REPORT ON A VISIT TO KENYA AND INDIA
14 September – 2 October 2004
FRP Research Scheme R6549, Phase II:
Scaling up the promotion of calliandra in East Africa

Janet Stewart, Oxford Forestry Institute, University of Oxford

ACRONYMS

CGIAR Consultative Group on International Agricultural Research
DST Decision support tool
ICRAF International Centre for Research in Agroforestry (World Agroforestry Centre), Nairobi, Kenya
ICRISAT International Crop Research Institute for the Semi-arid Tropics, Patancheru, Hyderabad, India
IFTS Indigenous fodder trees and shrubs
RELMA Regional Land Management Unit, World Agroforestry Centre, Nairobi, Kenya
SLP System-wide Livestock Programme of the CGIAR

INTRODUCTION

This trip differed from all previous ones under R6549 Phase II, as it did not include any monitoring of project activities. There were therefore no field visits. During the first two weeks I participated in two workshops. The first of these (15-17 September), organised by RELMA in ICRAF, was on indigenous fodder trees and shrubs (IFTS) in East Africa, and the second (21-23 September), on strategies for scaling out fodder innovations, was held at ICRISAT and funded by the CGIAR-SLP. The final week of the visit was spent at ICRAF, Nairobi, developing plans for a decision support tool (DST) as well as dealing with a number of administrative issues relating to R6549.

WORKSHOP ON IFTS, ICRAF, NAIROBI, 15-17 SEPTEMBER

The workshop, Research and Development on Indigenous Fodder Trees in Eastern Africa, was organised by Aichi Kitalyi of RELMA as part of the RELMA-in-ICRAF land use intensification programme. Country studies on the current state of knowledge on IFTS in Kenya, Uganda and Tanzania have been conducted under this programme and were presented on the first morning of the meeting, as well as a preliminary status report on Ethiopia, where the full study was delayed and is now in progress. The rest of the meeting focused on working group discussions about future research possibilities. On the final day I presented the proposal on IFTS (“FOLIAGE”) recently submitted to EU INCO-DEV. Reassuringly, most of the researchable constraints identified by the groups, as well as the research proposed to address them, corresponded quite closely to the work packages defined in FOLIAGE. One area which was identified as important, but omitted from the FOLIAGE proposal, is research to validate the extensive ethno-veterinary knowledge that exists about many of the indigenous species.

An interesting issue that emerged clearly from the country papers was the distinction between ‘most used’ and ‘best/most preferred’, which the authors tended to confuse. For instance Lantana camara was identified among the ‘top ten’ fodder shrubs in all three studies, but this was largely because farmers identified it as one of the most-used species. However it is known to be of low palatability and nutritive value (and potentially even toxic) and its high level of use is probably due more to its
availability during the dry season (caused in turn by its combination of low palatability and rampant, invasive habit) than to any intrinsic worth. Conversely, the best fodder species may be rare and therefore not given due weight in an appraisal based on utilisation level. This is an important lesson for future surveys of indigenous fodder.

Instead of a field visit to local farmers using indigenous fodder, farmers from Kenya, Uganda and Tanzania were invited to the meeting to share their experiences with the other participants. They brought specimens of the species they use which they showed and discussed during a morning session. This seemed a much more effective form of interaction than a typical (usually rushed) field visit, and it raised many interesting issues, including the high importance attached to medicinal (veterinary) attributes of many local species, and differences between countries in the species identified by farmers as important.

**Workshop on scaling up strategies, ICRISAT, Patancheru, India, 21-23 September**

The second workshop, on *Strategies for Targeting and Scaling out Fodder Innovations for Small-scale Farmers in Developing Countries*, was funded by SLP. It had four objectives:

- Review approaches for assessing the demand and targeting opportunities for dissemination of fodder technologies to small-scale producers.
- Share information on success and failure of dissemination pathways and strategies used for scaling out fodder technologies, so as to better understand the innovation process.
- Review options for development of seed multiplication and distribution systems for fodder technologies targeted to small-scale producers.
- Plan a strategy and process for scaling out fodder technologies in India and Nigeria within a project supported by DFID.

Most of the first day was taken up with presentations on strategies for scaling out and case studies on scaling out fodder technologies in South East Asia, West Africa, East Africa, Latin America and the Caribbean, and South Asia. I presented our extension activities under R6549 as the case study for East Africa: the summary is attached as Annex 1 of this report.

The last part of the first day comprised panel discussions of four general issues:

- Objectives, targeting and needs assessment.
- Selection and packaging of technologies.
- Dissemination pathways and institutional alliances.
- Drivers of adoption.

