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BOOK REVIEWS

Experiments in Ecology. By A. J. Underwood. Cambridge: Cambridge University Press (1997), pp. 504, £22.95. ISBN 0-521-55696-1.

This book argues for a more decision-based approach to ecological experimentation, in which understanding about how an ecological system works is advanced through successive formulation and testing of hypotheses. There is criticism of those who ‘gather data without clear-defined purposes’ or ‘for the sole purpose of description’. ‘Clear-defined purposes’ are identified with formal hypotheses, which the experiment is designed to test. The book is concerned primarily with describing tests based on the analysis of variance method.

While many long-running research programmes could benefit from the clarity of the author’s reasoning, there are undoubtedly dangers in a scientific approach so strictly tied to hypothesis testing. This is seen, for example, in medical research where human studies of diet or lifestyle, which identify statistically significant mortality effects, attract a level of public interest and concern out of all proportion to the predicted differences in risk. In practice, most experimental treatments will have non-zero effects and the success of a hypothesis test in demonstrating this may simply indicate the intensity of sampling. An effective model for a process should include treatment factors whose impact is both consistent and ecologically significant. The decision to include a treatment factor should therefore be based on its size and variability, not just on evidence of statistical significance. Contrary to the author’s strongly argued thesis, this supports the adoption of confidence intervals of treatment estimates to summarize experimental outcomes, rather than the artificial binary division of acceptance/rejection of statistical hypotheses.

R. A. Kempton

Biological Fixation of Nitrogen for Ecology and Sustainable Agriculture. NATO ASI Series G: Ecological Sciences Vol. 39. Edited by A. Legocki, H. Bothe and A. Pühler. Berlin: Springer (1997), pp. 328, DM198.00. ISBN 3-540-62056-7.

This is a multi-authored, camera-ready text which has remarkably little to do with its title! Arising from a workshop held in Poland in 1996, it is essentially a sort of ‘advances in nitrogen fixation research’ rag-bag comprised mainly of long (four page) abstracts. Of the 64 contributions, 30 papers address various aspects of signalling and recognition between legumes and rhizobia, 12 describe research on the physiology of nitrogen fixation, five examine nitrogen fixation in Cyanobacteria (under the inappropriate title of ‘nitrogen fixing systems’), four are on microbial ecology, four are (arguably) on sustainable agriculture, five are on evolution of nitrogen fixing symbioses, two are on the chemistry of nitrogen fixation and one is on actinorhizal nitrogen fixation. The papers are loosely grouped into headings but there is no attempt to draw the information together into any conclusions.

The highlights for me were a few papers which explored ideas rather than reported findings – in particular those which focused on evolution of the symbioses. For example, a longer paper by Debellé *et al.* explores the possibility that the small chitin polymers which function as early signals from rhizobia to legumes may represent the discovery of a class of endogenous plant signal molecules. Doyle and Doyle explore the phylogeny of legumes and conclude that determinate nodules arose in at least three separate cases, and Sprent raises the tantalizing prospect that at least

some antarctic bacteria should possess the genes necessary for nodulation and nitrogen fixation with legumes.

If, after reading this review, you still want to browse through this book, I suggest that you do not order it for your library but save the money for more substantial texts.

K. Giller

Developing On-farm Research – The Broad Picture. By Nora McNamara and Stephen Morse. Blarney: On Stream Publications (1996), pp. 173, £9.99. ISBN 1897685-882.

This publication records the development of a scheme for on-farm research in the middle belt of Nigeria. It was based on protracted developmental work carried out by the World Bank and an NGO, the Diocesan Development Services, commencing in the early 1970s. The scheme, implemented over 10 years and continuing, was based on the use of improved varieties of cassava, cowpeas, upland and lowland rice, groundnuts, maize and soyabeans, through a Farmer Level Agricultural Investigation and Response (FLAIR) programme. The account dispels some well established canards on farmers' response to and appreciation of new crop varieties. It does not pretend to be highly scientific or exhaustive in its treatment of the huge volume of data gathered from numerous simple participatory farm trials, questionnaires and surveys. Development workers will derive useful information on avoiding infructuous approaches in setting up on-farm activities. There is distilled wisdom based on over a decade of hands-on trial and error, but no panaceas.

