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# Book Reviews

## Quantitative Approaches to Phytogeography

P.L. Nimis and T.J. Crovello
Kluwer Academic Publishers, Dordrecht. 1991.
vii+304 pp. Hardback Dfl.275. ISBN 0–7923–0795.

This volume of *Tasks for Vegetation Science* (H. Lieth and H.A. Mooney, eds.) presents new developments in quantitative methodologies for phytogeographical analysis. It is the result of the 1987 Botanical Congress in Berlin, during which Drs Nimis and Haeupler organized a symposium on present-day phytogeographical studies.

The book offers a series of innovative numerical techniques, which are most helpful next to the more traditional descriptive analysis of phytogeographical regions and vegetation types. It contains nine papers on subjects ranging from the use of satellite imagery in quantitative phytogeography to distributional patterns of bryophytes and lichens. The many well-documented examples of case-studies illustrate the way in which new analytical methods can be applied successfully.

Therefore, this book should be consulted by all researchers in the field or by anyone interested in new developments in phytogeographical analysis, since—as H. Lieth expressed it in the preface of the book—'new methods have opened up new avenues of research, leading to a better understanding of the distribution and evolutionary patterns of species and communities'.

M. KAPPELLE

## Transplant Production Systems. Proceedings of the International Symposium on Transplant Production Systems, Yokohama, Japan, 21–26 July 1992

K. Kurata and T. Kozai (eds)
Kluwer Academic Publishers. 1992. x+335 pp.
Hardcover, Dfl.195, US$115, UK£66.50
ISBN 0–7923–1797–1.

In present-day horticulture, young plantlets are usually produced in specialized nurseries. Growers, specialized in a limited number of crops, then buy these plantlets and raise them to the end-products, namely vegetables, fruits, flowers or foliage plants. The plantlets produced by the nurseries are called transplants and include, amongst others, normal cuttings, microcuttings produced in tissue culture laboratories, and bulblets. The advantages of the production of transplants by specialized firms are clear. Through the facilities to grow young, vulnerable plantlets to the size of transplants and through the skilled labour in the nurseries the growers are supplied with transplants of high quality and free of diseases. The book under review contains the invited lectures presented at a symposium on transplant production systems, held in Japan in 1992. The topics include the production of the transplants and comparison of the performance of different type of transplants of the same crop. Some of the contributions deal with robotic systems.

Although considerable progress has been made, e.g. by the introduction of laser beams for making the cuttings, the problems that are faced in automation are often very large. One of the main problems is image analysis, in particular because many cultivars are produced, each one having its own morphology. The book is aimed at horticulturalists and gives valuable surveys of the various areas.

G.J. DE KLERK

## Towards Rational Use of High Salinity Tolerant Plants. Vol. 1

H. Lieth and A.A. Al Masoom (eds)
Kluwer Academic Publishers, Dordrecht. 1992.
xx+521 pp. Hardback, Dfl.425, US$290, UK£151.
ISBN 0–7923–1865–X.

Salinization and desertification are serious threats to the world's arable area, while agricultural production has to be increased in order to meet the requirements of the growing world population. No wonder that studies on the use of halophytic plants for human consumption or other purposes (forage, fibre production, etc.) receive ever-increasing attention.

It is both embarrassing and promising that the countries facing those problems cannot wait any longer for solutions from the so-called developed countries, but have to take action themselves. Seen in this context, the present volume of the series *Tasks for Vegetation Science* may serve as a landmark: it is the first volume of the proceedings of a symposium, under patronage of the president of the United Arab Emirates, H.H. Sheikh Zayed Bin Sultan Al Nahyan.

The idea of a symposium that brings together experts on saline ecosystems and plants: ecologists, agriculturalists, physiologists and soil scientists, is surely an excellent idea. But the reader expecting a state-of-the-art survey of saline crop production may be somewhat disappointed after reading the 500-odd pages of text. Surely, the cover of the book states clearly that this is only Vol. 1 of the proceedings of this symposium. But to obtain yet another volume for this somewhat stiff price might be prohibitive, especially for scientists in countries where the actual problems occur.

