Acta Bot. Neerl. 42(2), June 1993, p. 251–254

Book Reviews

The European Garden Flora Volume III

S.M. Walters and many others (eds).
Cambridge University Press, Cambridge, New York, New Rochelle, Melbourne, Sydney. 1989.
xv + 474 pp. Illustrated, hardcover. UK£65·00, US$120·00. ISBN 0-512-36171-0.

Good wine needs no bush, as the saying goes. *The European Garden Flora* is a must for any institute, grower or devoted plant lover working with garden plants. Volume III of this major vade-mecum is the first of four instalments of the dicotyledons containing families 43 to 82, the more primitive ones. Many authors from Great Britain and a few from Ireland, the Netherlands and Germany have contributed brief up-to-date treatments of many species interesting for garden use and in greenhouses. The Botanic Gardens in Edinburgh, Kew, Glasnevin, Cambridge and the RHS Gardens Wisley vouch for the editing.

As in previous volumes (treating the ferns, gymnosperms and monocotyledons) concise keys are provided, giving access to the species. In this respect the volume has an advantage over the *RHS Dictionary of Gardening*. Some genera are illustrated (leaves or inflorescences). References to other good illustrations from, as far as possible, widely available books are also given. The short descriptions are diagnostic, literature references where appropriate are brief but not too cryptically abbreviated for the convenience of non-taxonomists. Horticultural information is brief and useful for general guidance. Hardiness is indicated after the geographical distribution, which concerns the wild distribution.

The choice of plants is sometimes peculiar. The well-known tropical fruit species in *Anona*, for instance, are perhaps grown in greenhouses of botanic gardens to teach students of tropical botany or enlighten the public, but treatment in this book seems somewhat far-fetched. Perhaps because the public grow pips of exotic fruits in their conservatories? *Anona* can be grown only in sheltered placed around the Mediterranean, they are not likely to be found in general collections.

Some more important cultivars are quoted, which is an improvement over the first two volumes, but these are not indexed. If registration lists of cultivars exist, these are referred to in the literature. The glossary is a repeat from earlier volumes, which makes the book self-contained.

In all, *The European Garden Flora* is a monumental work, a splendid scientific companion to the many glossy garden books available on the market, providing valuable information and a first introduction to more detailed treatments of the garden plants cultivated in Europe. The next volume, which goes to press in early 1993, is eagerly awaited. Presumably users from other continents will find information of interest too.

L.J.G. VAN DER MAESEN

Isozymes in Water Plants

L. Triest (ed.).
National Botanic Garden of Belgium, Meise. 1991.
264 pp. Illustrated. ISBN 90-72619-03-X.

Water plants are notorious for their extreme variability. Traditionally, one tried to distinguish between phenotypic and genotypic variation on the basis of morphological analyses. More recently other characteristics were used in order to define the variation, and to better characterize the taxa: chromosome numbers, chromosome morphology, flavonoid biochemistry (in Lemnaceae), etc. In the last two decades isozymes have frequently been used to arrive at a better discrimination of the genetic variability within species and populations. The work presented by Triest consists of a collection of largely original studies on isozymes in aquatic monocotyledons. No dicotyledons are incorporated, so the title of the book is misleading. The various contributions deal with *Alisma* species (Triest & Roelandt), *Baldellia* (Triest & Vuille), *Hydrilla verticillata* (Verkley & Pieterse; Ryan), *Lagarosiphon* (Triest), *Potamogeton* (Hettiarachchi & Triest), *Ruppia* (Triest & Symoens), *Zannichellia* (Triest & Vanhecke), *Najas marina* (Triest) and seagrasses (McMillan).

Although the isozyme studies in each of these groups bring some special features to light, it is nevertheless clear that isozymes are excellent indicators of genetic diversity in populations of some species (*Hydrilla verticillata, Najas marina, Potamogeton pectinatus*), while they at most confirm the taxonomical status in other groups (*Alisma, Baldellia, Lagarosiphon*, most *Potamogeton* species, *Ruppia*, seagrasses). In *Zannichellia*, isozyme variation and morphological variation show different geographical patterns, and in fact complicate our road to understanding.