These were intended to draw out generic lessons from the strategy presentations and case studies; but in practice the cases presented were so diverse that this was difficult. Common themes included the importance of partnerships, and the involvement of the private sector, particularly with regard to seed production.

The panel addressing selection and packaging of technologies, of which I was a member, identified twelve key issues in this area:
1. Small-scale farmer forage adoption opportunities need first to be identified through participatory methods, experts’ experience in the area (or in similar situations), market opportunities (see point 5) etc.

2. Forage options should be offered to farmers in a variety of ways: research station plots, on-farm demonstrations (e.g. farmer field schools, farmer groups for technology validation and transfer, champion farmers), extension media (radio, TV, bulletins, technical journals, newspapers, posters, etc.). Farmer-to-farmer communication has repeatedly proven to very effective and should be encouraged in every way possible.

3. Technology options should ideally be developed by farmers themselves, with possible assistance from extension staff, researchers or more experienced colleague farmers.

4. Planted forages should complement other feed resources including crop residues, natural grass, shrubs and tree forages; grain and agro-industrial by-products and kitchen wastes.

5. The entire livestock chain should be looked at, from feed to market products, in order to determine the weak links.

6. The criteria that farmers use in selecting forages and in developing packages should be documented in order to direct future research and technologies.

7. Technology packages need to flexible in order to adapt to a variety of local conditions. Animal preference should be taken into account at early stages, particularly with some legume forages (e.g. *Gliricidia, Calliandra*).

8. Farmers’ technology innovations should be continuously monitored, documented and disseminated. Farmers will sometimes look for alternative methods of forage establishment and utilization, if convinced that certain forages are valuable for their systems.

9. Scaling-out forage adoption is sometimes limited by high seed prices, seed scarcity/timing, quality and high establishment costs. There is often a vicious cycle of low seed demand and supply.

10. Free or heavily subsidized seed can disrupt emerging seed supply initiatives and markets. Seed should always be sold or given as a loan instead of be given for free.

11. When offering new forage options, it is important to select and offer top performing varieties or cultivars.

12. Seed production and delivery systems are the key to meeting needs of poor livestock keepers. Options include seed production at farmer level, or contract farming to meet demand.

The second day of the workshop focused on the DFID-funded System-wide fodder project (*Enhancing livelihoods of poor livestock keepers through increasing use of fodder*) which has been operating for the last two years in India (Andhra Pradesh, based at ICRISAT) and the Northern Guinea zone of Nigeria. This project is implemented by ICRISAT (India) and IITA-ILRA (Nigeria) with a range of NARS and NGO partners in each country. It aims to scale out the adoption of selected fodder interventions which have been researched but not yet effectively disseminated. Both
project areas are semi-arid; the technologies currently being evaluated in on-farm trials and demonstration plots include sorghum/maize-cowpea intercrops, dual-purpose legumes, and forage grasses and legumes in Nigeria; and dual-purpose sorghum and groundnut, as well as mixtures of herbaceous legumes and grasses, in India. After an introductory presentation, the development of plans for scaling out these technologies was addressed by working groups on the following themes:

- Partnerships for scaling out fodder innovations
- Information dissemination (I participated in this group).
- Building capacity of partners to scale out fodder innovations.
- Indicators for assessing impact of fodder innovations on livelihoods.

The findings of the working groups tended to be very generic, because many of the participants had no detailed knowledge about the project under discussion, or even of the project areas, and this made it impossible to make specific recommendations.

The issue of private sector involvement in seed production, particularly with regard to hybrid seed production, was discussed at some length, because one of the technologies being promoted by the DFID fodder project is hybrid dual purpose sorghum developed at ICRISAT. Two concerns were expressed: firstly, the use of hybrids precludes on-farm seed collection and the development of community-based seed systems, raising possible concerns over sustainability issues. Secondly, there are issues of equity, and access for the poor: although 50% of the sorghum and millet grown in India is of hybrid varieties, much of this is probably grown by the 15% of farmers who own 65% of the land. Similarly, in the case of hybrid fodder varieties, the poorest farmers may be less likely to adopt a technology that requires regular purchase of seed.

The workshop finished after two days. On the third, there were field visits to the ICRISAT on-station fodder research plots, and to a local seed company.

