

numbers of molecular markers have become available, on diseases with genetical but not simple inheritance, and on pedigree analysis in animal models. The topic I considered most surprising, albeit through ignorance, was the use of populations of baboons for the latter.

Analysis of population variability takes up half the chapters. Although most of the work is not new, that which I found most interesting was the summary of human population diversity and discussion of the lack of evidence for population bottlenecks by Nei, Li and colleagues. Other papers in this section deal with theoretical problems, including a novel, but somewhat out-of-place, theoretical analysis of occupancy problems by Chakraborty.

Most geneticists will find both useful and interesting material in this volume because of its great breadth and the quality of the authors. As with other collected volumes, however, some of the material is being regurgitated and some is yet undigested.

WILLIAM G. HILL

*Institute of Cell, Animal and Population Biology,  
University of Edinburgh*

*Clonal Forestry I: Genetics and Biotechnology.* Edited by M. R. AHUJA and W. J. LIBBY. Springer-Verlag, Berlin and Heidelberg. 1993. 277 pages; 32 figures (including photographs). Price DM. 198.00. ISBN 3 540 52501 7.

*Clonal Forestry II: Conservation and Application.* Edited by M. R. AHUJA and W. J. LIBBY. Springer-Verlag, Berlin and Heidelberg. 1993. 240 pages; 34 figures (including photographs). Price DM. 198.00. ISBN 3 540 55714 8.

These two volumes on clonal forestry are edited by two eminent researchers and writers in the field. The first volume sets out to give an insight into the theory and science underpinning clonal forestry and the second volume surveys the applications of clonal forestry for various purposes and settings around the world. The editors suggest in their preface that they set out to recruit authors from amongst younger scientists across a number of countries to foster a diversity of thought and experience. When the editors recruited established authors, they were asked to write on recent advances or on different topics from their previously published work.

The editors introduce Volume I with an overview of the current situation, linking together the fields of genetics, biotechnology and clonal forestry. This is followed by a series of more or less linked chapters that take the reader through the genetics of clones, maturation, the population biology of clonal deployment and the selection and breeding of extreme genotypes.

The reader is then taken into areas in which he or she is faced with all the problems that have to be answered before clonal material, from whatever

source, can be introduced into the forest. Are regenerants from tissue culture systems genetically stable, how do you identify the ramets of a clone and how do you field test the clonal material? The various techniques for vegetative propagation are then described and the techniques discussed from a commercial viewpoint. This commercial point of view suggests that no vegetative propagation system established to date has made a steady return on the investment, let alone made a profit.

The problem of maturation and the possibilities of rejuvenation of mature genotypes are discussed. There is a classical Catch 22 in forestry in that when trees have expressed their desirable characteristics, they are too old to propagate vegetatively and when they can be propagated successfully, they are too young to be tested. The authors suggest possible ways to get around this problem but it must be said that this might prove difficult to do on a commercial scale.

The remaining chapters in Volume I include an in-depth survey of the current status of somatic embryogenesis in conifers and a description of the structure and organization of the nuclear, chloroplast and mitochondrial genome. The volume is concluded by an overview of DNA transfer in conifers, outlining the techniques and possibilities.

The emphasis in Volume II is very much the practice of 'full' clonal forestry rather than the techniques involved in the successful cloning of forest trees. Volume II can therefore be seen as a logical development from the methodology presented in I. Once it has proved possible to propagate a species vegetatively and obtain substantial genetic gain as measured in clonal trials, managers need to decide if there is a need to alter certain silvicultural practices. For example, should clones be laid out in monoclonal blocks or in intimate mixture? As genetic diversity of the nearest neighbour decreases, what is the effect on competition and mensuration of the crop? Is there an advantage in selecting specific clones for specific site-types? Should other management practices vary with specific clones? And, of course, what is the correct balance between genetic gain and risk in terms of number of clones deployed?

Most of the above questions are addressed, although, admittedly not all are answered in the 13 chapters which constitute this volume. Nine of the chapters involve detailed accounts of the experiences of different authors as they approach full clonal forestry with a variety of different tropical and temperate species. This is one of the strengths of the book in that any tree breeder or manager interested in learning how other organizations have moved towards full clonal forestry ought to be able to find a species related to his own. Experiences with radiata pine, Norway spruce, willows, poplars, teak, Eucalyptus and others are all presented.

