

BOOK REVIEWS

Diseases of Tropical Pasture Plants. Edited by J. H. Lenn and P. Trutmann. Wallingford, UK: CAB INTERNATIONAL (In association with CIAT and NRI) (1994), pp. 416, £60.00, (Americas only US\$99.00) ISBN 0-85198-917-9.

This volume is a synthesis of current knowledge gained from a global interactive research programme partly contributed by the editors and authors. The impetus for this belated activity in a neglected aspect of plant pathology was triggered in the 1970s, according to Cameron and Lenn (Chapter on International Cooperation and Future Research), by epidemics of anthracnose on *Stylosanthes* in northern Australia and the tropical and sub-tropical Americas. Although the book claims to be comprehensive, it is necessarily incomplete and lacks depth. This is not a criticism but an acknowledgement that the subject is in its infancy. An introductory 'context' chapter is followed by eleven on pathogenic diseases of legumes and grasses. Nematodes are included but not abiotic disorders, pests or weeds. These chapters are supported by colour plates of variable quality.

The next five chapters on regional experiences are interesting and edifying but more graphs, tables and distribution maps would be welcome. The last section covers disease management and prospects for future research and collaboration. The book is recommended for workers in this and related fields.

B. C. Clifford

Bioaerosols Handbook. Edited by C. S. Cox and C. M. Wathes. Boca Raton & London: CRC/Lewis (1995), pp. 623, £58.00. ISBN 1-87371-615-9.

Interest in biological particles present in the atmosphere and their impact on human, animal and plant health has increased enormously in the last 25 years. The number of scientists involved has increased accordingly. However, fundamental knowledge of the behaviour of airborne particles in different physical conditions and of methods for reliable and accurate assessment of these bioaerosols has been confined to a small group of specialist aerosol scientists. Too little of their knowledge has reached too few workers in aerobiology, phytopathology, allergy and other disciplines. The *Bioaerosols Handbook* provides a very good package of fundamental and methodological information bridging aerosol science with bioaerosol research. Obviously the handbook cannot go into great detail in areas where bioaerosols are tools rather than major aims, as in studies of allergy or infectious diseases.

The book is necessarily large, to accommodate 20 chapters by over 20 authors, mostly from the UK and USA. It is written instructively and despite its size is easy to handle, because almost all chapters can be considered separately. Sufficient references provide sources for specific information, although they are almost exclusively in the English language. The arrangement of the references to chapters is not consistent, being sometimes alphabetical, sometimes in order of citation.

Some aspects are treated extensively in more than one chapter, thus by more than one author. This overlapping is no great drawback as comments by different authors can be very enlightening. An extensive subject index assists speedy review of particular aspects.

For scientists who are preparing and organizing their bioaerosol research projects and who want to process and interpret their results appropriately and correctly, the *Bioaerosols Handbook* could be an indispensable source of information.

F. Th. M. Spijksma

Breeding Field Crops. (Fourth Edition.) By J. M. Poehlmann. Ames: Iowa State University Press (1995), pp. 494, £56.95. ISBN 0-8138-2427-3. (Distributed by the Eurospan Group).

This book is for teaching plant breeding at an introductory level. The diversity of breeding methods and objectives is restricted to some field crops, but more than half of the text is on general aspects of plant breeding. These include genetic analysis, chromosome manipulations, mutation breeding and developments in molecular genetics and biotechnology.

General methods and techniques for a range of objectives are described clearly, although a fuller coverage of yield and quality in a wider range of crops would be useful. Applications to specific crops – wheat, rice, soyabean, maize, sorghum, cotton, potato, sugarcane and forage crops – provide much useful detail but inevitably some repetition between general and specific presentations.

This edition is a commendable attempt to combine established and recently developed methods in plant breeding. The text is very readable, although some statements are either incomplete or incorrect, most of these are corrected in a useful glossary. There are good reference lists, but the 'study questions' should be more extensive. Although, as suggested in the preface, the book may be consulted by professional plant breeders, it will be most useful for introducing the principles and practices of present day plant breeding to students and to the general public.

