BOOK REVIEWS

L. FINS, S.T. FRIEDMAN and J.V. BROTSCHOL (Eds.) *Handbook of quantitative forest genetics*. Forestry Sciences Volume 39. Kluwer Academic Publishers, Dordrecht, The Netherlands. 1992. 424pp. Dfl.160/£54. ISBN 0-7923-1568-5.

This book arose from an idea at the Western Forest Genetics Association meeting in the USA during 1987 and from a training course given by the WFGA in 1989. Each chapter represents the contributions from the teachers on the course and it is now described by the publishers as 'a reference tool for forest geneticists, tree breeders and other tree improvement personnel, as well as a textbook for university courses and short courses at the graduate level in quantitative genetics'. I believe it lives up to this claim but it should be read with two other books in this series, Volume 33 (T.L. White and G.R. Hodge, eds., 1989, *Predicting breeding values with applications in forest tree improvement*) and Volume 42 (W.T. Adams *et al.* eds., 1992, *Population genetics*).

Trees are no different from any other crop in their genetic material and their methods of combining and redistributing it. The principles of genetics and the practices of plant breeding therefore apply; since the 1950s serious breeding programmes have been initiated for a number of industrial tree species, originally industrial trees (firstly in temperate regions, then in tropical regions) and most recently multipurpose non-industrial (principally legumes in tropical regions). However, foresters have been notoriously slow in understanding and applying statistical methods to many of their research and development activities and this has applied in fair measure to tree breeders in many institutions.

The first chapter (by Cheryl Talbert) not only sets the scene ('There is no substitute for intuition, experience and observation in complex decision-making.') but, in explaining the role of genetics in the decision-making process, it provides support for those wishing for discussions with, or additional support from, policy-makers and managers. The second chapter (Hans van Buijtenen) describes in clear terms and at a simple level the principles of Mendelian, population and quantitative genetics; it uses forestry examples in its illustrations but the quality of the reproduced maps is not high. Chapter 3 (Floyd Bridgwater) describes the history, objectives, costs, benefits and construction of the major mating designs used to estimate genetic parameters and provide future breeding material. In Chapter 4 (Judy Loo-Dinkins) field designs are considered for evaluating genetic material, i.e. progeny tests. The full range of designs is not treated and the arrangement is not as systematic as that of other chapters; however, the great value of this chapter is the consideration of sampling size and allocation, efficiency of different designs and replication levels, and the choice of numbers of field test sites. An excellent introduction is offered to the *a posteriori* adjustment of data for local variation and the use of neighbourhood and nearest-neighbour techniques.

The Series Volume 33 referred to above is admirably summarized in Chapter 5 (Gary Hodge and Tim White). It includes the principles and formulae for the prediction of genetic worth of all individuals in a programme, the ranking and selection of candidate parents, and the calculation of predicted gain from these parents. It considers mass selection, single or two-parent selection, and both between-family and within-family selection. The value of best linear predictors and multiple trait selection indices is stressed. All breeding programmes require the analysis of substantial amounts of complex data; Chapter 6 (Roy Stonecypher) introduces a range of analysis of variance models and some of the statistical packages available. Although some of the reproduced computer output tables may be confusing for the newcomer, the treatment of missing data and debatable assumptions may encourage field practitioners.

Chapter 7 (Sam Foster) is aptly named 'Estimating yield; beyond breeding values' because it considers the use of improved material in the field and the practical problems of allocating it to plantations, genetic tests and seed orchards. The section on seed orchards is not a review of orchard designs but ranges over number of clones, contamination, relatedness and seed production. A substantial section on growth and yield modelling seems rather out of place in such a text on genetics.

In any research and development programme economic costs and benefits weigh heavily with administrators and decision-makers. Chapter 8 (Sharon Friedman) provides a number of economic methods for taking decisions within genetic resource management; a stepwise simple economic analysis model is given. The last chapter (9, Bob Westfall, on seed transfer zones) is described by the editors as 'probably the most complex chapter' and it is true that it contains some multivariate analysis, matrix algebra and genotype-environment stability analysis; yet it is simply written and approaches the ultimate objective of tree breeding programmes, the allocation of optimum genotypes or populations to sites.

