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Book reviews

***Bacillus thuringiensis*—a cornerstone of modern agriculture**, Matthew Metz (ed.), The Haworth Press, Inc., USA, 2003, 242 pp., $89.95 (hbk), $59.95 (pbk) ISBN 1 56022 108 9.

Bacillus thuringiensis—a cornerstone of modern agriculture, takes us through the history of the utilization of *Bacillus thuringiensis* (Bt) in the control of insect pests to the current use of Bt transgenic crops and beyond to consider future opportunities and challenges. It is a valuable resource for research workers in the area and for those with an interest in GM crops. The book presents a balanced selection of chapters starting with an informative preface introducing Bt followed by consideration of the safety record of Bt, its application as a microbial insecticide, and examples and assessment of individual Bt transgenic crops. Together with the clear message of significant advantages from Bt transgenic technology are warnings of the importance of insect resistance management programmes to ensure that there is not a breakdown of resistance.

The structure of the book is such that each chapter can be read as a stand-alone review of a particular aspect of the utilization of Bt. Although a large number of crops have been engineered to express Bt insecticidal crystal proteins, it is only Bt corn and cotton that have seen widespread commercialization. Bt cotton is considered in some detail as cotton farmers in particular have embraced the technology in this non-food crop. Clear advantages in terms of increased yield and decreased insect damage have been recorded. The final chapter of the book provides an interesting insight into the actual experience of farmers growing Bt cotton in Argentina. Insecticide applications were two to three times lower than in conventional crops with the corresponding benefits to the environment and human health. Income from the Bt crop was higher than from the conventional crop due to increased yield even though the Bt seed and Bt crop production costs were greater.

Other food crops that have been engineered to express Bt insecticidal crystal proteins include rice, potato, cauliflower and sugarcane, and the potential benefits of these crops are considered in individual chapters. The conclusion is that in all cases Bt technology could offer substantial benefits, and in risk–benefit analyses the benefits significantly outweigh the risks. However, the clear take-home message is that strategies for minimizing the risk of breakdown of resistance together with appropriate biosafety regulations are essential for the safe and sustained application of the technology and the realization of further considerable benefits.

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Handbook of formulas and software for plant geneticists and breeders, Manjit S. Kang (ed.), The Haworth Press Inc., USA, 2003, 348 pp., $69.95 (hbk) ISBN 1 56022 948 9, $39.96 (pbk) ISBN 1 56022 949 7.

This book in the Food Products Press series has a title which does exactly what 'it says on the tin'. Each word has been chosen with care.

Firstly, it is intended to be a handbook. Something to keep on the shelf or by the PC awaiting the appropriate time to be useful. It needs to be visible and treated as a first point of call when developing applications or when encountering 'new' situations where we believe that these problems must have occurred before and hence somewhere there are solutions waiting to be utilized. Secondly, we have a clear statement on the content of the book. Formulas *and* software. The 'and' is very important in that it links the theoretical basis for the proposed solution to the specific problem with the software which applies model or algorithm. Lastly, we establish the primary user community who require pragmatic solutions to real problems. In fact this is not a statement of exclusivity, as elements of this book will have broad appeal.

The book comprises 32 chapters, each dealing with a specific problem. Some 30 contributors have combined their expertise and have worked to a common structure within a chapter which can be summarized as:

- Outlining the problem (importance).
- Solution—theoretical basis (definitions).
- Solution—implementation and code (program).
- Key references.
- Example output.

Such a harmonized structure works very well, although in a few cases the very lengthy output (given without additional annotation or comment) disturbs the slick presentation.

Given the title of the book and especially the targeted user community, it is of no surprise that five chapters are devoted to specific diallel analysis and related problems. Within this large book, there is plenty of scope to devote whole chapters to other related but diverse topics.

These include (in no particular order):

- Genotype by environment interactions, GGE and stability analysis.
- Best linear unbiased predictions (BLUPs).
- REML methods for additive and dominance genetic variance components.
- Principal component analysis, AMMI models and trend analysis.
- Quantitative trait loci—conditional mapping and interactions with environment.
- Path and trend analysis.
- Classification using categorical and continuous variables.
- Analysis of quantitative genetic models.
- Genetic linkage and mapping.
- Analysis of designed experiments.