The remainder of the chapters cover the advantages and disadvantages of clonal forestry with a bias

towards the former; how to counter-argument critics regarding clonal forestry not being natural; how to use clonal forestry to the benefit of conservation; and a necessary chapter on the legal aspects of deployment as currently legislated in various countries in the world.

The editors have fulfilled their role well in making sure there are excellent cross-references between chapters and volumes and that the same terminology is employed consistently. There are good but different glossaries in each volume and both are well indexed. The mark of one of the editors, Bill Libby, occurs throughout as there are constant references to WIMPS (Widespread Intimately Mixed Plantations) and MOMS (Mosaics of Mono-clonal Stands) across a range of chapters. As sources of references to take research into the subject further the volumes will prove invaluable to both students and researchers. However, like most volumes produced today they are expensive and probably out of the reach of a student's pocket. It is to be hoped that libraries will be foresighted enough to provide for their needs.

ALLAN JOHN AND STEVEN J. LEE  
*Tree Improvement Branch,  
 The Forestry Authority,  
 Northern Research Station,  
 Roslin, Midlothian*

*Biodiversity and Wheat Improvement*. Edited by A. B. DAMIANA. Wiley, 1993. 434 pages. Price £59.95. ISBN 0 471 94137 9.

This book falls into the genre of the book of the conference, the latter in this case being a workshop on the 'Evaluation and Utilization of Biodiversity in Wild Relatives and Primitive Forms for Wheat Improvement' which was organized jointly by the International Center for Agricultural Research in Dry Areas (ICARDA) and the University of Tuscia, Italy and held near Aleppo, Syria in October 1992. The aims of the workshop, and thus presumably of the book, were to review progress made in evaluating and utilizing non-conventional wheat germplasm, to discuss the constraints to their use and to identify areas for future research. The emphasis of the book is thus not on summarizing what is known about wheat diversity but rather on the results of the newest research. In that respect the title is misleading. The book is divided into eight sections (Cytogenetics of the Triticeae; Taxonomy of the Triticeae; Wide-crossing and hybridization; Resistance to diseases; Abiotic stress tolerance; Evaluation of biodiversity; Utilization of diversity; Research by national programmes) sandwiched between an introduction and a summary and list of recommendations for future research. The papers within each section read like journal contributions in that the only connection between them is that they fall in the same section. The 39 contributors have generally presented the results of

their latest research and whilst this is an effective approach at a workshop where there are opportunities to debate the conclusions, it is less appropriate in a book which has to stand on its own.

The difference between a special issue of a journal and a book is that although both should have a well-defined aim, the latter should reflect the aim in its structure, the contributions should complement each other, preferably by means of cross-references, and there should be a good index. This book falls down on each of these criteria although many of the papers are excellent in their own right.

Anyone familiar with the aims of ICARDA and who had read the introduction explaining the problems of agriculture in West Asia and North Africa and the importance of assessing and preserving the diverse wheat germplasm of the region, would be disappointed in the book as a whole. Editing conference proceedings is difficult. The editor normally has a clear idea about what he or she wants to achieve but is inhibited by the amount of editing needed to transform the individual contributions into a book, particularly when there are constraints of time and money and recalcitrant authors who fail to deliver manuscripts on time or who object to changes being made. In the present case, there seems to be a more comprehensive, but perhaps shorter, book struggling to get out. The key questions seem to be: what are the important attributes of wheat plants cultivated in water-stressed, low-input agricultural systems? How can the genes controlling for these attributes be discovered? What are the populations in which these genes are found? How can these genes be brought into commercial varieties? The introduction could usefully have explicitly discussed these issues in detail. As an aside, it might also have been useful to define biodiversity. At the end of the book there is an interesting list of 33 summary points and recommendations for further research which emerged from discussions at the workshop. These items could also be considered as the answers to questions which should have been posed at the start of the book. If this had been done, the structure of the book would have been rather different. Biologists often adopt a 'bottom-up' approach, starting with the fundamental level and then attempting to integrate the components in order to predict the performance of the whole plant or plant community. Work on farming systems, as at ICARDA, is based on a different paradigm. In the 'top-down' approach, the problem is first analysed in global terms by identifying the key limiting factors for further investigation. The former approach is good for investigating narrowly defined problems in depth while the latter enables progress to be made in complex issues and provides a clear intellectual framework for readers unfamiliar with the subject. The present book has an implicit 'bottom-up' viewpoint since the first sections are about cytogenetics and taxonomy while the evaluation of biodiversity has to wait till part six. If the book had been structured in