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# Book Reviews

## African Fig Trees and Fig Wasps

C.C. Berg and J.T. Wiebes.
KNAW, Amsterdam. 1992. 298 pp. Paperback, *f*135,00. ISBN 0-444-85741-9.

Figs are fascinating in many respects. The growth form of some species has been described as tree splitters or stranglers. Some individuals such as the giant banyans of the Calcutta Botanical Gardens and of Madras are well-known tourist attractions. But figs are best known to botanists for the close coevolution with their pollinators, the fig wasps, and their use as an example in many botanical text books. The symbiosis of figs and fig wasps shows many specializations and coadaptations. In the fig there are the fruit-like inflorescences (fig or syconium) closed by ostiolar bracts, short- and long-styled female flowers, synstigmas, and the extended interfloral phase between female and male flowering within one syconium; in the fig wasps, the tragic life of the wingless and often blind males whose active life is restricted to a few hours, during which they bite an opening in the wall of the fruit gall containing a female, copulate with her and tunnel through the wall of the receptacle so she can leave in search of a new fig tree.

*African Fig Trees and Fig Wasps* tells us about these and many other aspects of figs, fig wasps and their symbiosis. The book is the result of long-standing cooperation between a botanist and an entomologist, who devoted appreciable parts of their careers to the evolution and taxonomy of the figs and fig wasps, respectively. The book has chapters on the biology of figs and fig wasps, on the African figs, on the African fig wasps, and on fig wasps acting as pollinators. The chapter on *Ficus* provides keys to the sections and species and has detailed descriptions of the 105 African species, with data on geographical distribution and habitat. In the chapter on the pollinators, the females and males of 81 species of fig wasps are described with records of their specific host figs and keys for the genera and species. References are given after each chapter and in a separate bibliography on figs and fig insects of Africa. The book is well-illustrated with a good choice of beautiful drawings and SEM photographs.

The book is apparently written by taxonomists and therefore not fully complete. I missed a chapter on the ecology of figs and their importance as key-stone species by attracting many different frugivorous birds and mammals and by bridging periods of fruit scarcity. Also, no information is given on the more special characters, such as pollen morphology or on the anatomical adaptations of leaves. Nevertheless, the book is a very useful compilation of our present-day knowledge of the African figs, fig wasps and the symbiosis. I recommend it to all those interested in plant–animal relations; it should be present in any botanical library.

F. Bouman

## Utrecht University Catalogue of Plant Collections

B.J.W. van den Wollenberg, J. Tolsma, J. Vos, V.P.A. Lukkien and A. Oudijk (eds).
Botanic Gardens, Utrecht, The Netherlands. 1992. 548 pp. Paperback. ISBN 0-03-023-417-4.

The objectives and activities of botanic gardens are changing rapidly. Botanic gardens are not just repositories of scientific collections, they have to play an increasing role in the education of future generations and in the conservation of endangered species. It is now quite clear that, as a result of the large-scale deforestation in the tropics and subtropics, the biodiversity of this planet is endangered and many species are threatened with extinction. Botanic gardens have the responsibility to conserve as many plant species as possible, to gain experience in their cultivation, and to preserve them from extinction.

The plant collections of many gardens are still too reliant on the exchange of seeds offered by the yearly seed lists. The traditional seed lists of most gardens only provide the names of species, without data on the origin of the material, are sometimes notorious for their misidentifications, and by definition only comprise a part of the available living and potentially reproducible collections.

The *Utrecht University Catalogue of Plant Collections* is an example of how botanic gardens can respond to the demands of modern times. The catalogue comprises the names of all taxa under cultivation, whether they reproduce by seeds, spores or vegetatively. The taxa are arranged in alphabetical order of the family and genus. Per species, subspecies or variety up to 10 accessions are listed, together with a code including the year of acquisition in the garden, symbols for identification by the garden, verification, or identification by a specialist, provenance, and the WCMC-code. In cases of wild collections the abbreviated name of the collector, his collection number and the origin are added. The Utrecht garden has a number of broad specializations, such as Annonaceae, Gesneriaceae, *Magnolia* and Zingiberaceae, as well as the in-depth specializations, such as *Asarum, Arisaema, Sedum* and *Trillium*. The catalogue also includes an appreciable number of subspecies, varieties and cultivars of species with a horticultural interest, which results from the contacts and sometimes contracts with commercial growers.