L. K. Jones

Modelling the Impact of Climate Change on Rice Production in Asia. Edited by R. B. Matthews, M. J. Kropff, D. Bachelet and H. H. van Laar. Wallingford, UK: CAB INTERNATIONAL (1995), pp. 304, hardback £49.95, (US\$90.00 Americas only) ISBN 0-85198-959-4.

In 13 informative and well-edited chapters, this volume describes the fruits of effective international cooperation between the International Rice Research Institute and major research centres in the Netherlands and Japan. An Introduction reminds readers that Asia contains 59% of the world's population producing 95% of the world's rice. The following 13 chapters explore ways of forecasting how future increases in CO₂ concentration and consequent changes in temperature and rainfall may alter rice production for better or for worse. This is an exceptionally difficult task because change is complex and in many areas its direction depends on the relatively small difference between positive and negative terms. It is hardly surprising therefore that when two rice models (ORYZA 1 and SIMRIW) are combined individually with one of three climate models (GFDL, GISS and UKMO) six contrasting figures are obtained for the change in regional production expected when the mean annual concentration of CO₂ doubles: +6.5, +4.2, -4.4, -5.6, -10.4 and -12.8%. What is surprising is the conclusion that '...these figures would suggest that rice production...may decline by 3.8% under the climates of the next century.' Considering that the standard deviation of 3.8% is $\pm 7.1\%$, does the mean have much meaning?

Where do we go from here? First, sources of discrepancy between forecasts need to be identified. It should be possible to discover which models are most reliable by comparing predicted seasonal fluctuations of climate and yield from farmers' fields with records available for many years past.

When this was attempted in Japan over five prefectures and 12 years SIMRIW accounted for 69% of the recorded variance and ORYZA1 for 62%. If, as seems likely, the residual variance (31 or 38%) includes the impact of pests, diseases and other weather-dependent constraints not dealt with in this project, then we still have a long way to go before we can confidently predict the agricultural consequences of climate change in any region.

J. L. Monteith

The World Bank and Irrigation (A World Bank Operations Evaluation Study.) By W. J. Jones. Washington DC: The World Bank† (1995), pp. 150, US\$10.95. ISBN 0-8213-3234-X.

This work is a comprehensive and instructive review by the Operations and Evaluation Department of the World Bank of the history of the Bank's lending programmes in the Irrigation Sector. Its successes and failures are recorded and they are supported by numerous project examples. The work should be required reading for anyone involved in the planning, design, construction and operation of irrigation projects.

The conclusions reflect the intuitive beliefs of practitioners but there are some surprises. First, it is clear that big is beautiful; large projects perform better in terms of evaluated economic returns than the smaller ones; this is even true in Sub-Saharan Africa where project returns are generally lower. One of the Bank's 'holy cows', which proves to be barren, is the notion that higher cost recoveries from farmers lead to better organization and methods (O & M). It doesn't! O & M is better where those who do it collect the revenues and are answerable to the beneficiaries.

The study reveals an over-optimism by the Bank's appraisal and supervision staff in comparison with post-project analyses made by the Operations and Evaluation Department. Reasons are advanced for this but nowhere does it say that internal pressure to increase lending during the seventies may have led to over-optimism.

One criticism might be that the document is written entirely from the Bank's perspective. Thus when it says that 67% of all projects were successful, it considers this satisfactory because any higher figure would suggest that the Bank only backed certainties and avoided taking risks. Fine if it is your own money, but not so good for the 33% who still have to repay the loan!

R. F. Stoner

Molecular Basis of Virus Evolution. Edited by A. J. Gibbs, C. H. Calisher and F. Garcia-Arenal. Cambridge: Cambridge University Press (1995), pp. 603, £65.00, US\$94.95. ISBN 0-521-45533-2.

In modern times, man, animals and crop plants have experienced disease epidemics caused by a series of newly emerging viruses and virus strains, yet until the advent of nucleotide sequencing, the genetic effects leading to evolutionary change in viruses have been charted in only a few instances. Most of these concerned changes at the level of virus strains and little was known about the ways in which new virus taxa originate. With the availability today of nucleotide sequences of hundreds of complete viral genomes and thousands of individual genes, coupled with computer-assisted analysis of the data, the situation is totally transformed.

