

BOOK REVIEWS

The Genus *Inga*: Botany. T. D. Pennington. Illustrations by Rosemary Wise. Kew: Royal Botanic Gardens, Kew. 1997. 844pp. ISBN 1 900347 12 1. £60 (hardback).

Much criticism has been levelled in recent years at the 'glacial pace of progress' (e.g. Whitmore, 1996: 421) of systematic revisions and the problems this poses for financial sponsors with their short time horizons. No such criticism can be directed at Pennington's revision of the large Neotropical Mimosoid Legume genus *Inga*. It has been completed in record time, in only five years. The Forestry Research Programme of the Department for International Development, DFID (formerly Overseas Development Administration, ODA) of the UK Government which funded this research, should be well satisfied that it has extracted maximum taxonomic productivity (one species per week for five years) from one of the most experienced Neotropical taxonomists.

DFID can also be satisfied that development benefits measured in terms of poverty alleviation, which are its top priority, will flow from this strategic research work. *Inga* species comprise a widespread and ubiquitous element of the wet, subhumid, lowland and submontane forests throughout the Neotropics. One cannot roam very far in the Neotropics without stumbling across an *Inga* tree. In parts of Central America one can encounter between six and seven species on a single farm, while in the Peruvian Amazon there may be up to 50 species in a single Lat/Long degree grid square. They are economically important as a source of food, as shade for coffee, cacao and tea crops, and as a source of leaf mulch, green manure and firewood. Indeed, species of *Inga* are arguably the mostly widely cultivated trees in the Neotropics, being used in many diverse traditional indigenous and more recent innovative agroforestry combinations. Their potential to be used in combination with crops or timber trees for rehabilitation of deforested land with infertile acidic soils in the wet tropics shows great promise. For a genus of such diversity and diverse economic and subsistence importance, a sound taxonomic backbone is long overdue. With this revision what species there are, their characteristics, and where they grow, are documented for the first time since Bentham's treatment in 1875 which recognized only 140 species.

The taxonomic account covering 258 species – out of a likely total of 300 in the genus, with 30 undescribed species known from incomplete material from western South America alone – is extremely detailed and clearly presented. It includes species descriptions, notes on distribution, ecology, field characters, phenology, affinities, local names, citation lists of selected collections, distribution maps for all taxa and illustrations. It is lavishly, indeed well-nigh completely illustrated with drawings of 252 of the 258 species all expertly executed by Rosemary Wise. This is without doubt one of the most outstanding sets of botanical drawings by Rosemary Wise, adding to her already massive and distinguished portfolio. It is gratifying to note that the quality of reproduction and paper is excellent.

The taxonomic account is preceded by seven introductory chapters on morphology, wood and bark anatomy (Peter Gasson), cytology (Lynda Hanson), non-protein amino acid chemistry (Geoffrey Kite), flavonoid patterns (Jeffrey Harborne), variation, relationships and distribution, and uses. These provide a wealth of important information and data, but I found several of them to be frustrating in different ways. For a revision of this importance, the chapter on morphology is frustratingly sparse: there are no composite photographic plates or drawings which encapsulate important character variation; morphology is not discussed in any wider systematic context nor in terms of definition of characters and partitioning into character states; there is no detailed study of pollen of *Inga* despite its apparent variability and potential usefulness as a source of characters; above all, it is frustrating because morphological variation is apparently only considered 'useful' if it is congruent with the traditional infrageneric classification (see below). The chapter on wood anatomy is detailed and well presented, but, as might have been expected, frustrating because of the lack of variation amongst species. The detection of different ploidy levels reported in the chapter on cytology is notable and points to the need for chromosome counts for more than 17 species. The nonprotein amino acid data set looks extremely useful, but it is discussed in relation to the fundamentally flawed infrageneric classification rather than included in a new cladistic analysis of species relationships, and thus provides few revelations of immediate use. The flavonoid data appear to be of less interest.

Good keys are an essential ingredient in any competent taxonomic account. Keys to big genera are notoriously difficult to make work. Pennington provides 53 separate keys (spanning more than 40 pages); one for each section of the genus for each of six defined geographic areas. This makes the individual keys workable. However, the individual keys are preceded by a sectional conspectus rather than a key to sections. This is a serious limitation and could make identification of an unknown specimen extremely problematic.

Modern systematic monography combines alpha taxonomic descriptive botany to delimit species and resolve synonymy, with systematic analysis of species and higher level sister-group relationships to establish monophyly and an hypothesis upon which to base infrageneric classification. This revision provides us with the first part – species delimitation and associated synonymy – but little in the way of systematic analysis. Pennington's difficulties in constructing a sectional key stem from the inadequacies of his infrageneric classification which is 'largely based on several overlapping and quantitative characters' which are hence 'impossible to separate with a single key'. Pennington has only tinkered with previous infrageneric classifications, no doubt making important improvements. However, no amount of tinkering can take the place of a proper systematic analysis of species relationships carried out within a cladistic context. There do appear to be a number of discrete morphological characters that could be used in a cladistic analysis; the nonprotein amino acid data could be incorporated. However, there is no doubt that for a genus of this size with a paucity of nonoverlapping morphological character states, a molecular data set

will be needed to resolve species relationships. Only then will Pennington be in a position to state that 'it has to be accepted that *Inga* is not like some other large woody tropical genera in which certain key characters become fixed at an early stage in generic evolution', and only through such an analysis can hypotheses of species relationships be put forward as a more reliable basis for an infrageneric classification that will hopefully be amenable to constructing a sectional key. Perhaps this lack of systematic analysis is the price that has to be paid for speed. With a five-year deadline for a work of this size, some short cuts and compromises are inevitable.

Despite these reservations, much will flow from this revision of *Inga*. New collections of incompletely known species will be assembled and the species inventory of the additional 40–50 putative species will be completed. This book is a brimming reservoir that can be readily tapped to produce a steady stream of flora accounts and regional or national field guides, two of which have already been published in Spanish in association with this book (Pennington & Revelo, 1997, for Ecuador; Reynel & Pennington, 1997, for Peru). It will also provide important foundations for the rational utilization, possible domestication and conservation of *Inga* as an economically important genetic resource. Again, a companion volume on the utilization of *Inga* is already in production (Pennington & Fernandes, in press). Finally, this revision opens the way for much needed systematic analysis of species relationships using data presented here alongside new data from other sources as it becomes available.

References

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C. E. HUGHES

The Ferns of Britain and Ireland. 2nd edition. C. N. Page. Cambridge: Cambridge University Press. 540pp. ISBN 0 521 58658 5. £45 (paperback). ISBN 0521 58380 2. £95 (hardback).

This book is a welcome new edition of Chris Page's 1982 publication. It is based on the format and style of the first edition and all the species, subspecies and hybrids