**DECISION SUPPORT TOOL**

During the third week of the trip I worked at ICRAF, Nairobi with Steven Franzel and Charles Wambugu on developing a structure and outline content for the decision support tool to be prepared as Output 6 of R6549. We are planning to produce two complementary booklets, both focusing on fodder shrubs for smallholder dairy farmers in the East African highlands:

1. An *extension manual*, aimed at front-line extension workers running trainings for farmers. This will include:

   - An introduction describing the present situation regarding small-scale dairy production in the East African highlands, including both bio-physical and socio-economic aspects; constraints to production; and the role that fodder shrubs can play in alleviating these constraints.
   - A short review of relevant research findings
   - Detailed recommendations on the establishment, management and utilisation of fodder shrubs.
   - Summary information on up to ten important species.

2. A *decision support tool*, aimed at more senior staff within agencies involved in extension (including governmental systems and NGOs), to facilitate decisions on, firstly, whether fodder shrubs are appropriate to their situation, and if so on the best extension approach to use in promoting them. Certain technical decisions will also be supported, including the choice of species, seed supply
systems, and options for establishment and management. The draft outline of the DST is attached as Annex 2.

The extension manual will be designed to stand alone as a “how-to” manual, but the decision support tool will refer heavily to the extension manual, and will be distributed as a pair with it. For instance, the species and establishment/management methods will be outlined in the DST but the reader will be referred to the extension manual for more information. We have chosen this approach because it will allow us to bring the project’s findings and experiences to two different audiences, by addressing both decision-makers and practitioners.

The lead author of the extension manual will be Charles Wambugu (CW), and of the DST Janet Stewart (JS). Steven Franzel (SF) will also contribute to both documents. JC will be responsible for the design, layout and production of both documents as well as providing input to the content.

We agreed on a provisional timetable for the production of the manuals:

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<tr>
<td>Initial drafts of extension manual (CW, except literature review: JS) and DST (JS/JC, except chapter on extension: SF/CW) completed and circulated among authors for comments.</td>
<td>20 October 2004</td>
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<tr>
<td>Drafts of both documents ready for internal and external review</td>
<td>30 November 2004</td>
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<tr>
<td>Review process</td>
<td>December 2004</td>
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<tr>
<td>Final editing, and field testing</td>
<td>January 2005</td>
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<td>Printing</td>
<td>February 2005</td>
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In addition, we identified the following immediate tasks:

1. In collaboration with the GIS unit at ICRAF, to develop recommendation domain maps for as many countries as possible out of Kenya, Uganda, Tanzania and Rwanda (Rwanda the least likely to be possible): CW/SF to follow up.
2. Using two ICRAF booklets on improved fallows as examples, to get estimates from printers in UK and Kenya for production of 1000 copies (DST) and 10000 copies (extension manual): CW in Kenya, JC in UK.

**ITINERARY**

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<tr>
<th>Date</th>
<th>Location and Activity</th>
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<tr>
<td>Weds 15 September</td>
<td>Arr. Nairobi.</td>
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<td>Mon 20 September:</td>
<td>Arr. Mumbai; Mumbai – Hyderabad by air (9W 457)</td>
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<td>Tues 21-Thurs 23 Sept: SLP Scaling Out Workshop, ICRISAT, Hyderabad</td>
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<td>Thurs 23 September:</td>
<td>Hyderabad – Mumbai by air (9W 475); dep. Mumbai on KQ 201.</td>
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<td>Mon 27 Sept – Fri 1 Oct: ICRAF, Nairobi: work on DST.</td>
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<tr>
<td>Friday 1 October:</td>
<td>Dep. Nairobi on KQ102.</td>
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<tr>
<td>Saturday 2 October:</td>
<td>Arr. London (LHR); to Oxford by bus.</td>
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ANNEX 1. Summary of case study presentation at scaling-out workshop

Scaling out fodder technologies in the East African highlands
S Franzel¹, C. Wambugu¹, J. Stewart²
¹World Agroforestry Centre, Nairobi, Kenya.
²Oxford Forestry Institute, University of Oxford, UK

Introduction Smallholder dairying is an important enterprise in the highlands of east Africa. Farm sizes average 1-2 ha and zero-grazing, cut-and-carry systems predominate. Inadequate protein reduces milk production and forces many farmers to spend precious income on commercial dairy meal supplements. In the late 1980s, the International Livestock Research Institute began testing fodder shrubs in the coastal areas of Kenya. In the early 1990s, on-farm trials on fodder shrubs were started in the highlands of Embu District as a collaborative venture of the Kenya Agricultural Research Institute, the Kenya Forestry Research Institute, and the World Agroforestry Centre. *Calliandra calothyrsus* was released to farmers in 1995 and was followed by *Leucaena trichandra*, mulberry (*Morus alba*), and *Sesbania sesban*. Farmers usually produce seedlings of calliandra and trichandra in group nurseries and transplant them onto their own individual farms. Mulberry is planted using cuttings. Farmers plant the shrubs in hedges around fields, along farm boundaries, on contour bunds, and intercropped with napier grass. The shrubs grow rapidly and by the end of the first year, are ready to be pruned for feeding to livestock. Most farmers cut them at a height of about 1 meter to ensure that they do not shade the adjacent crops. Fodder shrubs are usually fed fresh or slightly wilted.

