

that local experience is not always reliable, serving only as a guide. Mike Gilbert drew our attention to the tremendous variability he had experienced in the results of soil tests taken from farm paddocks. He said that this is the real world, and that in this situation, soil tests are not a good indicator of fertility requirements.

Tom Cowan and Peter Kerridge spoke on the animal responses to fertilizer application. This is the area where farmers have to make decisions. It is the animal production response that they are interested in. Tom said that as plants may not respond to nutrients at levels required by animals, considerable savings could be made by feeding nutrients directly to animals as supplements. Peter Kerridge's results agreed with this, but also showed that phosphorus affected the animal through the plant as well as through diet supplementation.

Mike Hawley presented information on the sulphur story in the Beaudesert area. He showed there was a substantial saving to be made by fertilizing black soil flats with sulphur rather than Superphosphate, because sulphur, not phosphorus, was the nutrient limiting growth. Sulphur, although strongly held in acid soils, was not well fixed in alkaline soils. Mike posed the question of how frequently sulphur should be applied on deficient soils. It is an area for further research. Solving this question would certainly benefit producers. Howard Benstead told how deep ripping helped improve the physical structure of his alluvial soils which had become compacted after years of grazing under moist conditions.

Finally, Les Clarke spoke of the economic relationship between returns and fertilizer application. Producers do look fairly closely at what is put into the system, and try to match that with what they get out. Les provided the means of determining the economics of applying extra fertilizer.

Ray finished with the comment that there is no shortage of jobs for researchers to maintain farmland productivity.

BOOK REVIEW

Australian Soil and Land Survey Field Handbook. R. C. McDonald, R. F. Isbell, J. G. Speight, J. Walker and M. S. Hopkins (1984), (Inkata Press, Melbourne).

The ever increasing demand to conserve natural resources and to sustain and increase all forms of land use production has created a need for more precise and detailed information about soil and land. Sound land resource planning requires data in a form compatible for land use analysis. This Handbook has, for the first time in Australia, provided a basic reference to terminology and the means for consistent data collection to achieve this end.

The authors are to be commended for their provision of a much needed reference. They have surveyed comment from representative organisations involved in survey throughout Australia and have attempted to set limits for attributes to best accommodate the diversity of purposes for which soil and land surveys are conducted. Teachers, students and professionals directly or indirectly concerned with land use planning and production will find that this Handbook provides a comprehensive standard terminology for the systematic recording of soil and land features including those unique to the Australian environment. The manual is designed for use in the field and is presented in a plastic cover with colour coded page edges for easy location of the five major sections describing the properties of major soil and land attributes.

For survey purposes, the authors J. G. Speight and R. C. McDonald have defined the site concept which is arbitrary, but it does not provide the user of the Handbook with a clear guide to the spatial extent of a site which can be recorded as being acceptable for most survey purposes.

Landform description is well laid out with clear diagrams and is accompanied with glossaries to provide the user with explicit vocabulary for definition of basic landform elements and patterns.

In the vegetation section, the authors J. Walker and M. S. Hopkins have attempted to overcome the complexity and shortcomings associated with foliage cover and projective foliage cover methods by using a crown cover or separation method employing photographs of typical crown types. Whilst they argue that, for most surveys, detailed measurement of crown cover classes may not be warranted, the method they have proposed tends to oversimplify and could lead to impressionistic recording of this parameter. Classification of structural formations is not consistent with the more commonly accepted system of Specht, but if the method in the Handbook is accepted, it may be as desirable as the Specht system, and appears to satisfactorily serve the purpose of the book. The inclusion of a glossary in this section would have aided the user, particularly if the person is not well versed in this branch of science.

Description of land surface phenomena logically precedes the soil profile description section and if use is made of describing land surface conditions, the user can more confidently select representative soil profile sites. If used in this context, the authors have attempted to overcome a serious limitation which often exists in free soil survey methods by recognition and description of dominant past and present land surface processes which influence the distribution of soil properties.

In the soil profile section, the authors R. C. McDonald and R. F. Isbell have utilised widely accepted soil profile criteria from a range of texts and are to be commended for attempting to modify and standardise description of a number of attributes such as soil water status, consistency, condition of surface soil when dry, separations of pedogenic origin and internal drainage which are often inadequately dealt with in other texts.

Finally, criteria for the description of substrate material which commonly affects land surface and soil properties in the Australian environment is provided for in the final section. Whilst the names of weathered substrate materials are largely equated with geological rock types, provision has been made for naming altered substrate materials for which the original lithology cannot be determined.

In Appendix 1, soil taxonomic units commonly used in Australian soil and land surveys are included to assist the user in naming soils for communication purposes. The inclusion of the USDA Soil Taxonomy names is important for international communication. However, the user of the Handbook is presumed to be conversant with the four systems listed.

Examples of field sheets are given in Appendix 2 with advice as to the best kinds of data to include, constraints on data quantity and suggested field sheet types. Throughout the text mnemonic and multistate scales are provided in red for all parameters of properties, which, as the authors point out, requires the user to either memorise or repeatedly consult the lists. However, while this may be time consuming initially, with repeated use, the method they have proposed should improve the quality and precision of data recording. The provision of summary-reference cards to codes given in the Handbook for the 'fill in' example data sheet should assist the user in the field and overcome arduous 'thumbing' through the text to find relevant codes.

In Australia, more than 20 government and private organisations are currently involved in whole or part in soil and land survey using a variety of methods for diverse purposes. This Handbook can only be seen to pave the way for them more to concisely and comprehensively record soil and land attributes in the Australian environment.

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BOOK REVIEW

World Directory of Collections of Cultures of Microorganisms 2nd Edition—Eds. Vicki F. McGowan and V. B. D. Skerman 1982. World Data Center on Microorganism, Brisbane. US\$25 or US\$15 as microfiche.