

Book reviews

High-yielding anthracnose-resistant *Stylosanthes* for agricultural systems

Edited by S. CHAKRABORTY

Published by the Australian Centre for International Agricultural Research, Canberra, 2004. 264 pp. Price AUD45. ISBN 1 86320 442 3. Available at <http://www.aciar.gov.au/web.nsf/doc/ACIA-63Y6EC>

This is the most recent of a number of reviews of the state of scientific knowledge of *Stylosanthes* (stylo) and its use in farming and livestock production systems around the world. Previous reviews were in 1982 (Stace and Edye 1984) and 1996 (Winks and Chakraborty 1997). The present book comes at the end of an ACIAR-funded project aimed at developing new, high-yielding, anthracnose-resistant stylo cultivars for China, India, Brazil and Australia. While the results of this work are the main focus of the book, the authors have reviewed more broadly recent literature on *Stylosanthes* (approximately 1000 publications since 1990) and placed it in perspective. There is a degree of repetition in the chapters, and much information in the earlier reviews is not covered here, but, on the whole, the book is a considerable success and will be a welcome addition to the shelves of all research workers interested in tropical forage legumes. It is likely to be too data-intensive for most farmers and graziers.

The book is arranged in three sections. The first contains reviews of aspects of scientific research on *Stylosanthes* — species relationships, genetic diversity, potential forage productivity, constraints to production, and the use of stylo in a wide range of livestock and crop-livestock production systems. The second contains the results of the ACIAR project, in journal paper format. The third contains papers on aspects of the commercialisation of *Stylosanthes*, with emphasis on seed production and the emerging use of stylo leaf meal for livestock in China and India.

The book contains excellent figures and illustrations, many in full colour, and an abundance of information on the history of cultivar development and seed production in Latin America, Thailand, China, India and, to a lesser extent, Africa. By adding new information to the knowledge available in earlier reviews (*loc. cit.*) and for other countries, the historically-minded reader can now piece together a well documented story of determined efforts to bring stylo technology to farmers around the tropical world.

A major achievement of the last 10–20 years has been the increased adoption of stylo in farming systems in developing countries. Scaling up of stylo technology commenced in India and Thailand during the 1970s, and in China during the 1980s. Estimates of sown areas are hard to come by, but from this book and other sources, we estimate that the total sown area in these three countries has risen to about 750 000 ha. With significant areas in Brazil and parts of Africa, the total sown area in developing countries is now approaching the area sown in Australia. World-wide,

the economic benefits of stylo technology are now very significant indeed.

This book highlights the significance of anthracnose disease caused by the fungus *Colletotrichum gloeosporioides*. During the last decade much of the research agenda has been driven by (or has arisen from) the urgent need to control this disease in order to enhance the sustainability of stylo-based agricultural systems. Looking back at the achievements of the last decade, particularly the increased level of adoption of stylo by farmers, this reviewer is struck yet again by the small number of cultivars that make up the bulk of the area now sown world-wide to stylo, and their vulnerability to anthracnose. This is well documented in the book, as are advances in our scientific understanding of the host, the pathogen and their interaction. The evolution of aggressiveness and virulence of *C. gloeosporioides* on *S. scabra* cv. Seca in Australia over a period of 22 years is a case in point. Importantly, Seca has adapted to the pathogen, and commercial Seca is now significantly more resistant than the original cultivar.

Another lesson from the book is the diversity and complexity of the farming systems to which stylo can contribute. The provision of robust technology is vital; for example, in Brazil, there have been hard-learned lessons about the difficulty of promoting cultivars that do not readily produce seeds or possess lasting anthracnose resistance. However, robust technology is not in itself sufficient to ensure widespread adoption. A particular challenge is to provide a farm operating environment — a suitable business and policy context — that will enable farmers to adopt stylo technology in an economically sustainable manner. Some factors that are taken for granted in Australia (*e.g.* security of land tenure, and reliable access to markets for farm produce) do not exist in other countries. In India, Thailand and China, successful adoption has required long-term support by governments and aid agencies. The establishment and support of a reliable seed industry have been especially critical, but ongoing investment in research has been almost as critical, and ACIAR and other aid agencies are to be congratulated for their continuing support.

We have come a long way, and farmers have enjoyed many years of sustained economic benefits from stylo technology. Adoption is increasing rapidly. Sadly, although (as Chakraborty states in this book) stylo anthracnose disease has become one of the best-studied diseases of forage plants, it continues to hang over the heads of countless farmers and graziers like the proverbial Sword of Damocles. Results of research have strengthened the suspension material from the proverbial single hair to a much firmer twine, but the potential for trouble persists even as the research investments falter.