Much of the variation that can be correlated with isozymes is linked with the mode of reproduction (inbreeding, outbreeding, clonal), the ploidy level and the geographical distribution. In comparison with terrestrial plants, genetic diversity seems low. However, a more definitive conclusion cannot be drawn before the main dicotyledonous aquatic taxa (*Nymphaeaceae* s.l., *Ranunculus* subgen. *Batrachium, Utricularia, Myriophyllum, Callitriche, Nymphoides*, Podostemaceae) have been subjected to similar systematic investigations; only *Ceratophyllum* has been profoundly studied so far.

As a consequence of their relatively low variability, isozymes are useful in the study of only some aquatic taxa. The absence of isozyme variations in some aquatic groups (*Ruppia*, seagrass species) does not always imply that genetic variability is low. Other studies have shown that there are in some species genetic differences in morphological, physiological and life history characteristics, which so far cannot be linked with isozyme polymorphism. Further, it is possible by means of DNA screening to discover considerable variation in local populations, where isozyme analysis fails.

The book is written in a stimulating fashion; each chapter is concluded by a section 'Conclusion and further research needs', giving ample material for continuation of the study.

The chapter in which Triest tries to find a synthesis by relating enzyme polymorphism to the biology of aquatic plants, is a very original, fascinating contribution. This is also true for the final chapter, in which the very practical problem of conservation of genetic diversity in aquatic plants is raised.

D. DEN HARTOG

Genetics and Breeding of Ornamental Species

J. Harding, F. Singh and J.N.M. Mol (eds).
Kluwer Academic Publishers, Dordrecht. 1991.
429 pp. Illustrated, hardcover. ISBN 0-7923-1094-2.

In food crops, a long tradition of breeding has resulted in high-performing plants with an increased nutritional value. In present-day breeding, inbred lines are available and advanced techniques are being used. Breeding is facilitated by the fact that food crops are usually annual plants. In ornamentals, the situation is very different. The nutritional value and rate of growth are irrelevant and less important respectively. The breeding effort has been small and has been directed at ornamental value and 'keepability' of flowers. Ornamentals are usually slow-growing perennial plants and no inbred lines are available. In contrast to food crops, there are many different species of ornamental crop. Elite plants are mostly propagated vegetatively but this type of propagation is often slow: in bulbous crops, for example, it may take up to 20 years before a product from breeding can be propagated (vegetatively) in sufficiently large numbers for selling. There is one obvious common interest which ornamental and food crops share: the importance of resistance to diseases and plagues.

Recently, the breeding of ornamentals has received increasing attention. The abundant use of pesticides may be forbidden. Biotechnological breeding techniques, in particular the incorporation of new genes into the host genome by *Agrobacterium*, has offered a short-cut route to achieve resistance or to increase the ornamental value. The development of techniques for micropropagation of many crops offers the possibility of very rapid propagation of new elite plants.

The book under review deals with the breeding of ornamentals, covering both traditional and biotechnological breeding techniques. It is organized into three sections corresponding to the basic tools used in the breeding of food crops: cytogenetics, quantitative genetics and molecular genetics. With the exception of some chapters on flowers (in particular flower colour and senescence), the specific problems in ornamentals are not highlighted. Thus, almost all the information can also be found in other books on breeding. This book only exemplifies the methods with ornamentals instead of food crops. In my opinion, the specific situation in ornamentals should have received much more attention. In spite of this major shortcoming, this book remains very valuable as it offers excellent review papers on many aspects of breeding. It is hoped that future editions of this book will cover in detail the features specific to ornamental plant breeding.

G.J. DE KLERK

Molecular Plant Pathology. A Practical Approach, Vol. I

S.J. Gurr, M.J. McPherson and D.J. Bowles (eds).
Oxford University Press, Oxford. 1992.
xxiv + 216 pp. Paperback. ISBN 0-19-963102-6.

This is the first of two volumes aimed at providing a broad range of protocols describing both the latest molecular techniques and more 'classical' approaches for studying plant–pathogen interactions. Volume I covers pathogens and pathogen manipulation, as well as defence responses (genes), whereas Volume II will deal with defence responses (gene products), elicitors, signal transduction pathways and disease resistance genes. Each section comprises a number of short chapters varying in scope and detail. The impressive list of contributors—all well-known experts in their fields—guarantees that one can look over the shoulder of the experimentalist and follow the action step-by-step.

