

and several economic and modelling methods are reviewed. Part III is concerned with the socio-economic and ecological effects of land-use policies in Florida and in the Western States, plus a methodological chapter on the pursuit of conflicting objectives of human and biodiversity needs. The final section (Part IV) delves into the tricky area of valuing non-market costs and benefits of changes in land-use; for example, where there are changes in wildlife habitats, flood prevention or local amenity.

The diverse nature of the various papers illustrates the breadth and importance of the topic in the USA with its competing demands on rural land. The economic and modelling approaches described in this wholly American book may well have applications elsewhere, particularly for rural planners and land economists. It would also provide geographers, sociologists and policy analysts with a useful overview of economic methods applied to land-use issues.

Mike Daw

Science for Agriculture: A Long-term Perspective. Second Edition. By W. E. Huffman and R. E. Evenson. Oxford: Blackwell Publishing (2006), pp. 314, £69.50. ISBN-13: 978-8138-0688-4. doi:10.1017/S0014479706264536

Agricultural scientists are expected to meld pragmatism, practicality, innovation, market foresight, environmental sensitivity and multidisciplinary approaches, an unusual combination of talents in an era when most scientific communities are fragmenting into sub-groups. This text is by two eminent economists, well versed in the complex interface between agriculture, science, politics, higher education, and social and economic structures. Although focused on the USA, it has direct relevance to the world at large.

After a Foreword, Preface, and Introduction, there are nine chapters, each with a Conclusion, Notes, and References. Chapter 1 considers the factors influencing the development of the current structure of the US Department of Agriculture and State Agricultural Experiment Stations, relevant universities and extension services. Chapter 2 explains the transition to the present bureaucratic system with specialization and shift to more basic work. Chapter 3 deals with US scientists, their qualifications and private-sector relationships. Chapter 4 concentrates on spends and sources of funding. Chapter 5 analyses the power of generating, protecting and exploiting intellectual property rights, and reinforcing private-sector investments. Chapter 6 covers international impacts and transfer of knowledge, cultivars and inventions. Chapter 7 details the changing trends in funding influenced by interest groups and elected officials. The penultimate Chapter 8 concludes using new econometric evidence that the US real aggregate output grew remarkably at an average rate of 1.61 per cent per annum over 1900–2000, and 2.08 per cent over 1970–1999. Finally, Chapter 9 judges that the system remains viable and productive.

The book is superbly produced and has special utility for policy makers, senior managers, and strategic analysts in advanced agriculture.

John R. Hillman

Gene Flow from GM Plants. Edited by G. M. Poppy and M. J. Wilkinson. Oxford: Blackwell Publishing (2005), pp. 241, £89.95. ISBN-10: 1-4051-2237-4. doi:10.1017/S0014479706274532

A legitimate concern about the introduction of GM crops is the risk associated with gene flow from the GM crop to other organisms. This volume begins with a very lucid summary of the GM debate and then provides a series of contributions addressing the current status of application of crop biotechnology as well as detailed chapters on the transfer processes (pollination, hybridization, barriers to hybridization). The emphasis then switches to describing technology for monitoring gene transfer, fitness of 'accidental' recipients, assessing environmental risks and the current legislative situation. The emphasis is on environmental risk assessment, and this, together with the acceptance by stakeholders and reasonable adoption in legislation, is the crux of the issue.

In their preface the editors point out the need for a range of expertise to address the gene flow issue, from gene technologists to environmental modellers and much else beside. The challenge addressed by this volume is to provide information across these discipline barriers and, most importantly, to inform correctly all stakeholders. The volume provides information and methodology and ultimately (in a final summarizing chapter, written by the editors) the clear message that this is an issue which needs to be taken seriously and positively.

Contributors come from academia, industry and government. Clear introductions to the topics are provided for all chapters and supplemented with appropriate detailed technical information. Overall the volume provides

a collection of informative articles suitable for the student, professional and non-specialist, and should be widely read.

Malcolm Hawkesford

DNA Microarrays and Related Genomics Techniques. Edited by D. B. Allison, G. P. Page, T. M. Beasley and J. W. Edwards. Boca Raton, FL, USA: Chapman & Hall/CRC (2006), pp. 371, £49.99. ISBN 0-8247-5461-1. doi:10.1017/S0014479706284539

Thirty-eight contributors to this book provide 18 helpful reviews on almost all aspects of microarray data from quality control, pooling of biological samples, normalization, experimental design, anova, non-parametric methods, Bayesian methods, cluster analysis, false discovery rates, through to eQTLs and Gene Ontology databases for 'post-analysis interpretation'.

The book is aimed at the scientist who wants to understand the concepts underpinning the statistical methods used in microarray analyses and at statisticians who need a quick overview of specific topics in this area. Algebraic detail is, with a few exceptions, kept in check and most of the material is accessible. Software tools are discussed where relevant but never assessed or comprehensively reviewed. There is reasonable cross-referencing between chapters and a helpful level of duplication.

The contributors' experience seems to be biased a little towards medical applications where microarray experiments are often much simpler than would typically be found in a plant or animal institute. This does not detract from the book's usefulness, but reference to, for example, the Nottingham Arabidopsis Stock Centre (NASC) collection of array data or to The Institute for Genomic Research (TIGR) array facilities would have emphasized the comprehensive scope of the technology.

As a consultant statistician in a crop research institute, I now see data from as many microarray experiments as field trials. Unlike the latter, there is, as yet, no general consensus on optimum statistical strategies for microarray experiments but this book puts in context many of the options.

Jim McNicol

Genetic and Production Innovations in Field Crop Technology: New Developments in Theory and Practice. Edited by M. S. King. Binghamton, NY, USA: Food Products Press (2005), pp. 38, US \$49.95. (paperback). ISBN-13: 978-1-56022-12. doi:10.1017/S0014479706294535

This publication is a special issue of the *Journal of Crop Improvement*, edited by Manjit S. Kang. As a consequence, it has the format of a journal rather than a book and the reader can pick and choose which paper to read and in what order. The first three papers are short general ones on the role of modern plant breeding in the context of increasing food production, followed by one on designing and analysing field experiments aimed at increasing the efficiency of plant breeding programs. In contrast, the last three papers are weighty ones on genotype \times environmental interactions with a heavy emphasis on statistical tools, whilst not neglecting the biological issues. The first two papers give examples from wheat and barley, respectively, and include QTL (Quantitative Trait Locus) detection, while the third is a theoretical paper on stability and adaptation analyses. In between are six crop specific papers; one on maize, sunflower and soybean, two on soybean, then one each on maize, cassava and rubber. The landscape covered will be both familiar and useful to plant breeders: physiological determinants of yield; genetic diversity; seed-quality; hybrid maize; and breeding for low input, sub-optimal environments with mention of social, economic and political factors.

John Bradshaw

Ecological Responses and Adaptations of Crops to Rising Atmospheric Carbon Dioxide. Edited by Z. Tuba. Binghamton, NY, USA: Food Products Press (2006), pp. 414, US \$49.95. ISBN 10-1-56022-121-6. (paperback). doi:10.1017/S001447970630453X

Rising levels of carbon dioxide in the atmosphere would appear to be a real and increasing fact of life. Since CO₂ levels are among the primary drivers of plant growth, it is as well that we should investigate and try to understand the long-term consequences of the changes that we are bringing on ourselves. This book is a