Well-presented are *Betula, Euonymus, Ficus* and *Tsuga*. Families and genera belonging to the specializations of the garden are introduced, together with information on the aims, programme and references of the scientific publications.

The first 46 pages of the catalogue are devoted to general information on the garden, including short paragraphs on the history, present situation, survey of projects and activities and the garden's specializations. The catalogue ends with references to the literature, appendices on the gardens database system, explanations of the codes, and an index to the family and generic names.

With this catalogue, the Utrecht Botanic Garden offers scientists, growers and other users a great service, and enables optimal use of its living collection.

F. BOUMAN

## Ecology of *Cenchrus* Grass Complex (Serie T:VS 23)

S.C. Pandeya and H. Lieth.
Kluwer Academic Publishers, Dordrecht. 1993.
vii+234 pp. Hardback, Dfl. 250; US$156;
UK£102.50. ISBN 0-792-30768-2.

The book summarizes the long-term research by Pandeya and his team on the agriculturally highly estimated (sub)tropical grass species *Cenchrus ciliaris* and its more recently segregated variety *setigerus* in Western India. In 10 chapters various aspects are presented.

After a general description of soils and climate in India, differences of 11–25 populations of *C. ciliaris* are elaborated using morphological and a few physiological characters. Chapters on primary production of *Cenchrus* and some other co-occurring plant species give some impressions on the annual dynamics of grassland productivity. The chapter on germination supports the assumption that the populations are ecologically clearly differentiated. The final chapter 'Discussion of results' is only an extended summary. The chapter on 'System analysis of a village ecosystem—a case study' has nothing to do with *Cenchrus* grassland, at least if Table 9.8 is complete.

Although the second author (H. Lieth) has obviously tried to get the book into a readable state, it remains primarily a raw data collection book for further ecological studies of *Cenchrus* grassland. Condensation of pages of raw data to a few well reproduced figures would give more reading pleasure. Delay in finalizing the manuscript may be the reason why references to more recent work from India and the rest of the world are missing; the most recent relevant references date from the late 1970s. But this cannot be a valid excuse for not discussing the Indian *Cenchrus* complex in view of other *Cenchrus* ecotypes around the world, thus omitting some hundreds of relevant publications.

For tropical grassland researchers this book may provide a nice raw data collection, but nothing more.

W.H.O. ERNST

## Breeding for Stress Tolerance in Cool-season Food Legumes

K.B. Singh and M.C. Saxena (eds).
John Wiley & Sons, Chichester. xiv+474 pp.
Hardback, UK£69.95. ISBN 0-471-94212-X.

This is a well-executed volume of Proceedings of an international conference on stress in the four cool-season pulse crops, and how to overcome this by breeding, held in Ravello, Italy, in September 1990. It updates the 1988 volume on these crops edited by R.J. Summerfield, the account of the 1986 conference in Spokane. Despite the greatly increased knowledge about pea, chickpea, faba bean and lentil, as witnessed again by the contributions of 70 specialists from 16 countries, productivity has remained low and variable in the last three decades. The reasons for this are stress-susceptible cultivars, limited inputs and efficient production techniques.

Detailed accounts are given for major diseases, insect pests, nematodes, broomrapes, cold and drought. Breeding methods are reviewed, and examples from wheat and oats are cited to advocate the pure-line and multi-line approach, including the lower levels of resistance (tolerance) that do not restrict so severely the lifetime of a cultivar due to rapid evolution of new pathogenic races. Despite the availability of large germplasm collections for the crops it is advocated that gene banks be both maintained and extended in order to keep potential germplasm available. Even in the large collections diversity for some common stress tolerances are rather limited.

One paper discusses the use of induced mutations, but questions are raised if real mutations are produced and not outcrossing due to mutagenic treatment. The wild relatives of the crops have been made little use of. Despite a long history not all related species are available alive in genebanks. Much work is still required to obtain useful hybrids.

The search for sources of resistance to abiotic stresses also continues. The methods to detect these need more standardization.

Examples from other crops where biotechnology is pioneered are described, but given the multiplicity of areas where the cool season legumes are grown, the contributions of biotechnology are gauged as unlikely to replace existing techniques. Testing in many areas to manipulate many characters at the same time is still the way plant breeding works.