A real plus point is that the algorithms suggested as efficient to solving particular problems are given accompanied with the source-code. Advantages of this are obvious; and include the ease in which the supplied material can be edited/modified as required.

The software package used in the examples is mainly SAS, good news for the many SAS users but a frustrating feature for others. True, the approaches are 'readily' portable to other systems but, as users, we become very familiar with code in our software of choice. When starting a new project we are not always sure if the balance between effort required and benefits is in our favour or not before we try it. In an ideal world, we would gain much from having the same problem with solutions given in a number of popular statistical software systems, say SAS, SPlus and GenStat; unlikely to cater for all eventualities but such additions would extend easy applicability to non-SAS users.

One of the reviewers on the dust-jacket states 'there is something for everybody', which is a succinct summary which I wholeheartedly support yet it also contains an implied criticism that the book may not deliver solutions to your specific problem but helps in other areas of application.

I feel that the book is slightly the weaker for not having a companion CD to bring all the supplied code, examples and output together. Additional free-standing programs are mentioned in the book that appear to require the reader to write to the authors of the programs for copies of these software. As many of these programs are effectively 'free', it would be efficient to include these (with manuals), making this volume more of a reference than a cook-book.

The book truly offers good value for money and will be a valuable addition to the subject area.

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Testing of genetically modified organisms in food, Farid E. Ahmed (ed.), The Haworth Press Inc., USA, 2004, 315 pp., $69.95 (hbk) ISBN 1 56 022 273 5, $49.95 (pbk) ISBN 1 56 022 274 3.

The quest for genetic optimization of crop species is as old as agriculture itself. Over centuries our methods of selection have become more sophisticated and our methods of introducing useful variation into breeding material have closely followed advances in genetics, physics, chemistry and latterly molecular biology. Despite all the advances of the past century, the goal of the quest remains the same today as it was 10,000 years ago in the fertile crescent of the Middle East: to reliably feed ourselves.

In the past century we have seen increasingly exotic technologies used to produce food crops: hybrid seed, chemical and radiological mutagenesis, double haploid, embryo rescue and genetic manipulation. Somewhere, in the minds of a significant minority of ordinary consumers, technology has crossed an invisible line between 'natural and unnatural'. It is out of respect for the right of these consumers to choose what they eat that foods are labelled as to their GM status and the need to test for the presence of GM ingredients has evolved.

This book is a truly excellent reference for anyone involved in the production of foodstuffs in the post-GM environment. Even if you are not actively involved in testing it is essential to understand the background and limitations of the various testing methods being used.

Starting from a balanced account of risks and benefits of GM technology, the book moves on to look at the contrasting regulatory environments in the USA and Europe. For any European who has not spent time talking to US producers these early chapters give a real insight into why these two huge markets have reached such an impasse over the trade of GM produce.

An aspect of analytical testing which is often overlooked is the issue of sampling. The reader will find within this book some clear guidance on sampling

procedures and some tools to begin designing suitable sampling and testing plans.

The authors move from this background to give the nuts and bolts of GM testing today. Starting with reference materials they move on to cover the common technologies: immunoassay, and qualitative and quantitative PCR. Less commonly used technologies, such as Near Infra-red Reflectance Spectroscopy (NIR), are also considered.

The book concludes with a round-up of risks and safety issues set against a background of liability and regulatory concerns.

In conclusion, I would recommend the work to anyone seeking a broad background in GM testing. Read with an open mind, this is a balanced account of the pragmatic response by food technologists to a very challenging and highly emotive analytical problem. The editor and contributing authors are to be commended.

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Seed policy, legislation and law: widening a narrow focus, Niels P. Louwaars (ed.), The Haworth Press Inc., USA, 2002, 260 pp., $49.95 (hbk) ISBN 1 56 022 092 9, $29.95 (pbk) ISBN 1 56 022 093 7.

Seed Policy, Legislation and Law: Widening a Narrow Focus looks at a broad range of global issues facing seed systems intended to manage the uptake of improved varieties and seed quality. The range is from establishing workable systems in emerging economies, managing the effects of privatization in the former Soviet Union, international agreements on genetic resources, to adapting formal systems to handle technological innovation. The message is the scope for wider policy development to evolve seed systems meeting the needs of different economic and cultural circumstances, and that there is no universal blueprint and no single solution. The widening focus of the book's subtitle is the need to involve seed system specialists, environmentalists, small business development specialists and social scientists to ensure that seed legislation meets the needs of farmers, consumers, and those breeding varieties and selling seed.