Reading the book, one gets the impression that this volume serves as an introduction to the next. About half of it deals with vegetation descriptions, ecosystem studies and physiological analyses of mangroves. Many of the papers in the section, 'Vegetation and descriptions of mangroves' are, indeed, only descriptive but some indicate the human (ab)use of the mangrove vegetation, and one paper deals with the rehabilitation and management of mangrove forests (Qureshi's paper on Pakistan mangroves). One would expect more of such information in a book with this title.

Although the volume provides a wealth of scientific information, much of it is not directly applicable to people that have to deal with the problems in the field: more papers on agricultural practice, crop productivity, and other answers to practical questions would have been useful.

Nevertheless, the book provides ample information on physiological processes in halophytic plants, salt tolerance, plant growth response to salt stress, and the possibilities for the utilization of halophytic plants. Seven papers on soil and water analyses conclude this volume.

There is, of course, also the problem common to all symposium proceedings: the quality of the papers varies substantially and sometimes the sequence of papers does not seem very logical. It is obvious that the publishers set the page extent of the volume. In order to meet the publisher's requirements some of the diagrams had to be reduced, to the detriment of their readability.

Despite these shortcomings, this first volume of the proceedings of the ASWAS (Above Sea Water Salinity) symposium whets the appetite for Vol. 2.

A.H.L. HUISKES

## Hybrid Wheat: Results and Problems. Advances in Plant Breeding: Fortschritte der Pflanzenzüchtung, Band 15.

Adrian A. Pickett.
Paul Parey Scientific Publishers, Berlin. 1993.
iv+259 pp. Paperback, DM96.
ISBN 3-489-53510-3.

Stimulated by the overwhelming success story of hybrid corn, investigators as well as private seed companies in the late fifties initiated sometimes impressive research and breeding programmes to transfer hybrid technology into wheat. The similarities between the two crops are striking: both of them are major cereal food crops for human and animal nutrition, both offer huge export perspectives to major producer countries, and both are well-suited to large-scale farming. But there is an essential difference, the effects of which were definitely underestimated at the beginning of the hybrid wheat research: wheat is a self-fertilizing crop whereas maize is a cross fertilizer. Indeed, from the beginning there was scepticism about wheat hybrids based on the lower expectations of hybrid vigour. But in the course of research and breeding it became clear that low heterosis is not the main constraint in hybrid wheat breeding, but that a number of unforeseen factors, all connected to the self-fertilizing status of wheat are greatly limiting the prospects of wheat hybrids. These limiting factors are: (i) the high risk of impurity of the hybrid; (ii) the problematic transfer of pollen from pollinator to seed line; and (iii) the design and location of hybrid seed production fields. These constraints, added to the common procedural complexity of hybrid breeding, led to the generally accepted conclusion that hybrid wheat production is not economically feasible in most cases.

From the 1970s onwards many research groups have slowed down or discontinued their efforts, and nearly all seed companies have stopped investment in hybrid wheat programmes. It might be deduced from this that there is no longer demand for a book on wheat hybridization, but in my opinion the opposite is true. It is easy to write a book on success stories or promising future developments, but it shows courage when an author summarizes a less glorious subject, especially when it is done in the scrupulous and critical way demonstrated by Pickett's report.

The book gives a full account of all aspects of hybrid wheat. Though the emphasis is laid on major topics, such as genetics and the assessment of heterosis for yield and other important traits, the different ways of protecting the seed line from self-fertilization (nuclear and cytoplasmic-genic male sterility; gametocides), as well as the various steps in hybrid seed production are covered, as are minor aspects such as the controversial concept of mitochondrial complementation fiercely advocated in the late sixties. Of course, the book has some shortcomings, if only because no author can meet the wishes of all potential readers. I would have liked the section on the prospects of hybrids for developing countries to be elaborated further. Other reviewers have criticized the book for its (too?) optimistic presentation of hybrid seed production cost or have pointed out some statements lacking sufficient support. Nevertheless, this is a very useful book for a large readership as it contains a wealth of information on literally all aspects and possible pitfalls in hybrid breeding. It deserves a place on the desk of all researchers and breeders of wheat and other self-fertilizing crops, and should appear on the reading list of students graduating in plant breeding as a counterbalance to over-optimistic tales on hybrid production. Last, but not least, it should be required reading for the fortunately diminishing horde of molecular workers who

still think that breeding is just shooting a gene in place.