There is a wealth of information on the recent development of knowledge and techniques in breeding of peas, chickpeas, faba beans and lentils, well-edited by seasoned pulse scientists. The potential of the crops is there, but there are so many obstacles, so many steps to take, that all-over success still seems far away. Nevertheless, average yields have the tendency to increase slowly since the sixties, more so in the developed world and excluding lentils, but nevertheless the average per-capita availability will have diminished. Continued scientific attention is the message.

L.J.G. VAN DER MAESEN

## Legumes: The Australian Experience

B.R. Davidson and H.F. Davidson.
John Wiley & Sons Inc., Chichester. xiii+471 pp. Hardback, UK£75. ISBN 0-86380-146-3.

This is a very readable account of the legume family in Australia. As in many areas, this family is numerically one of the richest, *c.* 10% of 18 000 species. A number of genera are endemic: *Daviesia, Jacksonia, Boissiaea, Lultenaea.* Half of the species of *Cajanus* are Australian endemics. A huge number of *Acacia*, more than 800, are of Australian origin. The other dominant genus is the Myrtaceous *Eucalyptus*, with about 400 species.

With the assistance of many specialists duly acknowledged, most from Australia, this book covers many aspects in a balanced and well-digested way. The bibliography extends to 38 pages of documentation for chapters on, e.g. origin, taxonomy, climate and human influence, the nitrogen cycle, pasture and farming systems, and legume crops. A special chapter is devoted to subterranean clover, and one on its interaction with superphosphate, popularly entitled 'The sub-super revolution'.

During the Late Cretaceous, legumes appeared in other parts of the world; in Australia legumes are immigrants. The earliest records are from the mid- and late Eocene (50–44 million years ago), the earliest *Acacia* pollen dates from the late Oligocene, 27–22 million years ago, when Australia had broken loose from Antarctica. Land bridges to the Indonesian Archipelago appear to have existed for long periods as no single major invasion of pollen during the Miocene appears to have taken place. Certainly, separate taxa developed in Australia due to its relative isolation. Speciation of many herbaceous and twining legume genera such as *Cajanus, Vigna, Crotalaria* may be dated to the Pleistocene and Holocene after 2·5 million years ago. All mechanisms of dispersal over short and long distances are reviewed.

The taxonomic framework is from Polhill & Raven (*Adv. Leg. Syst.* 1981), as the revision for the *Flora of Australia* has not been completed yet. However, the nomenclature is as recent as it can be. Root nodule systematics are covered succinctly. For ecologists, the uninitiated would find an admirable summing-up of the Australian scene including the climatic zones. Nitrogen in its various forms and all forms of symbiosis with micro-organisms are covered in rather great detail.

Agriculture and animal husbandry have been important for Australia, and its economic dependency on export markets is considerable. The Aborigines did not domesticate plants, while the native legumes were of limited use to the European settlers. Legumes and their roles in grazing lands for cattle, but particularly for sheep, are described in a historical and economic context.

Native legumes provide(d) cash crops such as *Acacia* wattles and timbers and *Castanospermum* wood, whereas pulses and oilseeds could only succeed when mechanical harvesters were introduced. Some very beautiful ornamentals, such as *Swainsona formosa* (formerly *Clianthus formusus*) are Australian endemics. Until *Trifolium subterraneum* was introduced from the Mediterranean by chance with fodder before 1842, and discovered to be a solution to problems with pasture in 1889, the carrying capacity of the land could not be raised to the present level. Most of the technical problems have been solved, e.g. topdressing with superphosphate was needed, and machines were developed to harvest the subterranean pods and seeds. Different pasture regions with their particular problems are reviewed.

Legume crops were domestically not in great demand as meat was in large supply and the population was small. Export of peas and beans decreased, chickpeas (not 'chick peas' please) rapidly increased in area but met with import tariffs from the Indian government; lupins are quite successful, as are soybean and groundnut, but the value of all legumes is less than 15% of that of cereal crops.

This book is highly recommended for any botanist or agronomist interested in legumes and/or Australia.

L.J.G. VAN DER MAESEN

## The Tapetum: Cytology, Function, Biochemistry and Evolution (*Plant Systematics and Evolution*, Supplementum 7)

H. Hess, E. Pacini and M. Willemse (eds).
Springer Verlag, New York. vi+152 pp. Hardback, Cloth ÖS 1190; DM 170. Reduced price for subscribers to *Plant Systematics and Evolution*: Cloth ÖS 1071; DM 153. ISBN 3-211-82486-3.