References

- STACE, H.M. and EDYE, L.A. (1984) *The Biology and Agronomy of Stylosanthes*. (Academic Press: North Ryde).
 WINKS, L. and CHAKRABORTY, S. (eds) (1997) International research and development on *Stylosanthes*. Proceed-

ings of a Workshop held at the CSIRO Davies Laboratory, Townsville, Queensland, April 1996. *Tropical Grasslands*, 31, 385–527.

R. J. Clements
Executive Director
The ATSE Crawford Fund

Grassland: a global resource

Edited by D.A. GILLOWAY. Published by Wageningen Academic Publishers, 2005. 429 pp. ISBN 907699871X.

XX International Grassland Congress: Offered papers

Edited by F.P. O'Mara, R.J. Wilkins, L't Mannetje, D.K. Lovett, P.A.M. Rogers and T.M. Boland. Published by Wageningen Academic Publishers, 2005. 975 pp. ISBN 9076998817.

These two books contain the proceedings of the main session of the XX International Grassland Congress held in Dublin from June 26 to July 1, 2005. The congress was based on three themes:

- Efficient production from grassland
- Grassland and the environment
- Delivering the benefits from grassland

and these themes form the structures of the two books.

Grassland: a global resource contains the 4 primary papers and 29 invited papers presented at Dublin. These are spread over the 3 themes — 13 on efficient production, 10 on environmental issues and 10 on delivering benefits. The authors were predominantly from Europe, northern America, Australia and New Zealand (24 of the 33 senior/sole authors).

There are a number of useful papers in this book. C.L. Delgado covered the future demands for meat and milk. By 2020, it is estimated that meat consumption will increase by 81 M tonnes and milk production by 180 M tonnes compared with 2002/03. Most of this increase will be in developing countries, and ruminant livestock are predicted to produce a greater proportion of this increase than in the past, highlighting increased opportunities for products from grasslands. A paper on alternative uses for forages (e.g. biomass, energy) is particularly relevant to current debates on alternative sources of fuel.

The theme on 'Grassland and the environment' illustrates the increasing importance of this topic worldwide. There are both positive and negative aspects of environmental issues in grasslands — they have a role in carbon sequestration but are also sources of contaminants (N, P, pathogens and sediments) as well as greenhouse gases. David Kemp and David Michalk stress the need to find payment and/or market systems that allow environmental values to be enhanced while farm income does not suffer, in determining future management of grasslands. A paper on global atmospheric change highlights the uncertain-

ties with this topic. Projections of climate change and the frequency of extreme weather conditions remain uncertain, and generalisations about the responses of grasslands to global atmospheric change are not possible due to other factors affecting responses (e.g. soil type, nutrient availability) and long-term adaptations of grasslands (nutrient cycling and sequestration).

The papers addressing the 'Delivering benefits' theme are positive with a number of examples of the role of forages in reducing poverty.

XX International Grassland Congress: Offered papers contains 829 offered papers arranged under the 3 themes: 457 on efficient production from grassland; 213 on grassland and the environment; and 159 on delivering benefits from grassland. The papers were reviewed and edited so standard and presentation are reasonably consistent. However, all papers are only one page so most address "small" issues associated with tackling larger issues or interactions between issues.

Within the 3 themes, the papers are broken up into a number of sections. Theme A has 13 sections: 1- Grass and forage plant improvement (72 papers); 2- Animal production (42); 3- Improving quality of products from grassland (17); 4- Grass and forage physiology (18); 5- Forage quality for animal nutrition (81); 6- Impacts of endophytic fungi and other biotic interactions on grassland production (12); 7- Advances in sown legumes (32, on a range of genera including *Siylosanthes*, *Leucaena*, *Arachis*, *Desmodium*, *Centrosema*, *Macroptilium*, *Vigna* and *Clitoria*); 8- Grassland management (23); 9- Integrated production systems (23); 10- Industrial products from grassland (1); 11- Grass and forage agronomy (38, the majority on temperate species); 12- Overcoming seasonality of production (38, again dominated by temperate species); and 13- Animal-plant relations (60).

Theme B has 7 sections: 14- Climate change (13); 15- Greenhouse gases (21); 16- Carbon sequestration (14); 17- Biodiversity in grassland (70); 18- Grassland and water resources (23); 19- Soil quality and nutrients (51); and 20- Multifunctional grasslands (23).

Theme C has 7 sections: 21- Adoption of new technology (21); 22- The contribution of participatory and on-farm research (25); 23- Improved livelihoods from grasslands (24); 24- Tools for grassland management (44); 25- Decision support for grassland systems (17); 26- Participatory research and decision support systems (5); and 27- The role of the IGC and grassland societies in technology interaction and influencing policy (23).