In the section on pathogens, introductory background chapters on viruses, bacteria, fungi and nematodes describe their basic characters, pathogenic properties, and isolation and maintenance in the laboratory. Further chapters indicate how molecular techniques can be exploited to analyse and modify the genetic properties of these organisms in order to gain a better understanding of their pathogenicity, and the test systems that may be suitably used. In contrast, the section on defence response genes addresses the application of more general techniques, such as nucleic acid isolation and hybridization, the polymerase chain reaction, transcriptional regulation, *in situ* hybridization, and the use of baculoviruses to express relatively large amounts of proteins from cloned genes. Although these

latter subjects might be found in any handbook on molecular biological techniques, their inclusion can be justified on the grounds that these are essential methodologies if one wishes to study plant–pathogen interactions at the molecular level. Moreover, these chapters are up-to-date, contain many useful practical details, and often provide helpful discussion on the advantages and disadvantages of the use of specific methods when using different types of material.

Protocols differ in detail as to basic molecular biological procedures and some describe only selected techniques with many references to information published elsewhere. This means that the reader is assumed to have a fair bit of understanding of basic molecular techniques, both to be able to follow the procedures described and to reproduce many of the protocols. This book will not turn a physiological, or even biochemical, plant pathologist into a molecular biologist, nor does it provide sufficient information to the molecular biologist on the complexities of plant–pathogen interactions. However, those plant pathologists who have already discovered the magnificent tools of molecular biology, and those molecular biologists who have already become fascinated by the way in which pathogens induce disease, will find this book a handy reference covering a broad range of important methods, even though these may have to be adapted to suit the particular plant–pathogen combination under study. Its use would have been further facilitated if, apart from contents, protocols had also been listed separately. The book contains useful appendices of characterized defence response genes and suppliers of specialist items, the latter mostly from Britain.

L.C. VAN LOON

Woody Plant Biotechnology

M.R. Ahuja (ed.).
Plenum Press, New York. 1991. xi + 373 pp.
Hardcover. ISBN 0-306-44019-9.

This book is based on a NATO workshop held in October 1989 in California and deals with recent developments in the application of biotechnology to woody crops. Biotechnological techniques that have been developed for model plants and food crops, are now being applied to woody species, mostly in forest trees and fruit trees. A major difference between woody crops and food crops is that the former are perennial plants with a generation cycle of often 10 years or more, whereas the latter are mostly annuals. This is one of the major reasons why breeding in woody plants is so poorly developed.

Biotechnology offers the possibility of improving woody crops in the short term. Micropropagation facilitates the rapid clonal propagation of elite plants, thus, two long sections of the book cover conventional micropropagation via axillary branching and somatic embryogenesis respectively. A major problem in the clonal propagation of woody plants is the juvenile to adult phase change occurring, often, many years after sowing. The selection of desirable characteristics should be carried out in adult plants. However, during this developmental stage, vegetative propagation is difficult, in particular because the (micro)shoots root only poorly or not at all. The problem of phase change is covered in the third section of the book. Genetic engineering using *Agrobacterium* enables the incorporation of selected genes within the genome of the vegetatively propagated elite plants. The fourth section of the book describes the rather slow progress in this area and presents other molecular studies in woody plants. Finally, the fifth section deals with germ plasm preservation.

Applications of biotechnological techniques to woody crops, in particular to forest trees, are of the utmost importance both for environmental and economic reasons. Most of the research that is presently being carried out is very practical. The problems met in the various species can be traced back to only a few major problems, viz. recalcitrance in the regeneration of roots, shoots and somatic embryos, slow growth, and—in particular in tropical species—contamination. At the moment, various research groups are beginning fundamental research in woody crops on these problems. Some contributions in this book report on these studies, in particular the section on phase change. Undoubtedly, the future course of woody plant biotechnology will be determined to a large extent by progress in these fundamental studies.

G.J. DE KLERK

New Zealand's Economic Native Plants

R.C. Cooper and R.C. Cambie.
Oxford University Press, Auckland and Oxford.
1991. xii + 234 pp. Hardcover. £25·00. ISBN
0-19-558229-2.

