Book reviews

North American Range Plants. James Stubbendieck, Stephan Hatch, and Charles Butterfield. Illustrated by Kelly Rhodes, Bellamy Parks Jansen and Debra Meier, Fifth Edition, 501 pp., many line drawings and maps. University of Nebraska Press, Lincoln. ISBN 0–8032–9243–0.

How many of us can easily recall the wildlife value of the shrub *Celtis pallida*, the North American distribution of Woolly Mulesear, and the habitat of Indian ricegrass? Were could this information be found easily, and in the same volume? Professional resource managers and university faculty have enjoyed the quick-reference advantages offered by North American Range Plants since its first edition in 1981. Designed to unite descriptions of abundant species of North American rangelands under one cover, this volume has filled the literary gap between botanical taxonomic keys and pictorial floral guides.

Created as a reference for range professionals, university faculty and range plant identification teams, this text's usefulness has quickly expanded to a much wider readership. Without reference to taxonomic keys, it provides field identification tips for 200 species of grasses, grasslike, herbaceous and woody plants, and presents this information in a concise, easily comprehensible format for beginning field botanists. For newcomers to rangeland plant identification, enlarged details of grass morphology are especially useful. The written grass descriptions are practical aids for discerning very similar species by using characteristics available to the naked eye. Extremely helpful to beginning botanists is a set of figures (1–18) which clearly illustrate key morphological terms. Even for experienced botanists, figures and species illustrations offer a nice review of inflorescence and vegetative characteristics of grasses.

Organization of species into plant groups (grasses, grasslike, forbs and woody plants), followed by an alphabetical listing of species within tribes (for grasses) and families (for non-grass plants) is logical and functional. This approach allows the novice to develop an intuitive grasp of common characteristics within groups and thus facilitate identification of unfamiliar species. For the more discerning user, the text is well supported by a straightforward glossary of the

most crucial terms, sections for authorities, and an index of both common and scientific names. Inclusion of a list of synonyms is also helpful, although not all-inclusive. Travelers and field ecologists new to North American vegetation may want to refer to the reference section to learn sources of greater botanical detail for specific regions of the continent.

Beautifully detailed line drawings of each species are placed adjacent to the most pertinent and revealing floral and vegetative descriptors, allowing quick reference to both. Maps included with the drawings expedite estimates of species distributions. Each species' description occurs on a single page, which contains extensive information pertaining to growth habits, origin, life span, season of growth, forage uses and toxic qualities. Changes in this edition incorporate addition of several wetland and riparian species, reflecting an area of current concern to many naturalists.

This text is now available both in paper and cloth-bound formats. For future printings, a spiral-bound edition would free the users hands for plant sample examination. Beyond this minor consideration, North American Range Plants allows the novice to quickly discern common species without dissection scopes and extensive floral keys.

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Plant-Soil Interactions at Low pH: Principles and Management. R.A. Date, N.J. Grundon, G.E. Rayment and M.E. Probert eds), 1995. 822 pp., tables, ills. Kluwer Academic Publishers, Dordrecht, The Netherlands. Dfl 250, US \$481, UK £299. ISBN 0792331982.

This volume represents the proceedings of the Third International Symposium on Plant-Soil Interactions at low pH held in Brisbane in 1993, and is partly reprinted from Plant and Soil 171.

The volume contains an overview paper on the global extent and economic importance of acidic soils, and is then divided into seven sections: Chemistry and Physics of Acid Soils; Microbial and Faunal Activity in

Acid Soils; Mechanisms of Acid Tolerance of Plants; Selection and Breeding of Acid Tolerant Plants; Diagnosis and Correction of Acid Soil Infertility; Socio-economic Aspects of Acid Soil Management; Management Systems for Agriculture, Horticulture and Forestry on Acid Soils.

As the titles of these sections indicate the book is heavily weighted to agricultural soils, and relatively little attention is given to semi-natural ecosystems. This severely limits the interest to plant ecologists, but the first three sections at least do contain relevant information. These include several papers dealing with the complex chemistry of aluminium in acidic soils, microbial activity and how this might be affected by aluminium availability, the solubility and mobility of heavy metals, and nitrogen mineralisation in acidic soils.

The book contains a mixture of reviews and new experimental observations. Overall, I found the reviews more interesting. The paper from which I derived most benefit was the review by G.J. Taylor on the cellular basis of aluminium resistance. This highlights the difficulties of experimentation with aluminium and reviews evidence for the fact that resistance has a fundamental cellular basis. It also demonstrates that, although there is still much to learn about aluminium tolerance, considerable progress is being made. He suggests that results from recent experimentation should be interpreted in the context of a suite of co-ordinated adaptations leading to aluminium tolerance. For the plant ecologist, it is perhaps disappointing that much of this progress has been achieved by studies of crop plants rather than the generally more aluminium-tolerant calcifuge species.

Overall this book has little to offer plant ecologists, but ecophysiologicals with an interest in plant mineral nutrition will find the old nugget of information which will be useful to them.

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Instrumental Element and Multi-Element Analysis of Plant samples. Methods and Applications. B. Markert. 1996. xvi + 296 pp. John Wiley and Sons, Chichester, Hardback, UK £65.00.

The book is a translation of the German (1993) edition 'Instrumentelle Multielementanalyse von Pflanzenproben'. The growing interest and understanding of the occurrence and interaction of chemical elements in plants is a timely justification of such a book because many published articles are full of flawed analyses in addition to errors in sampling and sampling preparation often not recognized by reviewers and editors of journals and books. After a brief introduction the first chapters are dealing with some general aspects of chemical elements in plants. In Chapter 3 the concept of the 'reference plant' is introduced in analogy to the 'Standard Man' (International Commission on Radiological Protection 1975) and to the standard genome of man and yeast by routine DNA sequencing (Foury 1997).

All these 'standard' concepts disregard the evolutionary essentials of biodiversity, in the case of chemical elements the genotypic and species-specific demands, uptake patterns and allocation processes by plants (cf., Ernst 1995).

Markert's reference plant is a hypothetical plant 'which grows in a system in Central Europe or North America which is anthropogenically loaded to an average degree and which grows in soil which only has a moderate level of nutrients'. The data base of this hypothetical plant is a compilation of data on chemical elements in green plant parts without specifying developmental stages of plants and without considering differences in soil chemistry, genotypic and species-specific patterns of element uptake and accumulation. Fortunately, the examples of multi-element analysis in Chapter 5 ('Using plants in bioindication') deal with the variation of chemical elements in time, space and plant species and will hopefully stimulate the researchers in carefully, designing the timing of sampling.

Chapter 6 'Instrumental analysis of environmental samples' together with six appendices elaborate the essential steps to be considered for a meaningful analysis, i.e., sampling, sample preparation, homogenization, mineralization and finally the chemical analysis. Several instrumental measuring approaches are described showing the advantages and to a lesser degree the disadvantages of the various analytical methods such as atomic absorption spectroscopy, neutron activation, X-ray fluorescence, and atomic emission and mass spectrometry, both with inductively coupled plasma. The very promising technique of energy dispersive analysis of X-rays (EDAX) in element localization at the (sub)cellular level receives a growing interest in eco-physiology and ecology of plants (cf., Van Steveninck