The volume also contains a brief history of the IGC by Ross Humphreys, including an analysis of disciplinary content. All Congresses have devoted large sections to the genetic base for grassland improvement, plant physiology, plant ecology and soil science, complemented by grazing management and animal production from forage. Environmental science, systems theory, socio-economic perspectives and technology transfer have emerged in more recent congresses.

Both books contain sections on advances in sown tropical legume technology. The one-page offered papers outline many success stories from different

regions and Max Shelton and co-authors analyse the reasons for their success. They conclude that vital factors for success are: meeting the needs of farmers; building relevant partnerships; understanding the socio-economic context and skills of farmers; participatory involvement with rural communities; and long-term involvement of champions.

Both books will be useful additions to libraries catering for grassland scientists. The invited papers provide a good summary of the current status of a number of topics, with some useful predictions for the future. Although the offered papers are all short, they are a useful library reference on a wide variety of topics.

John McIvor
Cam McDonald
CSIRO Sustainable Ecosystems

Pastoral systems in marginal environments

Edited by J. A. MILNE. Published by Wageningen Academic Publishers, 2005. 215 pp. Price AU\$70. ISBN 9076998744.

This book represents the proceedings of a satellite conference of the XX International Grassland Congress conducted at Glasgow, Scotland in July 2005. Eight invited papers are presented in full and a further 100 (offered plus poster) papers are presented as abstracts in 3 sections: biological constraints; research advances in soil/plant/animal relationships; and biodiversity, landscape and social issues. Generally, it explores the environmental, economic, social and some political aspects of pastoral marginality in semi-arid tropical and disadvantaged temperate systems across several continents.

The juxtaposition of papers from the European experience (Baumont *et al.*, Eriksson *et al.*), where retention of a much altered environment is the goal and food production almost an incidental issue, alongside papers on degradation of communal grazing lands in (particularly) Africa (*e.g.* du Toit), where food production is of paramount importance, seems curious indeed. Somewhere in between is the Australian and Texan rangeland (Walker *et al.*) experience, where pasture degradation is evident and (apparently) motivated by short-term profit or lifestyle issues.

Ash and McIvor identify rainfall amount and variability, poor soil fertility, variable forage production and variable forage quality as major constraints to successful management of rangelands. In Australian and African rangelands, severe droughts occur every 3–5 years. Livelihoods become increasingly marginal as falling commodity prices and rising costs couple with these environmental constraints. Data from northern Australian rangelands illustrate how infrequently

good commodity prices coincide with good rainfall and pasture growth seasons. Equilibrium/non-equilibrium dynamics are discussed in relation to grazing and forage supply in environments with temporal and spatial variability. Unfortunately, Andrew Illius's presentation on equilibrium/non-equilibrium theory is not included in this book as it was arguably the most interesting address at the conference. However, a good review of these models is available from S. Vetter (2005) in the *Journal of Arid Environments*.

Policy-driven land tenure arrangements are responsible for the marginalisation of pastoral enterprises in central Asia and Australia. The collapse of the Soviet Union in the 1990s caused the disintegration of the infrastructure necessary to maintain 35 M sheep in Kazakhstan. The closer settlement leases in the mulga lands of south-west Queensland were too small to support a grazing family. In all cases, the result of not working within those identified constraints has been environmental degradation, manifested by loss of pasture species and woody encroachment. This degradation stems from management decisions made at all levels (individual, community and government) and these people need to be part of the solution. An example of a community living within environmental constraints in Turkmenistan (Behnke and Davidson) is tempered by an observation of modest expectations within that community.

Lynam's thought-provoking but largely theoretical paper suggests that a greater understanding is needed of processes behind behaviours that lead to undesirable outcomes. He also sees a role for planners to take account of possible outcomes across a range of plausible futures and which of these are likely to be robust. In essence, people and their institutions are responsible for the changes and they must be central to the solution.

Abstracts from poster papers cover a range of expected topics. Managing salinity, landscape engineering and expressing marginal environments in terms of animal productivity (dairy, sheep and beef) are well covered. Given the location of the satellite conference, many abstracts relate to temperate environments, and may not have much relevance to some readers of *Tropical Grasslands*.

This booklet usefully demonstrates the commonality of issues relating to sustainable use of rangelands, whether examined geographically or across the spectrum of societies inhabiting them. There is a gulf between developed (driven by policy and largely urban expectations) and developing worlds (driven by poverty and the need for food production) in the shape of science and even the underlying visions for their respective futures.

Joe Rolfe
Kev Shaw
QDPI&F