Extent and benefits About 30,000 farmers have planted in Kenya, 10,000 in Uganda, and several thousand more in Tanzania and Rwanda. These are minimum numbers, as they include only those areas where we have reliable estimates. Numbers of trees per farmer vary widely; averages from sample surveys range from 30 to 924 depending on the area surveyed. Seed quantities produced and distributed are not known as most seed flows through the informal sector. A farmer having 500 calliandra shrubs is able to provide about 6 kg of fresh fodder leaves per day to his/her dairy cow, earning an additional $US 98 to $US 124 per year, beginning in the second year after planting. The benefits are the result of either increased milk production or reduced use of dairy meal. The 40,000 farmers with fodder shrubs in Kenya and Uganda have about roughly 250 shrubs each; total net benefits are thus about $US 2,220,000 per year. Farmers also reap other benefits from fodder shrubs not included in the calculation: improved animal health, fuelwood, seed sales, improved manure, quality bee fodder for honey production, and stakes for vegetable production. Environmental benefits are also significant as many trees are planted along contour bunds, reducing soil erosion.

Factors in achieving successful adoption
- Farmers’ demand for fodder shrubs has been high, mainly because the shrubs save cash and require only small amounts of land and labour.
- The project area is noted for the dynamism of its farmers and access to markets is fairly high.
- Participatory methods were used in designing the fodder shrub technology. On-farm trials were farmer-designed and –managed, permitting farmers to innovate.
- Partnerships between researchers and local extension organisations helped to build on local organisational skills and knowledge and reach large numbers.
- Dissemination through farmer groups, instead of individual farmers, economised on scarce training skills and transportation, and ensured greater farmer-to-farmer dissemination.

Factors slowing adoption
- Extension services and NGOs are unfamiliar with agroforestry practices.
• Practices are relatively knowledge intensive and training is required intermittently over long periods, eg., at planting and at harvesting time.
• Shortages of planting material and lack of information about fodder shrubs.

Future of the technology  The future is promising, as intensive livestock production is rapidly increasing in the East African Highlands. In addition to dairy cows, fodder shrubs are important for dairy goats and meat goats. Facilitating projects are needed to ensure that government and NGO extension staff are trained in fodder shrub management. Research is also needed to diversify tree species and identify suitable species for semi-arid and high-altitude areas. There is also potential for including fodder shrub leaf meal in commercial feeds.

References
ANNEX 2. Decision support tool (DST): outline

Provisional title: Promoting fodder shrubs for smallholder dairy farmers in the highlands of East Africa: a decision support tool for extensionists

1. How to use the DST
   • Explain purpose of DST: to assist extension providers to make decisions regarding:
     - whether fodder technologies are appropriate to the area
     - choice of suitable species
     - choices relating to establishment, management & feeding
     - extension approaches and methods
     - seed delivery
   • Explain how to use the decision trees (at the beginning of each chapter): guide reader to options most relevant to their situation.
   • Explain how DST relates to extension manual (EM).

2. Introduction
   • Define the recommendation domain
   • Describe the problem (shortage of good quality feed → animals’ potential not realised), explain how fodder shrubs can address it.

TECHNICAL DECISIONS

3. Areas and systems with high potential for fodder shrubs
   • GIS maps
   • Factors affecting adoption & economic impact

4. Species options
   • Table or decision tree on species selection: refer to EM for more information on species.

5. Sustainable seed supply
   • Local systems: on-farm own-seed collection, local exchange amongst farmers
   • Seed market development, e.g. small packets

6. Decisions relating to establishment and management, e.g.:
   • direct seeding/bare-root seedlings/pots;
   • planting arrangements/niches on the farm;
   • alternative uses and how these affect management, e.g. cutting frequency (less frequent if fuelwood/bean poles also required);
   • feeding – supplement or substitute?

EXTENSION DECISIONS

7. Extension approaches & methods: sensitisation, training
   • Summary of options
   • Potential for working with/through partners
   • Potential for working with groups
   • Choice of methods based on socio-economic context and available resources