GIJSBERT A.M. VAN MARREWIJK

## Pigment–Protein Complexes in Plastids: Synthesis and Assembly

Christer Sundqvist & Margareta Ryberg (eds).
Academic Press, Inc. HBJ College Publishers, 1993.
xiv+520 pp. Hardback Hfl.345.
ISBN 0–126–76960–5.

This is a multi-author book in the Cell Biology series of Academic Press. It covers in 15 chapters the variety of processes which are at the basis of synthesis, assembly and function of the pigment–protein complexes in the photosynthetic apparatus of plants and algae. Of course, the thylakoid membrane is in focus as it is the site of the energy generating machinery for oxygen production and carbon dioxide reduction and houses the pigment–protein complexes as its main constituents.

The first three chapters deal with a description of the chloroplast as the site of pigment synthesis and photosynthesis, with the ultrastructure and development of this plastid, and light and temperature effects on chloroplast development. The next 150 pages, covering three chapters, are devoted to an extensive treatment of the biosynthetic pathways of chlorophyll synthesis and of some key enzymes therein, mainly protochlorophyllide reductase. This is not the most exciting part of the book.

Chapters 7 and 8 deal with chloroplast lipids and proteins. Lipid heterogeneity and specific interactions between thylakoid lipids and pigment–protein complexes are outlined. Regulation, synthesis and integration of chloroplast- and nuclear-encoded proteins are comprehensively treated in Chapter 8.

Chapter 9 describes the fascinating pattern of protein translocation and routing in the compartmentalized chloroplast. This is a clearly written chapter with an overview of the state of the art in this area of cellular and organellar protein traffic.

Chapters 10–13 deal with the structure, function, assembly and activities of pigment complexes in general (Chapter 11) and of photosystems I and II in particular (Chapters 12 and 13). Chapter 10 describes the status and prospects of reconstitution of *chl alb* containing complexes *in vitro*. It is regrettable that relatively little space has been reserved in this book for a treatment of the dynamic characteristics and features of the assembled pigment–protein complexes, notably those of PSII. This item would certainly deserve more attention than it has been given here in four pages.

The book closes with a chapter on biosynthesis, location and function of carotenoids in pigment–protein complexes and with one on the molecular biology of chromoplast development.

The book contains valuable information for researchers working in the field of experimental plant sciences, agriculture and horticulture. It certainly should be on the shelf in libraries of botanical and agricultural research institutes.

W. J. VREDENBERG

## Plant Biochemistry and Molecular Biology

Peter J. Lea and Richard C. Leegood (eds).
John Wiley & Sons Ltd, Chichester, 1993;
viii+312 pp. Paperback UK£19.95.
ISBN 0–471–93313–9.

It is true that plant metabolism is a neglected field and that there is considerable ignorance about the structure and regulation of important pathways, let alone the synthesis of innumerable plant products. We have been intimidated for too long by biochemists who consider plant cells as 'green liver cells'. Thus, a textbook which emphasizes the pathways and processes typical for plants, and is also well-written, is most welcome.

The book is a multi-author production with chapters on 'classical' subjects such as energy conversions in plant cells, $CO_2$ metabolism, carbohydrate, lipid and nitrogen metabolism, but also on gene organization and expression, molecular control of development and gene technology. This mixture of biochemistry and molecular biology is most natural because it is impossible to consider metabolism without the underlying gene expression, and vice versa.

In a textbook like this one, I believe that it is important to provide sufficient experimental evidence to teach the student scientific reasoning. It is not enough to state that 'there is a substantial body of evidence to show that nitrate reductase activity may be regulated by carbohydrate supply'. Students should be allowed to see for themselves why we think so. On the other hand, too much experimental detail would make the book unsuitable for use in courses. In general, the authors have maintained a very good balance in this respect. It is of a lower complexity than a similar recently published book *Plant Physiology, Biochemistry and Molecular Biology* (D.T. Dennis and D.H. Turpin, eds) from Longman Scientific & Technical, which more explicitly emphasizes the integration of various processes like photosynthesis, respiration and nitrogen assimilation.

