the Central and State Pollution Control Boards in India, has also not been covered in the context of tradable permits/effect-specific strategies.

It needs to be recognized that there are no soft options for pollution abatement in particular, and for environmental management, in general. Rigorous implementation of the standards set by the governments will alone achieve the level of environmental quality that is warranted for protecting the fundamental rights of the citizens.

The authors undertake their research with the premise that economic instruments must be increasingly deployed for environmental management, and conclude, without any substantiation, that these instruments will indeed serve the cause of environmental management. The dependence of public policy to the extent of fair economics and governance is understated in the book.

The limitations notwithstanding, this reviewer complements the Indo-Dutch Programme on Alternatives in Development to include a critical area of concern in India and the Netherlands in its scope of coverage

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Annual Review of Phytopathology 1996. Robert K. Webster, ed. Annual Reviews Inc., 4139 El Camino Way, Palo Alto, CA 94303-0139, USA. 620 pp. Price: US\$54; elsewhere \$59.

The volume starts with a tribute to Kenneth F. Baker (1908–1996), who was the member of the first editorial committee of *Annu. Rev. Phytopathol.* when it was started in 1962 by James G. Horsfall. Baker served as editor with great distinction and dedication from 1972 to 1977, and he provided an endowment to promote plant pathology through ARP; the Baker's Gift was used to launch ARP into electronic age and ARP was produced as CD ROM.

The prefatory chapter describes how the department of plant pathology at the University of California was destroyed as a consequence of a contentions reorganization in 1992, and included in the Department of Environmental Science, Policy and Management (ESPM). Plant pathology is both a basic and an applied science and concerns host, pathogen and environment, and above all, healthy as well as nutritious food to humans and animals; it is thus a unique and indispensable member of plant sciences. The attitude of the administrators must be changed by providing proper insight into the problems because disease problems will persist in one form or another with the crops.

The research achievements of two pioneers, Helen Hart (wheat stem rust) and Gotthold Steiner (nematology) have been described.

Haldane (1949) observed that pathogens could be strong selective agents maintaining genetic diversity within host populations. Later, Flor (1956) demonstrated the complementarity of host and pathogen genetic systems. The RQH (red queen hypothesis) explains how pathogens may maintain sexual reproduction in hosts despite the two-fold advantage of asexual reproduction. However, there are several difficulties in testing RQH theory, which is central to reducing pathogen damage in agricultural systems.

The ideal structures of a plant clinic in developing countries have been detailed. World trade and GATT concerns have emphasized sanitary and phytosanitary-related issues. The discussion on dwarf bunt of wheat (*Tilletia contro-*

versa) describes how trade is jeopardized by economic but more political issues. The case study is the stoppage of import of wheat by China from USA in 1973 (previously China purchased wheat worth 500 million US dollars from USA). There are still no clear cut and easy answers as to what constituted a potential economic and biological threat to an industry and what was merely a minor nuisance of little danger to food production and security.

Thirty soilborne viruses or virus-like agents are transmitted by five species of fungal vectors, namely, *Olpidium brassicae*, *O. bornovanus*, *Polymyxa graminis*, *P. betae* and *Spongospora subterranea*. The viral coat protein gene has an essential role in *in vitro* transmission. With *in vivo* transmission, a site in the coat protein-read through (CP-RT) of beet necrotic yellow vein furovirus determines vector transmissibility as does a site in a similar 98-kDa polyprotein of barley mild mosaic bymovirus. Only three species of xylem-limited bacteria (XLB) that are fastidious in cultural requirements, are plant pathogens, and that exclusively occupy xylem, have been characterized. Two of these, *Xylella fastidiosa* and *Pseudomonas syzygii* are transmitted by sucking insects, while *Clavibacter xyli* is mechanically transmitted.

More than 30 bacterial avirulence genes have been cloned and characterized, but the function of the gene products in the elicitation of resistance is known only in one case. The product of *avrD* from *Pseudomonas savastanoi* pv. *glycinea* functions indirectly to elicit resistance in soybean (the gene product is an enzyme involved in elicitor production). In most cases *avr* gene function is dependent on interactions with the hypersensitive response and pathogenicity (*hrp*) genes. Many *hrp* genes are similar to genes involved in delivery of pathogenicity factors in mammalian bacterial pathogens. Thus, analogies between mammalian and plant pathogens may provide the needed clues to elucidate how virulence gene products control induction of resistance. The purification and characterization of specific elicitor-binding proteins is essential for a detailed understanding of the molecular basis for the signal ex-

change between plant hosts and microbial pathogens that leads to activation of host defenses.

Phytotoxic effects of ozone are described with emphasis on secondary plant metabolism, which seem to change plant predisposition to either enhanced tolerance or susceptibility for a second stressor.

The *Epichloe* species and their asexual descendants (*Acremonium* endophytes or *Epichloe* endophytes) are fungal symbionts of cool-season grasses (C-3 grasses), for which they can be important agents of biological protection from nematodes, insects, wildlife, and grazing livestock, and can confer enhanced drought tolerance; four classes of beneficial alkaloids have been shown to be produced. Genetic engineering of the fungal symbionts as more suitable biological protectants for forage grasses require identification of fungal genes for alkaloid biosynthesis, and DNA-mediated transformation of the fungi.

The role and functioning of the anterior chemosensory organs of plant parasitic nematodes have been examined, with particular emphasis on the amphids. The morphology of the amphids has been discussed primarily in the context of the changes in the ultrastructure associated with different life stages. The involvement of amphidial secretions in chemoreception and the behavioural and electro-physiological analyses of nematode responses to semiochemicals has been discussed with special reference to researches on sex hormones. These research techniques, combined with the use of lectins and antibodies, provide information on nematode sensilla that may lead to novel control strategies for economically-important plant parasitic nematodes based on perturbing nematode sensory perception to prevent host or mate location.

Wheat is grown on about 10 million ha in the tropical highlands and lowlands of the world; many farmers in these areas work under subsistence conditions. For economic and environmental reasons, host plant resistance is one of the most appropriate and sustainable disease control methods. Highland and lowland tropical wheat regions have

been described and the breeding strategies, philosophies of CIMMYT have been discussed; the progress made in developing resistance to major diseases such as rusts, foliar blights, *Fusarium* scab, BYD and spot blotch have been detailed. Leaf rust (caused by *Puccinia recondita* f. sp. *tritici*) is the most widespread and regularly-occurring rust on wheat. To date, 46 leaf rust resistance genes have been designated and mapped in wheat. Adult-plant resistance genes *Lr13* and *Lr34* singly and together have provided the most durable resistance to leaf rust in wheat throughout the world.

Quantitative trait locus (QTL) mapping is a highly effective approach for studying genetically-complex forms of plant disease resistance. With QTL mapping, the roles of specific resistance loci can be described, race specificity of partial resistance genes can be assessed, and interactions between resistance genes, plant development and the environment can be analysed. Outstanding examples include: quantitative resistance to the rice blast fungus, late blight of potato, gray leaf spot of maize, bacterial wilt of tomato and the soybean cyst nematode. QTL mapping also provides a framework for marker-assisted selection of complex disease resistance characters and the positional cloning of partial resistance genes.

Other topics described are: mechanism of penetration by fungi, pathogen quiescence in postharvest diseases, multifocus population structure, nematode and fruit disease management in sustainable agriculture, epidemiology and molecular biology of rice viruses, root and growth regulation, cacao witchesbroom, phenylamide resistance in *Phytophthora*, and quantitative disease resistance in plants.

The volume is an outstanding collection of 28 reviews, mostly in exciting frontiers of plant pathology. The articles have been written very critically and make fascinating reading.

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