The peculiar endemic and otherwise native flora of New Zealand is regarded as most similar to the Mesozoic Forest of Gondwanaland. This flora is under threat, even if population pressures are low. The ethnobotanic treatment of the better known of *c.* 2200 native species by Cooper and Cambie will appeal to the general reader and the botanist alike. In brief paragraphs many interesting details are presented on the vascular flora, algae, mosses and other lower plants. On fungi, bacteria and viruses the modest amount of research done on these organisms is referred to: for all chapters a comprehensive literature list no doubt covers most important references.

The chapters cover items such as the history of the utilization of the flora, their discovery by Western botany and introduction into other continents since Captain Cook's first voyage, the various areas in New Zealand with use and conservation of its timber and other species, industrial uses of plants and their

chemistry. As ornaments the many *Hebe* species, *Pittosporum, Cordyline australis, Acaena* and some *Sophora* species are but a few of the better known taxa treated in the book.

The easy-to-read paragraphs present a guide to many items worth knowing, and stimulate browsing. Good indexes facilitate entry. Both historical attempts to introduce plant species as a crop or ornamental and accounts of the up-to-date situation on basic or applied research on the native species, make the book a valuable companion to everyone who is interested in the flora of New Zealand. The role of introduced plants is not forgotten.

This reasonably priced book is presented as a revision of a first edition, but it took searching to find bibliographic details of the first edition. Brooker, Cambie and Cooper (1988) has only 130 pages, the 1991 issue amounts to 234 pages, and therefore contains considerably more. Plant illustrations in colour embellish the book, some black and white ones portray scientists, while some pictures of plants are too small for easy recognition. More landscapes and pictures of Maori uses could have been added. In the acknowledgements, many botanists, chemists and librarians are thanked. It is obvious that no Maori has made these occupations his own, yet many vernaculars and local uses by the Maori are covered. To the non-New Zealanders the diacritic signs in the Maori language are not explained. In another edition the chapters could be ranked differently, e.g. Chapter 12 on *Solanum* alkaloids could have been included in Chapter 10.

In conclusion, this is a well-written volume on the economic species of the relatively unknown flora of our antipodes, well worth buying.

L.J.G. VAN DER MAESEN

Green Plants. Their Origin and Diversity

P.R. Bell.
Cambridge University Press, Cambridge. 1992.
315 pp. Paperback. £16·95. ISBN 0-521-43875-6.

Botany advances rapidly—hence the need for concise accounts of the plant kingdom, the relationships of the various groups and their biology. Continued demand made the publishers decide on an update. This book is a thoroughly revised edition of *The Diversity of Green Plants* by Bell and Woodcock. Even so, the amount of pages has decreased, although page size is considerably larger. In fact each edition has grown in page size.

After an introduction to general features, particularly photosynthesis and its evolution, life cycles and nutrition, the major part of the book treats the sub-kingdoms Algae, Bryophyta and Tracheophyta. The blue-green algae are here included in the plant kingdom, even if they are prokaryotic organisms, since they are phototrophs. Structure, reproduction and evolutionary trends are well described with many illustrations. All groups of the plant kingdom are treated on an equal footing. This means that for lower plants all extinct and extant orders are listed, except for the angiosperms, which are of necessity relatively briefly treated. Bell estimates that angiosperms contain only 200 000 species, not the usual 250 000.

The author makes many references to fossil structures and cautiously discusses possible phylogenetic relationships. His explanations of evolutionary steps are very clear, as in the origin of the angiosperm carpel.

Compared with the 1983 edition the illustrations, many of which needed no change at all, are reproduced less crisply. Figure 1·1 of the thylakoid membranes in a chloroplast, intended for non-specialists, is incomprehensible, the legend and its reference to Fig. 1·2 do not really enlighten the reader about the structure of the chloroplast. The earlier version was easier to understand, but was also not ideal in this general text.

For the high school teacher (not necessarily the pupils themselves) and college classroom, and for the devoted amateur botanists, the text indeed contains a wealth of information placed in an up-to-date setting. The glossary is succinct. The price of this paperback is quite reasonable.

L.J.G. VAN DER MAESEN