The book has been very well and consistently edited and is an attractive production with many clear pictures and diagrams. It should be seriously considered for use in undergraduate courses.

H. VAN DEN ENDE

## Cellular and Molecular Aspects of the Plant Hormone Ethylene

J.C. Pech, A. Latché and C. Balagué (eds).
Kluwer Academic Publishers, Dordrecht, 1993;
xiv+385 pp. Hardback, Dfl.225, US$132.50.
UK£89. ISBN 0-792-32169-3.

The book contains a collection of papers representing oral and poster presentations of a symposium held in Agen, France. The papers are conveniently grouped by subject and the book contains an index of authors and of keywords. This book is the third in a series covering papers from ethylene symposia. Earlier symposia were held in Israel (1984) and Belgium (1988). Unlike the two previous volumes, which were more focused on physiological and biochemical aspects of ethylene production and action, this volume contains a large number of papers dealing with the characterization, localization and molecular cloning of the genes involved in ethylene production and genes associated with fruit ripening and senescence. As this area of research is rapidly expanding, the book provides an excellent and up-to-date overview of the progress in this field.

Among others, papers are included dealing with the role of ethylene in the responses to stresses such as wounding, pathogen attack, anaerobes, heavy metals and flooding. The role of ethylene in flower senescence and abscission is covered by a series of papers dealing with ethylene-induced gene expression in abscission zones (e.g. cellulase genes), senescence-related genes in petals and inter-organ relations during flower senescence. Papers on the role of ethylene in growth and development deal with the effects on seedling growth during flooding, the role of ethylene in gravitropism and the effects of ethylene on development of plants and cells grown *in vitro*.

Concerning the enzymes involved in the biosynthesis of ethylene, several excellent papers are included describing the characteristics as well as the expression patterns of the different 1-aminocyclopropane-1-carboxylic acid (ACC) synthase isoforms in several species. It has become clear that the members of this highly divergent gene family are differentially expressed in a tissue-specific way. Also, the isolation and characterization of the final enzyme in the ethylene biosynthetic pathway, ACC oxidase, is described in detail. The enzyme requires $Fe^{2+}$ and ascorbate as co-factors and enzyme activity was found to be dependent on the presence of carbon dioxide.

Examples are described of successful inhibition of ripening in tomato plants by genetic modification of ethylene biosynthesis through suppression of ACC synthase and ACC oxidase activities by the anti-sense technique and by expression of a bacterial enzyme capable of metabolizing ACC.

In contrast to the large number of papers dealing with the molecular characterization of ethylene biosynthesis genes, little attention is paid to the mechanism of ethylene perception and signal transduction, indicating that progress in this area of research is much slower. The recent identification of *Arabidopsis* mutants with decreased sensitivity to ethylene will probably open the way for further elucidation of the mechanism of ethylene action in the near future.

Although not suitable as a textbook, the book provides a fairly complete and up-to-date overview concerning all different aspects of ethylene biosynthesis and action and the role of ethylene in a variety of developmental processes. Therefore, the book may serve as a reference book for scientists involved in plant hormone research, ripening and senescence.

E.J. WOLTERING

## Molecular and Cell Biology of the Plant Cell Cycle

J.C. Ormrod and D. Francis (eds).
Kluwer Academic Publishers, Dordrecht, 1993.
vii+222 pp. Hardback, Dfl.190, US$118, UK£78.
ISBN 079231767-X.

This book is the published proceedings of a meeting held at Lancaster University, 9–10 April 1992, as part of the Spring Meeting of the Society for Experimental Biology (SEB). The volume begins with a short and compact overview of check-points of the cell cycle, followed by a chapter on gene products regulating entry into mitosis in plants. The third chapter deals with *Arabidopsis* homologues to yeast cell cycle genes. The next three chapters are about the regulation of DNA synthesis in root meristematic cells, for example during release from quiescence. This is followed by two papers on the induction of the cell cycle in auxin-treated plant cells, and a most interesting overview of the effect of polyamines on the cell cycle. The book ends with three review papers on the relationship between the cell cycle and plant development.