This book, inspired by a Fundación Juan March symposium on the subject in 1991, describes the impact of these molecular studies on our understanding of viral evolution. After an excellent

†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.

introductory overview by the editors, the first half of the book consists of 16 chapters, ranging from the origins of viruses and their genes to the characteristics of virus populations. The second half consists of 17 case studies of evolution in individual animal and plant virus taxa, followed by two chapters (which I should prefer to have seen near the beginning of the book) on modern techniques for viral systematics.

Not surprisingly, because of the wide variety of types of viral genomes (DNA or RNA, single-stranded or double-stranded, monopartite or multipartite, and so on), evolution is found to proceed differently in different viruses. For example, evolution is fast in HIV and human strains of influenza A virus, slow in human papilloma and tobacco mild green mosaic viruses; and by co-evolution with the host in some, but not all, viral taxa. At the virus species level, individual genes may evolve at similar or different rates, and the variants are produced mainly by point mutations, insertions and deletions, and exchange of homologous genome parts. Among higher taxa, individual genes seem to have been acquired by duplication plus divergence, by non-homologous recombination with other viral taxa or with host genetic material, or they have arisen *de novo* by gene overprinting. Other topics discussed include the quasi-species, modular evolution, the apparently ancient origins of replicative elements of RNA viruses and of retroviral elements, and the relative merits of different computer programs for assessing relationships.

I found this a fascinating and well-written book. Although some of the chapters seem less up-to-date than others, all virologists and many people interested more generally in molecular aspects of evolution will find it a valuable source of information, ideas and illustrative examples.

B. D. Harrison

Principles of Seed Science and Technology. (Third Edition.) By L. O. Copeland and M. B. McDonald. New York and London: Chapman and Hall (1995), pp. 409, hardback, £49.00. ISBN 0-412-06301-8.

There are several good books on seed science but few which satisfactorily relate science to technology. The first edition of this book, published in 1976, filled this gap. Since then much has happened in seed technology and even more in seed science. As in the first edition, approximately the first half of this third edition concentrates on the seed science which underpins the technology which occupies most of the second half of the book. The chapter titles remain very similar, except for a new one on 'seed enhancement', but even those chapters which deal with the more conservative topics, such as reproductive processes and seed development, have been largely revised and improved. For further improvement in the next edition more methodical consideration should be given to water relations and temperature – both so fundamental to much seed technology. For example, there is little consideration of the effect of temperature on the rate of germination or the quantitative relations between temperature and after-ripening; and there is only a rudimentary treatment of alternating their interaction with other factors on the removal of seed dormancy. Nevertheless this is an attractive text which I would recommend as a standard for any course on seed technology.

E. H. Roberts

Strengthening National Agricultural Research Systems in Eastern and Central Africa. (World Bank Technical Paper No. 290.) By J. Weijenberg, M. Dagg, J. Kampen, M. Kalunda, A. N. Mailu, S. Ketema, L. Navarro and M. A. Noor. Washington DC: The World Bank† (1995), pp. 139, US\$10.95. ISBN 0-8213-3322-4.

In Africa, as almost everywhere, agricultural research is a good investment (see p. 13 of this book). In Africa agricultural research has certainly not been under-funded, receiving more per

dollar of national output than elsewhere in the developing world. Yet agricultural productivity in Africa is well below that seen elsewhere and, in particular, there is very little sign of a 'green revolution' for most crops or regions. This book addresses one aspect of that paradox, the role played by national agricultural research systems (NARS). Their performance in African countries has been called into severe question by the World Bank (for example in Kevin Cleaver's 1993 review of agricultural policy in the continent); the approach taken here is to invite senior staff of the NARS of five eastern and southern African countries to co-author the report with World Bank specialists.

The self-diagnosis made by NARS staff of their own work (p. 45) will not surprise students of the 'World Bank approach' to agricultural research: recurrent-cost funding has been inadequate, objectives have not been sufficiently prioritized and the users of the research product have not been involved in policy-making or resource allocation. The solutions proposed are greater financial autonomy for NARS (pp. 55–56), the generation of a farmer-driven research agenda through farmer empowerment (p. 52), 'sustainable, stable and consolidated funding' (p. 59) and the establishment of a structure for regional collaboration throughout eastern and central Africa (pp. 64–65).