The conclusions are commended to policymakers, administrators and those concerned with renewable natural resources at farm level. They give a flavour of the realities of meeting the rhetoric of sustainable development in terms of patient long-term commitment, including dedicated long-term staff input and pointed timely deployment of funding. The pragmatic common sense of farmers and their ability to make choices appropriate to their niche situations are reaffirmed. Some may find the format of the book less than user-friendly in terms of the arrangements adopted for figures and tables and in the overlong introductory chapters – but it is a worthwhile read.

J. C. Davies

Global Climate Change: Economic and Policy Issues. (World Bank Environment Paper No. 12.) Edited by Mohan Munasinghe. Washington DC: The World Bank† (1995), pp. 111, US\$8.95. ISBN 0-8213-3402-6.

The report contains three sections dealing with 'Intertemporal Equity and Discounting', 'Cost Benefit Analysis', and 'Financing Global Environmental Programmes'. These topics are treated as exercises in economic theory into which the real world rarely obtrudes. For example, climate change is nowhere specified in terms of temperature or rainfall nor is any attempt made to quantify the impact of some putative climate change on specific systems of food production. However, there is one table in which the estimated impact of unspecified climate change on agriculture ranges from 1 to 39.1 billion dollars (per year presumably) depending on the source of information! As expected in a World Bank publication, the contrasting abilities of industrial and developing countries to respond to climate change receive special attention.

Few readers of *Experimental Agriculture* are likely to find this document easy to read or to relate to our current very limited understanding of how agricultural production is likely to respond to climate

† Pricing of publications by the World Bank. The World Bank has agreements with sole distributors in most countries. The prices quoted in US\$ are for the USA. For UK prices it is necessary to consult the UK agent, Microinfo Ltd, PO Box 3, Alton, Hants, UK.

change over the next century. However, the report is a timely reminder that any systematic alteration in the average level or variability of agricultural production within a region can have complex economic consequence both locally and globally, feeding back to decisions at farm level in ways we usually ignore.

J. L. Monteith

Phytophthora Diseases Worldwide. By D. C. Erwin and O. K. Ribeiro. St Paul, Minnesota: The American Phytopathological Society (1996), pp. 562, £90. ISBN 0-89054-212-0.

Phytophthoras are among the most destructive of all fungal plant pathogens, causing diseases ranging from crop epidemics (for example, potato blight and cocoa black pod) to destabilization of forest ecosystems. This book is essentially encyclopaedic. The first seven chapters (210 pp.) describe the isolation, detection, artificial culturing, physiology, genetics, morphology and identification of the pathogen, its biological and chemical control, and host resistance. Each is a detailed, well illustrated condensation of the literature, though with limited critical evaluation, and they are supplemented with appendices listing methods of particular researchers. These chapters will be a valuable information source for the experienced 'Phytophthorologist', but are likely to be a little intimidating to the casual user. Chapters 8–66 (220 pp.) cover each of the 60 or so species of *Phytophthora*, describing their traditional taxonomic characteristics (with many photomicrographs and simple morphological diagrams) and the development and control of their principal diseases. An enormous citation list (> 5000 entries) largely but not exclusively to about 1990, is provided at the end of the book. This book is mainly for the specialist, to be used rather than read, but because of the worldwide economic importance of *Phytophthora*, it should also be a valuable sourcebook for many agricultural institutions.

C. Brazier

Plant Pathology, Fourth Edition. By G. N. Agrios. London: Academic Press (1997), pp. 635, hardback US\$59.95. ISBN 0-12-044564-6.