*The Tapetum* is essentially a collection of papers presented at a special symposium organized in

connection with the 8th International Palynological Congress held in Aix en Provence, France, in 1992). *The Tapetum* comprises eleven original contributions from different authors representing ten different groups with a concluding chapter on recent trends in tapetum research. Despite the comprehensive subtitle: *Cytology, Function, Biochemistry and Evolution*, which suggests an almost complete coverage of tapetum research, seven of the contributions focus on various cytological aspects of tapetal tissue from different organisms. Diverse as they are, these chapters are the core of the book. The remaining chapters are dedicated to various subjects. The role of the tapetum in pollen dispersal and the role of flavonoids are reviewed in chapters 1 and 11 respectively. Chapter 9 concerns protein electrophoretic patterns and chapter 8 describes nuclease activities in pollen and tapetum; altogether, quite a heterogeneous collection of papers which could have been published individually in specialized journals. Chapter 12 gives mainly a survey on cytological techniques as well as a survey of recent, again mainly cytological, literature. General techniques need not be discussed in a book dedicated to the tapetum. Literature surveys, useful as they were in the past, are superfluous now that various literature search systems are available at almost every library. Most chapters are interesting and present significant results. The contributions on nuclease activities (chapter 8), protein electrophoretic patterns (chapter 9) could have been omitted without detriment. The impact of *The Tapetum* could have been considerably given the current interest in plant reproduction. For that purpose it should have been linked to current molecular approaches in tapetum and pollen development. Evolution and ontogeny of the tapetum should have been reviewed more elaborately. In that case, *The Tapetum* could have been a true source book. As it stands, *The Tapetum* suffers from the same difficulties as most proceedings: lack of coherence and an indistinct scope, even if one takes into consideration the cytological part only. *The Tapetum* is well presented and the beautiful artwork does justice to the generally excellent microscopic images. Yet the contents hardly justify a price of DM 170.

J.W.M. DERKSEN

## The Families of Flowering Plants

L. Watson and M. Dallwitz.
CSIRO Information Services, Melbourne, Australia. Interactive program on CD-ROM, incl. a colour illustrated manual. Price: US$180. ISBN 0-643-05507-X.

Electronic media will play an increasing role in the identification of organisms as more and more relevant information is put onto databases, and as the programs for retrieving and handling that information become increasingly sophisticated. The present material is mainly transcribed from accessible literature, and the advantage of the electronic medium lies in the fact that, after some practice, interactive programs can help the student out of problems with unknown characters, characters that do not discriminate properly, or wrong character state choices that have led to a dead end. *The Families of Flowering Plants* uses the interactive program INTKEY, with features such as the optional display of notes on characters and character state definitions, the direct handling of numerical values, restricting operations to subsets of characters or taxa, calculating the most discriminating characters for a set of taxa, obtaining lists of taxa possessing or lacking certain attributes, etc. It needs an MS-DOS-based computer with at least 640 KB of memory and a hard disk with at least 1 MB of free space, an operating system equivalent to MS-DOS 3.1 or higher with MS-DOS CD-ROM Extensions 2.1 or higher. To display the images, a VGA card and monitor capable of displaying resolutions of 1024 × 768 in 16 (for a few images 256) colours is needed. How quickly one gets used to the program depends on one's computer literacy, but the features of INTKEY are pretty helpful. All families are represented by a morphological description, information on geographical distribution, all kinds of useful aspects of anatomy, development and phytochemistry, and classifications to the level of order according to Dahlgren, Cronquist and Takhtajan for dicots, or Dahlgren, Clifford and Yeo for monocots. There are 690 illustrations of families, mostly line drawings from Le Maout and Decaisne (1873), Lindley (1853) and Thonner (1915) with their original legends. These drawings are useful, but I must confess to a strange feeling when reaching nineteenth century style drawings after a journey through electronic lists and menus. It may not be long before an electronic pastiche of information that is also available in the library next door will appear terribly outdated. For the moment, it is a sensible way to bring taxonomic identification into the computer age, and we may hope that it is a significant step towards making taxonomy accessible and palatable to students.

K. BACHMANN