All these proposals seem perfectly reasonable to this reviewer but they beg larger questions which are not addressed. Do these NARS co-authors feel a genuine sense of *mea culpa*, or have they reluctantly put their names to a document substantially written by the World Bank? Does the political will to provide sustainable, secure and consolidated funding exist in any east African country, as it did in India at the beginning of its 'green revolution'? (Perhaps only in Uganda.) If secure funding is provided for NARS, will the rather minor changes summarized above generate the basis for new 'green revolutions'? (Probably not.) What is the role of the non-governmental organizations and the private sector in relation to provision of research by NARS and the CG System? (Potentially fundamental but not discussed here.) The absence of any discussion of these questions leaves a hollow feeling in the reader's mind, and it is urgent that this deficiency is remedied.

P. Mosely

Technology Transfer: Making the Most of Your Intellectual Property. By N. F. Sullivan. Cambridge: Cambridge University Press (1995), pp. 221, paperback £14.95, US\$29.95, ISBN 0-521-46616-4, hardback £40.00, US\$69.95, ISBN 0-521-46066-2.

This book aims to provide research scientists with an overview of the procedures involved in identifying, protecting, and then exploiting the intellectual property they generate through licensing and business start-up. The authoritative coverage given to the management of these interlinked but potentially complex processes will undoubtedly help laboratory-based researchers to understand the business environment in which their commercial partners may operate. The author highlights the plethora of functions, skills and processes that successful commercialization requires, and rightly urges that professional advice and input is sought, particularly with regard to managing the legal and financial complexities of intellectual property.

The book's publication is timely – particularly for the academic researcher. Traditionally, a prime function of such research is the advancement of knowledge. Whilst high quality basic research remains of the highest priority, the culture in which academic, if not all, researchers operate is changing significantly, and for a variety of reasons. Bench scientists are being required to acquire a more entrepreneurial spirit – in the interest of promoting greater 'wealth creation'. Although only a few researchers are likely to commercialize their technologies, the insights provided by Dr Sullivan's book will be illuminating for many.

R. K. Atkin

Dynamics of Weed Populations. By R. Cousens and M. Mortimer. Cambridge: Cambridge University Press (1995), pp. 331, paperback, £17.95, US\$29.95, ISBN 0-521-49969-0, hardback, £50.00, US\$79.95, ISBN 0-521-49646-7.

This book sets out to provide a conceptual framework for weed scientists to understand the ecological attributes of weeds and to allow ecologists access to the extensive research on weed populations. To a very large extent this has been achieved. The authors have taken a fresh view of weed population biology and successfully drawn together most recent work on weeds from ecological, stochastic and spatial perspectives. This is a welcome approach, which includes aspects of biological attributes through the text and extensive descriptions of modelling approaches.

This book is structured into nine chapters; the framework, dynamics of geographic range expansion, dispersal within and between populations, processes involved in the regulation of population density, the intrinsic dynamics of population density, extrinsic factors affecting population density, the spatial dynamics of weed populations, the evolution of herbicide resistance, and synthesis and prognosis. Each chapter has a useful conclusion/summary. Lecturers will find much well-presented material and a good bibliography. Readers will appreciate the clear identification of limitations and gaps in understanding. Most examples, perhaps necessarily, are drawn from cereal systems in the UK, Australia, USA and Canada. Areas that might be expanded are developments in mechanistic models of crop-weed competition and in the needs for community ecology approaches in weed science. These points aside, the book is essential reading for weed scientists.

Jon Marshall

Food and Feed from Legumes and Oilseeds. Edited by E. Nwokolo and J. Smartt. London: Chapman and Hall (1995), pp. 419, hardback £59.00, ISBN 0-412-45930-2.

The need to increase the exploitation of pulses and oilseeds for human nutrition in the developing world is recognized by this new compilation of data on the composition, nutritional quality and use (current and potential) of a range of candidate crops. Over half of the volume deals with legumes, with separate accounts of over 20 different species prefaced by discussions of the global need for dietary pulses, the nutritional quality of asiatic pulses and the exploitation of wild Mexican species. The species range from major crops (e.g. cowpea) to ones which are currently of local significance but have potential for increased exploitation. Examples of the latter are the African oil bean (*Pentaclethra macrophylla*) and the escumite bean (*Phaseolus acutifolius*) from Nigeria and Mexico, respectively.