The last 5 years have seen an avalanche of publications and reviews on the molecular basis of cell cycle control but, as usual, plant cell systems have somewhat lagged behind in the public interest. In this book this is turned to advantage: it applies a large deal of knowledge obtained with yeast and mammalian cells to higher plants. And of course one can hardly imagine a system where cell cycle control is so manifest as in plant meristems. Therefore, the book is most enjoyable for plant scientists who have followed the recent developments in other systems. For the newcomer some of the material might be too tersely written. The book will certainly contribute to understanding cell cycle control in plants and is

recommended strongly to everybody concerned with plant development. It is very well edited and produced.

H. VAN DEN ENDE

## Sexual Plant Reproduction

M. Cresti and A. Tiezzi (eds).
Springer-Verlag, Berlin. 1992; x+247 pp.
Hardback, DM133. ISBN 3-540-55746-6.

The Biotechnology Research for Innovation Development and Growth in Europe (BRIDGE) programme of the Commission of the European Communities, sponsors research on sexual reproduction (mechanism of flower initiation and evocation, differentiation of sex cells, mechanism of gamete recognition and selection) and plant regeneration (genetics and molecular biology of somatic and zygotic embryogenesis). The programme organized an intensive course on sexual plant reproduction in Siena, Italy in 1991. The resulting volume includes a series of lectures delivered during that course. Hence, many of the papers have an introductory nature which makes it good reading for students and those who want to enter the field. However, reading these chapters, which are of varying quality and scope, leaves the overwhelming impression that very little is known of such subjects as meiotic control, incompatibility mechanisms, pollen longevity, etc. Indeed, much of the work is of a descriptive nature, such as a lucid paper on fertilization, or exploratory, such as an account on attempts to transform pollen by particle bombardments. I liked the chapter on water relations, showing that physico-chemical approaches may reveal unexpected but vital aspects of resistance of pollen not only to dehydration but also imbibition.

The BRIDGE money is undoubtedly well spent, but it is a pity that more of it was not used for the production of this book. It is a camera-ready production, poorly edited: chapter headings have been exchanged and pages shuffled. The overall visual impression of the book is not in accordance with its contents.

H. VAN DEN ENDE

## Biotechnology in Agriculture

C. You, Z. Chen and Y. Ding (eds).
Kluwer Academic Publishers, 1993, xi+519 pp.
Hardback, Dfl.325, US$192, UK£127.50.
ISBN 0-7923-2168-5.

This book contains the proceedings of the First Asia-Pacific Conference on Agricultural Biotechnology, which was held in Beijing, China in August 1992. It is published in the series on Current Plant Science and Biotechnology in Agriculture. For some time scientific literature has been dominated by publications based on research in the West. This might easily give the impression that research institutes in North American countries and western Europe seem to be far ahead in biotechnological research. However, our knowledge about the on-going research of the large number of scientists in this field in China and other Asiatic countries is very limited, except for specific areas of plant tissue culture, e.g. protoplast culture and anther culture. In molecular biological research there is only limited knowledge about what is going on. Good and safe production of crop plants is extremely important for countries like China, where a relatively small amount of arable land has to supply food for approximately 22% of the world population. Agricultural research therefore, is aimed at the improvement of the production, not only in terms of yield enhancement but, increasingly, on quality and disease control. Biotechnology is regarded as a key method of reaching these goals in the coming years, and these proceedings give a very good impression of the present status of biotechnological research in Eastern Asia. More than 90% of the papers deal with plant biotechnology and cover plant cell and tissue culture, plant–microbe interaction and genetic manipulation. The field is very broad and a wide range of subjects is described in short contributions. Therefore, it is not possible to identify particularly important topics. They are all there: from the development of anther culture to the production of artificial seed, from *in vitro* selection for disease resistance to the introduction of insect resistance genes. Of course, there is a relatively high number of contributions dealing with research on rice, the major crop plant in this part of the world. Besides the large number of contributions by plant biotechnologists from, e.g. China, Japan and India, a number of invited key-note lecturers present the current state of the art in their research field. These general papers give a good overview, but do not contain much new information. In conclusion, this book gives a good impression of the quality and the breadth of the present research in plant biotechnology in the eastern part of the world. It also clearly reflects the strong belief that agricultural biotechnology can help to overcome present problems that constrain agricultural production.