Niels Louwaars has brought together a strong group of contributors from across the world. His editing leads us through an overview of the roles of formal and farmers' seed systems, the importance of free market enterprise and technological innovation, different models for seed policy and legislation, mechanisms to support international trade, and new policy fields. The section on seed legislation includes three differing case studies, from Turkey, Uganda and Bangladesh, making it clear that different circumstances need different policies. Two well-made points concern the early stages of formal seed systems. Firstly, the need in emerging agricultural economies to develop formal seed systems alongside existing farmers' systems based on land races, traditional varieties and free exchange of seed. Secondly, that privatization of public breeding and seed production needs balanced polices to introduce competition gradually without disrupting the flow of improved varieties and increased seed quality. In his own chapter on Variety Controls, Niels Louwaars successfully argues that formal systems require a free market, meaning transparency, informed consumers and competition, and that to work well governments must regulate within their resources to implement.

The sometimes negative impacts of formal systems on farmers' own systems in emerging economies has echoes for the shortcomings of European-type legislation in specialist sectors, for example organic production, heritage varieties, returning intensive farmland to nature conservation, and production of straw for thatching. In both cases, this is arguably a negative impact on traditional agricultural systems which almost as a by-product are conserving plant genetic resources. The final section on new policy fields provides an interesting contrast between this agrobiodiversity perspective and regulation of genetically modified varieties, both very current issues in the European Union.

Niels Louwaars and his contributors have successfully broadened my focus on seed policy and legislation. Their objective is not to provide solutions but to combine overview chapters with analysis of the major topics influencing seed policy. They have succeeded in this, with a thought-provoking read for anyone involved in seed systems, whatever development stage their system has reached, and its drivers for change.

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Seed identification handbook: agriculture, horticulture and weeds, 2nd edn, Steve Jones, Jane Taylor and Felicity Ash (eds), NIAB, Cambridge, UK, 2004, 94 pp., £35 (pbk) ISBN 0 948851 14 7.

Applied scientists require just as good a theoretical background as pure scientists. In addition, they need good understanding of the practices, processes and technologies across the applications of their sciences ('the wider fields of knowledge'), skill in multidisciplinarity (to network with experts and practitioners in different subject areas),

creativity and, last but not least, good practical expertise. This handbook covers one aspect of the latter.

The title provides a precise summary of the contents of the book; no more, no less. The four pages of introductory text are admirably brief and simply instruct the reader on the book's background and how to use what follows (and remind the reader that the term seed is used in the agricultural and horticultural context, i.e. the propagule). Seventy pages follow with each of some 200 species, fitted three to a page. The information for each species comprises a colour photograph (usually magnified 2× or 4×) of seeds of that species and two or three sentences giving some background and a description of seed shape, size and colour. A white inset 10 mm in diameter within each photograph provides life-size silhouettes of the seeds to aid identification (because seed size is an extremely useful character when identifying an unknown seed). The arrangement of species is alphabetical within families, beginning with *Amaranthaceae* and concluding with *Violaceae*. Six pages of life-size silhouettes then follow in order of ascending size. The handbook concludes with an index of botanical names (following the International Seed Testing Association List of Stabilised Plant Names 2001), an index of (UK) common names, a substantial bibliography and reference list, and a few relevant websites.

This admirable, concise, very useful handbook 'does exactly what it says on the tin' (title) to quote a well-known series of UK advertisements for DIY products. The book is ring-bound and exceptionally well designed for laboratory bench use (e.g. the paper appears highly non-absorbent). The photographs range from good to excellent. I suspect this book will win the authors no academic or literary award. It should, however, win the admiration and thanks of a generation of seed analysts, biologists and physiologists. I believe that the majority of readers of this journal—and indeed a wider range of plant biologists—will find this seed identification handbook a very useful addition to the resources within their laboratories. More widely, this is exactly the sort of use of modern technology (i.e. comparatively inexpensive cheap colour printing) that should help universities and colleges stimulate and develop identification skills in students of biology, environmental science, agriculture and horticulture: I wish I'd had a book like this when I was a student!

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