Oilseeds are, of course, a botanically diverse group, and are covered here in five sections. Groundnuts and soyabeans are included with other legumes, while separate sections deal with the Compositae (sunflower, safflower), the Cucurbitaceae (melon, pumpkin, gourds), the Palmae (bassu, coconut and oil palms) and miscellaneous species (castor, rubber, breadfruit and salseed). A final chapter discusses the potential for quality improvement by genetic engineering, providing a brief overview based largely on studies of temperate crops. There is no doubt that this will prove to be a well-used reference book, bringing together information from diverse sources. It also makes enjoyable reading, being concise, well written and attractively presented. In short a valuable addition to the literature on tropical and sub-tropical crops.

P. R. Shewry

Cotton Production Prospects for the Next Decade. (World Bank Technical Paper No. 287.) By F. E. M. Gillham, T. M. Bell, T. Arin, G. A. Matthews, C. Le Remeur and A. B. Hearn. Washington DC: The World Bank† (1995), pp. 277, US\$17.95. ISBN 0-8213-3312-7.

The book makes recommendations to solve problems in cotton production by synthesizing the findings of independent study teams on nine countries: Brazil, China, Egypt, India, Mali, Mexico, Pakistan, Tanzania and Uzbekistan, together with the discussions and conclusions of an international workshop held in Egypt in 1994. The study was made at a time of transition in most of the countries, with a general move to more open economies.

The origins and types of cultivated cottons and the history of cotton in different countries/regions are described as are the areas of production in each country of study and the role and performance of cotton in each country's economy. Technical issues covered are wide ranging and comprehensive. They include the changing requirements of the cotton industry, fibre and spinning test facilities, quality and varietal improvements, variety maintenance and seed production, integrated crop management, agronomy, irrigation and drainage, crop protection, harvesting, storage and ginning. Two chapters are devoted to the effect of contrasting government policies on cotton production and marketing and the effect of micro-economics on farmers, ginners and marketing agents. A chapter on support services describes the organizing and funding of research and extension, in addition to regulatory functions such as information on production, quality control, seed certification, and pesticide use (which causes serious problems in many countries).

The text, well-supported by tables, boxes, exhibits, figures, a list of acronyms and abbreviations, glossary and references, unfortunately lacks an index. On p. 63 there is a confused description of reducing (increasing ?) lint fineness without a concomitant reduction in maturity, and there are a few typographical errors. This is, however, an informative book that will, as intended, be of most value to donor organizations in assessing the merits of cotton-related development projects to government policy makers in developing their national cotton policies and programmes. It should also be useful to cotton researchers, extension workers and academic lecturers.

N. L. Innes

Return to Resistance: Breeding Crops to Reduce Pesticide Dependence. By R. A. Robinson. Davis, California: agAccess (1996), pp. 480, US\$29.95 plus 4.00 p&p. ISBN 0-932857-17-5.

The aim of this book is essentially popular which would be good if well done. Unfortunately, the author's heart is in the right place but his head is not because there are just too many errors and misemphases. Agricultural research in general and plant breeding have not been wholly wrong; a few vertical resistances (VR) have worked well and so have some chemicals. The author is surely right to emphasize the importance of horizontal polygenic resistance (HR) but overdoes it and makes his support into a fanatical appeal to observe the 'True Doctrine'. From this impassioned defence of HR against all-comers, the author goes on to a huge and rather muddled proposal (c. 120 pp.) for plant breeding clubs and amateur breeding. There is surely a core of sense here because farmers' skills could be used better than they are, but too much is hung on the idea. The author is realistic about population pressures, pollution and the need for sensible technology in agriculture if we are even to survive, but his solutions tend to the simplistic. So professional readers could well spend an hour or two with this work because it has some good sense in it: but it is not, I think, for the amateurs at whom it is said to be aimed, alas!

N. W. Simmonds