The Fourth Edition of this well-established text has created a classic textbook embracing the whole of plant pathology, ideal for undergraduate courses and for those associated with research and practice of applied plant pathology in all climatic regions. The new, larger format and extensive use of high quality illustrations (including colour plates) and the widespread use of annotated flow diagrams to show pathogen life cycles, the gene-for-gene concept, forecasting of epidemics and procedures for isolation and culture of pathogens are all exceedingly well done. A section about the classification of fungal pathogens includes a list of well-known anamorphic stages against their certain or likely teleomorphic group. The text describes gene transcription and translation for understanding plant breeding and for disease resistance, the replication of a virus and the use of DNA-based methods for the identification of pathogens, but this material never leads to the exclusion of the wider aspects of plant pathology. Selected references are given at the end of each chapter and a glossary of terms is included. I recommend this book highly for teaching and reference and hope the publishers will also produce a paperback version to extend the ownership of this worthy text.

B. Williamson

Biotechnology: Building on Farmers' Knowledge. Edited by J. Bunders, B. Haverkort and W. Hiemstra. London and Basingstoke: Macmillan (1996), pp. 240, £8.95. ISBN 0-333-67082-5.

This is a well produced paperback written by 22 authors in nine chapters. The word 'Biotechnology' is used very broadly to mean more or less any tropical agriculture. The focus of the work is to promote 'Interactive Bottom-Up' (IBU) methods by way of 'Participatory Technological Development' (PTD) rather than molecular tricks. Thus the first seven chapters refer to very diverse topics such as plant breeding, genetic resource conservation, pest control, weed control, animal diseases and various fermentations among much else, but hardly touch 'Biotechnology' in the (to many readers) usual sense of molecular manipulations devoted to diagnostics and transgenesis. The last two chapters really get to the point in 'The Socio-political Context' and 'Building on Farmers' Practices'. Teams are required, of course, and PTD begins to sound very like what CIMMYT used to call On Farm Research with Farming Systems Perspective (OFR/FSP). The authors (correctly, I think) foresee serious industrial threats to Third World small-farmer agriculture and little prospect of 'biotechnology' having any useful impact; it is strictly for the rich. So long as the reader doesn't judge by the title and expect a different book, this work is reasonably readable, covers a lot of ground superficially and deserves to be widely read or at least scanned. I especially liked the emphasis on the local exploitation of the chemical constituents of plants. Some sensible remarks on neem are paralleled by a current review of the tree occupying 716 pages (*Experimental Agriculture* 33: 247).

N. W. Simmonds

Evolution of Crop Plants. (Second Edition). By J. Smartt and N. W. Simmonds. Harlow, Essex: Longman Scientific and Technical (1995), pp. 531, £70.00. ISBN 0-521-08643-4.

The first edition of this volume has been a standard text for research and teaching for almost 20 years, so a revised edition is very welcome. The original editor, N. W. Simmonds has been joined by J. Smartt and the growth in knowledge has necessitated almost 200 extra pages. The coverage is also widened, with 101 chapters dealing with individual crops or crop groups. The result is comprehensively global and the index of common names ranges from abaca to zucchini.

Despite the increase in size, the high scholarship and readability of the first edition remain unchanged, as has the successful format. Individual chapters, contributed by a range of experts, follow a standard pattern, with a brief introduction followed by accounts of the cytotaxonomic background, early history and prospects. In addition many chapters also have maps, charts and tables to illustrate geographical distribution and evolutionary and genomic relationships. This book is undoubtedly an essential purchase for libraries specializing in crop and plant science. However, the unique combination of genetics, evolution, archaeobotany and economic botany makes it a fascinating volume for browsing as well as an unrivalled source book, so many workers will wish to own a copy. Although this hardback price is by no means unreasonable, a paperback edition would almost certainly meet a wider demand and achieve the circulation that the book demands.

P. R. Shewry

Agricultural R & D at the Crossroads. Edited by A. Budelman. Amsterdam: KIT Press (1996), pp. 247, £17.95. ISBN 90-6832-107-2.

This book is a selection of papers from the 1994 Montpellier Symposium on Systems-oriented Research in Agriculture. Six of the seventeen papers are in French, with English summaries. It also includes a detailed annotated bibliography containing English and French sources of both grey literature and published material in this field.