This book is a valuable and readable contribution to the literature. It is carefully edited and standardized with large, clear type fonts, simple tables and graphs, and an excellent supporting bibliography for each chapter. The few figures (maps and metaphase chromosomes) are not of the same quality but are hardly distracting. The statistical formulae are well developed and clearly presented throughout. The spelling and units of measure reflect the American origin but there are very few editorial errors. Where examples are given they are invariably industrial plantation species and the book lacks serious comment on the special problems of multipurpose trees for rural development, problems of self-pollinating species, the evaluation of non-productive properties, and the concepts of multipopulation breeding strategy. Despite these gaps the book will serve well as an introductory text in courses while most specialist tree breeders will also find many things of value in it.

J. BURLEY

A. GOMEZ-POMPA, T.C. WHITMORE, and M. HADLEY (Eds.). *Rainforest Regeneration and Management* (Vol. 6 of Man and the Biosphere Series). 1991. UNESCO and Parthenon Publishing, Casterton Hall, Carnforth, Lancs LA6 2LA. xxiii + 457pp. £35.00. Parthenon ISBN 1 85070 261 6; UNESCO ISBN 92 3 102647 X

This book sets itself the tough task of reviewing present scientific understanding of rainforest regeneration and evaluating the implications for forest management. It is based on contributions to a workshop held in 1986 to promote and develop the ecological understanding necessary for rational forest management. It seeks specifically to help bridge the gap between scientific research and on-the-ground management. An impressive international team of contributors has been assembled to take on the task. The book begins with eight review chapters which occupy almost half of this mammoth volume. This is followed by 23 case studies featuring examples of both natural regeneration and forest management from all major tropical rainforest areas.

The obligatory introductory chapter walks a well worn path, offering a brief overview of natural regeneration and silvicultural

systems. The authors voice the hidden fear of many rain forest forest scientists, that despite substantial advances in the understanding of rainforest regeneration in the last three decades, there has been almost no improvement in forest management techniques nor an increase in the areas of tropical forest coming under some form of management. This raises the fundamental issue of whether tropical rainforest management is in fact constrained by lack of scientific knowledge, an issue which is largely dodged in this book.

The first topical review by Oldeman and van Dijk is, unfortunately, a prime example of the gulf that exists between the scientific interests of biologists and the practical needs of foresters. It discusses in great detail (it is over twice the length of any other chapter in the book) how tree 'temperament' may often be predicted from crown and leaf characteristics and related to regeneration strategy. This extended and esoteric analysis concludes with the truism that any silvicultural treatment should be appropriate to the ecology of species the forester wishes to favour. This scientific insight is unlikely to surprise many on-the-ground foresters.

The following five chapters by Whitmore (tropical rainforest dynamics), Bazzaz (physiological responses of pioneer and secondary species), Bawa and Krugman (reproductive biology and genetics of tropical trees), Janzen and Vasques-Yanes (seed ecology), and Jordan (nutrient cycling) are comprehensive and accessible reviews. Despite an ever burgeoning tropical rainforest literature, particularly in ecophysiology and genetics, I could find only five references in these chapters from the last five years, no doubt a consequence of the book having been so long in production. Their value is only marginally reduced, however, by the five year gestation period, for they are clear and successfully focussed on practical applications to forest management. Whitmore introduces little that is new to those familiar with his work of the last ten years, but the chapter is characteristically succinct, readable and well illustrated with examples. His analysis warns of the difficulties in devising viable silvicultural systems for South American forests dominated by very shade-tolerant, slow-growing, climax species. Bazzaz points out the paucity of physiological studies in the rainforests of Africa and Southeast Asia. If biologists are to make a valuable contribution to developing forest management techniques, then surely greater effort should be directed towards those regions where forestry rather than forest clearance is a major force. Jordan's fulsome praise of the agroforestry system used at Tome-Assu in Para State, Brazil looks somewhat dated in view of the conversion of many of these farms to more profitable cattle-ranching. This section concludes with a competent analysis of the state of tropical forest management world-wide, by Schmidt. His study, more than any other in the book, has suffered from the tardy publication, because it is heavily dependent on the statistical information available in 1986.

