

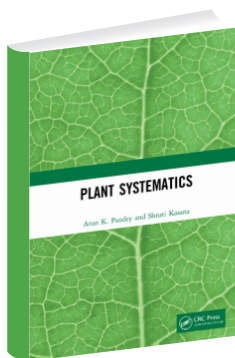
BOOK REVIEW

Plant Systematics

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ISBN 9781032024660, Year 2021, Pages 340, 150 B/W Illustrations, Published by CRC Press.

Plant systematics is fundamental to understanding and interpreting the floral diversity. This discipline has advanced considerably in recent years as a result of spurt in new information generated by the plant taxonomists. With the commencement of Angiosperm Phylogeny Group (APG) IV classification (2016), the Shenzhen code (2018) and novel scientific perspectives, an urgent need has been felt to update the students of botany at the undergraduate and post graduate levels. This void has been filled by a new book entitled 'Plant Systematics' by Dr. Arun K. Pandey and Dr. Shruti Kasana, Department of Botany, University of Delhi. The book follows the University Grant Commission's (UGC) recent learning outcome-based curriculum framework syllabus so as to equip the students with the basics *vis-a-vis* recent advancements in the field of plant systematics. The book provides the most relevant data in an easy-to-understand manner along with adequate explanations and innovative illustrations in the form of figures, tables and sketches. The book is organized in 21 chapters with a short summary at the end, introduce and explain the concepts in a stimulating manner, key highlights of the same are presented in this note.



The introductory chapter provides descriptive accounts on the components of taxonomy, developments in the field of taxonomy-cytology, phonetics, cladistic theory, DNA sequencing, molecular systematic which have revolutionized our current understanding of relationships among plants and their patterns of diversification across time, space and form. Chapter on 'Plant identification' presents different methods of plant identification including taxonomic keys with suitable examples. Notably, there is a special mention of collection of special groups of plants such as aquatic plants, aroids, bamboos, orchids, cacti, palms, ferns, medicinal plants. Chapter on 'Herbaria' deals on how the arrangement of specimens in an herbarium usually follows a well-accepted system of classification. Role of herbaria in tracking changes in climate and its impact on humans is also discussed as herbaria preserve the record of any change in vegetation over a period of time, if plants of an area become extinct. In the next chapter on 'Botanic Gardens', the authors have highlighted about important botanical gardens of the world such as Royal Botanic Garden, Kew, England. Key features of this chapter include major emphasis on important botanical gardens of India with A.J.C. Bose Indian Botanic Garden, Howrah being one of the best designed gardens in the world. Chapter five on 'Taxonomic literature' reviews novel methods of storing taxonomic literature. In an age when biodiversity is being lost at an unprecedented rate, it is vital that floristic and faunistic information is up to date, reliable and easily accessible for the formulation of effective conservation strategies. The content

provided in this chapter is suitable for graduate and post graduate students. Sixth chapter on 'Taxonomic hierarchy' deals with hierarchical classification as a way to help scientists understand and organize the diversity of life on our planet. A range of topics in evolution as concepts like speciation and reproductive isolation, lineages are described in the book, with color photographs. Next chapter on 'Plant nomenclature' describes author citation concept in a simple language along with information about various mistakes which can lead to rejection of names. It provides descriptions of case studies in which different names have been changed as changes were necessary since earlier authors did not follow the provisions of ICBN/ICN in naming plant taxa. The eighth chapter on 'Morphology' discusses various morphological characters and their importance in systematic positioning of any group instead of a single character. It takes a pragmatic approach and uses case studies as well as theoretical examples to offer practical understanding. In chapter nine on 'Anatomy' discusses on anatomical features that have been proved to be useful in tracing evolutionary trends at species, genus, familial, and ordinal levels. The chapter on 'Embryology' deals the morphological characters related to development of anther, ovule and seed are used as embryological characters. The authors have used various case studies to highlight the importance of embryology in solving problems of systematic position of genera using figures. Although, appropriate figures, illustration and plates have been given wherever possible in the text, little extra efforts by adding the colored figures/plates/illustrations especially in the chapters on morphology, anatomy and embryology would have made this book more attractive. Chapter eleven on 'Palynology' provides case studies in which different scientists have used pollen data at generic and sub-generic levels. The chapter on 'Chromosomes' deals with different methods of chromosome study, terminologies related to cytogenetics. This book contributes to our understanding of the applications of cytology in taxonomy. Chapter thirteen on 'Phyto chemistry' explains on how phytochemistry plays an important role in taxonomy. The authors have categorized chemical characters as macro and micro molecules. It also considers related topics such as genomics, transcriptomics and proteomics. Chapter on 'Molecular systematics' provides a solid conceptual basis for evolutionary history of organisms. Different steps involved in acquiring DNA sequence data are well illustrated. Construction and major methods of estimating phylogenetic trees are also discussed with suitable figures and examples. Chapter fifteen on 'Systems of classification: artificial to phylogenetic' review major contributors of taxonomy, their theories, ideas, merits and demerits of their theories. An important chapter on 'APG IV classification' which is established by using data from recent molecular studies, discusses APG IV classification and revisits the concepts of APG I, APG II, APG III. It draws attention to basal angiosperms according to APG IV classification with photographs and figures. This important addition will be of great importance to graduates, post graduates and academic researchers as it presents APG IV classification by comparing it with Bentham and Hooker system of classification. Chapter seventeen, i.e., 'Phenetics (Numerical Taxonomy) and Biometrics' discusses the concept and principles of phonetics including continuous and discontinuous variations with appropriate examples and figures. Readers will also be able to get information on how to perform phenetic analysis.

The important addition to the text is the insights on phenogram and biometrics. Next chapter on 'Cladistics' explains the concepts and methods that are used to understand the branching pattern of evolution. Difference between phonetics and cladistics is well described in the text in a tabular form. Chapter nineteen on 'Origin and evolution of angiosperms' provides a single resource for understanding the origin and evolution of angiosperms. Fossil records of early angiosperms is well described with figures. Diagrammatic representation of phylogenetic relationships of eight major angiosperm clades of angiosperms has been provided. Next chapter on 'Phylogenetic systematics' illustrates the concept of monophyletic, paraphyletic and polyphyletic groups. The important addition to this chapter is next generation sequencing which will be essential for graduate, post graduate students and also for biologists. Inclusion of a few missing references that are

cited in the text would be desired in the 'further reading' section along with uniformity in the font size in few figures for the next edition. The last chapter on 'DNA barcoding' provide extensive details on the novelty of DNA barcoding method that provides rapid and accurate species identification using short, standardized gene regions as internal species tags. Important addition to this chapter is also the concept of microfluidic enrichment barcoding.

Thus, considering the recent advancements in the field of plants systematics such as advent of APG IV classification, the Shenzhen code, use of efloras, molecular phylogeny and DNA barcoding to name a few, overall, this book is an excellent piece of information which will not only be helpful to the under graduate and post graduate students but also for young researchers, scientists, teachers and field biologists in research and training institutions.

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