Farming systems research and development has an essential contribution to make to the quest for

location specific research. Carefully selected papers from the symposium bring out the importance of both anglophone and francophone traditions in systems-oriented research and explore the possibility of fusing both to evolve a unified approach to the subject. Some of the papers stress the importance of a social actor perspective for the achievement of sustainable agricultural development and advocate bringing hard systems and soft systems together. Important aspects that relate to social actor perspective, such as local knowledge and farmer experimentation, development of joint agencies and land literacy are brought out in some of the case studies presented. This book also explores new roles for agricultural systems researchers which direct them towards enabling rural populations to manage their resources as participants rather than as observers.

Some of the case studies will be of value to students and scholars in the fields of agricultural economics, rural development and development studies.

J. B. Dent

The Evolving Science of Grassland Improvement. By L. R. Humphreys. Cambridge: Cambridge University Press (1997), pp. 261, £45. ISBN 0-521-49567-9.

In the classic 'The Land Now and Tomorrow' the founder of grassland research, Sir George Stapledon, proclaimed 'that a serious mistake had been made in the endeavour to organise agricultural research in terms of subjects – chemistry, physiology, genetics, economics – rather than in the terms of the basal problems of agriculture itself'. His philosophy of grassland research was to integrate the basic sciences into a holistic approach. This message was well received by grassland scientists and is the recurring theme throughout this authoritative review by Ross Humphreys.

Central to the evolution of grassland research has been communication through the medium of the International Grassland Congress. The proceedings of these meetings have provided the raw material for Dr Humphreys to review the scene. In so doing he presents a very comprehensive interpretation on the past and current state of grassland science. Looking to the future, in Chapter 7, 'Innovation, Optimization and the Realisation of Change', he brings together the various strands and their role in meeting global needs for food and fibre production, and ameliorating climate change.

This book is strongly recommended to all students of grassland and to those who require proof of the value of research to the development of sustainable agriculture in order to make decisions on the funding of grassland research.

M. D. Hayward

Readers may be interested to know about the following publications received but not reviewed because of their limited relevance to the majority of readers of *Experimental Agriculture*.

Biodiversity in Agricultural Development. Towards Good Practice. Global Overlays Program. (World Bank Environment Paper No. 15.) By Stefano Pagiola and John Kellenberg with Lars Vidaeus and Jitendra Srivastava. Washington DC: The World Bank (1997), pp. 50, US\$20.00. ISBN 0-8213-3884-6.

The Greening of Economic Policy Reforms. Volume I: Principles. By Jeremy J. Warford, Mohan Munasinghe and Wilfrido Cruz. Washington DC: The World Bank Environmental Department and Economic Development Institute (1997), pp. 120, US\$30.00. ISBN 0-8213-3477-8.

The Greening of Economic Policy Reforms. Volume II: Case Studies. Edited by Wilfrido Cruz, Mohan Munasinghe and Jeremy J. Watford. Washington DC: The World Bank Environment

Department and Economic Development Institute (1997), pp. 222, US\$40.00. ISBN 0-8213-3797-1.

Medicinal Plants. Rescuing a Global Heritage. (*World Bank Technical Paper No. 355.*) By John Lambert, Jitendra Srivastava and Noel Vietmeyer. Washington DC: The World Bank (1977), pp. 61, US\$7.95. ISBN 0-8213-3856-0.

Integrated Lake and Reservoir Management. World Bank Approach and Experience. (*World Bank Technical Paper No. 358.*) By Wendy S. Ayres, Awa Busia, Ariel Dinar, Rafik Hirji, Stephen E. Lintner, Alex F. McCalla and Robert Robelus. Washington DC: The World Bank (1997), pp. 29, US\$20.00. ISBN 0-8213-3867-6.

Molybdenum in Agriculture. Edited By Umesh C. Gupta. Cambridge: Cambridge University Press (1997), pp. 276, £45.00. ISBN 0-521-57121-9.