The second half of the book, comprising 23 case studies, is a mixed bag. Many are concise and informative. I found studies by Saldarriaga and Uhl (Recovery of forest vegetation following slash-and-burn), Saulei and Lamb (Regeneration after pulpwood logging), and de Graaf (Managing natural regeneration for sustained timber production in Surinam) of particular value. There is a typically plainspoken dissection of some of the reasons for the failure of tropical forest management by Palmer, drawing on his experiences at Jari, a vast Brazilian plantation scheme. It sits somewhat uncomfortably in a book which states explicitly in the introduction that it is concerned with natural ecosystems and not plantations, but many of the experiences are applicable. This section of the book would have benefited from a much stronger editorial hand to sift out some of the chaff and ensure coherence.

The book is not a successful bridge between scientists and forest managers, but it does provide a readable synthesis of academically orientated tropical rainforest research with ample regional examples.

N. BROWN

HERB HAMMOND. *Seeing the Forest for the Trees: The Case for Wholistic Forest Use*. Polestar Press, Vancouver. 1991. 310pp. 286 x 247mm. softbound. (UK distributor Book Systems Plus, Bishop's Stortford.) Price (in UK) £35.95. ISBN 0919591582.

Four descriptive parts: I 'What are forests?', II 'How do we use the forest?', III 'What are the impacts of our use of the forest?', and IV 'The politics of forest use', are followed by a prescriptive Vth part entitled 'The solution - wholistic [*sic*] use.' The volume is handsomely, in places sensationally, illustrated with the author's photographs and some of the best of these are reproduced once more in the sixth part, Summary/photo essay. Avowedly factual sections are in places inaccurate, for example we are told (page 18) that nitrogen makes up 'approximately 20% of the atmosphere', and (page 62) that evenaged management is also called the shelterwood system, when what is referred to is uniform shelterwood, while on the same page the reference to the administration of clearcutting in Switzerland is in fact to that of deforestation. The economics of forestry (page 177 *et seq.*) are treated in so elementary a fashion as to be banal; and later (page 246) the author makes it clear that for him conventional cost/benefit analysis does not 'consider unpriced values alongside dollar values.' Observations like these give the reader little confidence that the indictments of government and industry in part IV on forest politics in British Columbia are dependable.

The book is in fact a panegyric upon near-to-nature management to satisfy a totally different set of ideals about the purposes of forestry from today's convention. The flavour of the work is given in the introduction's condemnation of the current practice of removing old growth and replacing it with generally even-aged, often planted, stands; the first step in changing the use of the forest is to 'connect our hearts and our brains so that we once again become part of the forest.' Throughout the work, assertion does duty for argument. The aims of ecologically responsible forestry in British Columbia are to be achieved by adopting a near-natural forestry which combines retention of large reserves of old forest with low intensity silviculture in the used parts of the forest on the lines favoured by Franklin in Oregon; that is, uneven-aged, mixed stands throughout. Thus 15 to 20% of the original stand would be left to grow on with the crop below *and to die*. This two-storey forest would operate with a rotation of the understorey of 150 to 250 years. The effect would without doubt be a most attractive forest from the points of view of landscape, wildlife and other attributes. The reader is asked to accept that the ways in which private business conducts its affairs will change, in particular by adopting much more value-added processing within the province, so that the effects on jobs and income of a much reduced cut will not be serious. The solution is a utopian one, with a strong dose of idealism thrown in, and the work must be read as one man's view of the desirable balance of attributes of the British Columbian forest. It is unfortunate that the various recommendations on what constitutes desirable forestry are so extreme, since it means that many criticisms will be dismissed as the author's idiosyncrasies. That would be a pity.

A.J. GRAYSON

D. HOCKING, (Ed.) *Trees for Drylands*. New Delhi: Oxford and IBH Publishing Co., 1993. 370pp. US$59.95 (or INR100 in India). ISBN 81-204-0730-X.

The editor of this book was commissioned by the Swiss Development Corporation to produce a book covering the choice of species and their establishment and management practices for 'semi-arid and arid' areas. In doing so, Drake Hocking drew on the services of