J.J.M. DONS

## Exkursionsflora für die Kanarischen Inseln

A. Hohenester and W. Welss.
Eugen Ulmer, Stuttgart. 1993. 374 pp., 438 drawings, 96 colour illustrations. Hardback, DM68. ISBN 3-8001-3466-7.

The time of dragging around on the Canary Islands with a pile of books is over: at last we have a

comprehensive pocket-size *Flora*. Of course, a third-generation photocopy of Dankwart Ludwig's (regrettably never published) mimeograph *Die Gefässpflanzenflora der Insel Teneriffa* was a gift of the gods; and once we knew (but how?) that a plant was an endemic, the well known volume by the Bramwells usually brought the solution, but in many cases one was left in uncertainty.

This book, covering all taxa reported from the Canary Islands, is the fruit of many years of teaching university students. This explains the somewhat unbalanced level of both the explanatory texts and the keys. A rather technical paragraph on nomenclature is followed by an explanation of how to use a dichotomous key. The use of technical terms cannot and should not be avoided, but their necessity is to be weighed carefully: It is not illuminating that 'cyathia are assembled in a pleiochasium' if only the first term is explained. Likewise, the key to the main taxa is too technical to be of any use for a beginner and superfluous for a qualified botanist who, on the other hand, is disappointed by hardly finding any of the promised flower formulas. The meagreness of the introductory chapter on the region is a more serious drawback and is not compensated for by the single reference to a paper in Spanish. The space dedicated to the list of the plant communities should rather have been spent on more details of the biogeography and the physical geography of the individual islands.

However, this critique of details does not affect the essential merits of the book. I am really looking forward to using it in the field and to identifying species about which I had to remain in doubt thus far. The keys are carefully constructed and the lay-out makes them easy to read in spite of the small print. The authors have chosen the type of key in which the taxa covered by one alternative are listed immediately below it; this facilitates detailed comparison but may separate the two alternatives by several pages. It requires some training to use such a key, but I agree that in this case it was the best choice. Many line drawings help to follow the keys.

The volume is carefully edited in a handy format, and illustrated with attractive photographs.

I congratulate the authors on their achievement. They have supplied the *Flora* that we have been expecting for a long time. I am convinced that it will be a valuable companion to many travellers. The low price will certainly contribute to its success.

A.C. ELLIS-ADAM

## Progress in Botany, Vol. 54

H.-D. Behnke, U. Lüttge, K. Esser, J.W. Kadereit and M. Runge (eds).
Springer-Verlag, Berlin. 1993; xviii+561 pp. with 56 figures. Hardback, DM298.
ISBN 3-540-56358-X.

The first volume of *Progress in Botany* appeared in 1932 under its German name of *Fortschritte der Botanik*. Its stated aim was to help botanists deal with the flood of mass-produced literature. Experts in various fields took on the task of digesting the literature that had appeared in the preceding year. The format has changed little since then. The reviews now usually cover more than 1 year and, consequently, not all areas of botany are covered in each volume. Continuity is assured since most reviewers or teams of reviewers keep contributing reviews on their topic to the series. Volume 54 is bigger and better than any of the preceding ones and contains 28 chapters. After an introductory special review on the Archaea (Archaebacteria) by Otto Kandler, there follow four chapters on Structural Botany, eight on Plant Physiology, seven on Genetics, two on Taxonomy (on bryophytes and pteridophytes), three on Geobotany and three on Special Topics (one on floral ecology and two on mycorrhiza). Readers unfamiliar with the series may wonder why ecology is stashed away under 'Special Topics'. There is some serious ecology in a chapter on mineral nutrition in tropical savannas (Ernesto Medina) and in the latest thorough instalment on plant–water relations by Lösch, both in the 'Physiology' section.

The reader in 1993 may never have attempted to stay abreast of the primary literature outside a narrow area of expertise and may even feel inundated with reviews and literature collections, both printed and electronic. The continued value of *Progress in Botany* lies in the combination of very concise reviews with voluminous literature lists. The authors seem to combine a thorough understanding of their topics with a remarkable amount of industry. The best electronic search system yields only a mass of titles and abstracts, not a guide to the literature. Here, we get a true and intelligent digest. *Progress of Botany* still belongs in every botany library.

KONRAD BACHMANN