CALLIANDRA SEED PRODUCTION

PROJECT R6535

REPORT ON A TRAINING WORKSHOP HELD IN
NAIROBI, KENYA
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SUMMARY OF A CNRD/KARI/KEFRI/ICRAF/FRP TRAINING WORKSHOP 'CALLIANDRA SEED PRODUCTION'

1.0 INTRODUCTION AND AIM

The aim of this training workshop was to:

- Provide training on the reproductive biology of *C. calothyrsus* and assess the implications for improving seed production in the species.

The workshop was organised in collaboration with Programme 2 (Tree Domestication) of the International Centre for Research in Agroforestry (ICRAF). The workshop was held at ICRAF headquarters in Nairobi, Kenya and was combined with a field visit to Embu, organised in collaboration with the Kenya Agricultural Research Institute (KARI) and the Kenya Forestry Research Institute (KEFRI). A list of participants can be found at Annex 1.

The participants were supplied with a number of materials including:

- A folder and notepad;
- Information leaflets to accompany each presentation;
- 'Improving seed production in *Calliandra calothyrsus*: a field manual for researchers and extension workers' (OFI).

2.0 TRAINING PROGRAMME AND METHODS USED

The workshop ran over a period of three days and involved a mixture of presentations, group discussions and a field visit. The programme for the workshop can be found at Annex 2. The workshop began with an informal session in which the participants could introduce themselves to one another, and express their expectations. This session was followed by an introduction to the FRP-funded work and why the workshop was taking place. Presentations were made by Joanne Chamberlain (CNRD) on the findings of R6535 and a large group discussion allowed the participants to share their experiences of seed production in calliandra. These sessions were each accompanied by an information leaflet.

Group discussions were conducted in two further areas and the results presented to the whole group:

1. Designing seed production areas of calliandra
   Two working groups each with a mixture of extension workers and researchers.
2. Needs assessment for new training/extension materials
   Two working groups each with a mixture of extension workers and researchers.

The second day involved a field visit to the Embu. Discussions were held in three seed orchards of calliandra established by ICRAF collaboration with KARI and KEFRI. Each of the three orchards is composed of a single provenance; Embu (local Kenyan landrace), San Ramón (Nicaragua) and Patulul (Guatemala). The material in the seed production presentations was reviewed and discussions surrounding the seed production performance of the orchards were held. Lunch was followed by visits to farmers involved in ICRAF/KARI/KEFRI activities with calliandra and other agroforestry species. Strategies for seed and seedling production on-farm were discussed.

3.0 RESULTS OF THE GROUP DISCUSSIONS

3.1 Designing seed production areas of calliandra

There were two working groups composed of both extension workers and researchers. Each group was asked to address the following question from the perspective of an extension worker:

'*How can farmers in east Africa develop planting systems for calliandra to optimally produce both seed for income generation and fodder for their livestock?*'

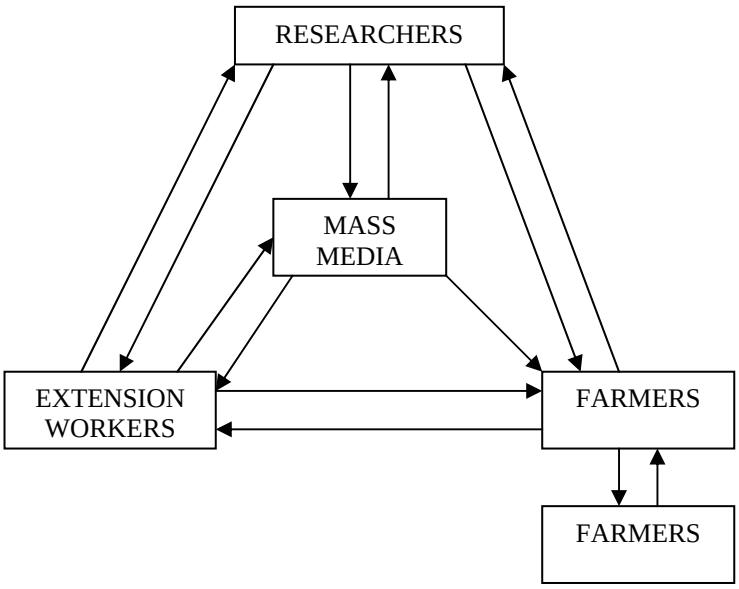
Each group broadly described a typical farm (size, crops grown, climatic conditions) in east Africa. Both groups suggested using a participatory approach to develop planting systems for calliandra that included the following stages:

1. Define appropriate sites for planting calliandra based on bio-physical data
2. Start a programme of farmer sensitisation, awareness creation and consensus building
3. Choose an appropriate seed source (criteria for selecting a seed source included biomass production, fodder quality, ability to produce good quantities of seed)
4. Start farmer training on fodder use and seed production
5. Establish nurseries of calliandra
6. Provide planting options for fodder production
7. Provide planting options for seed production
8. Start farmer training on tree management, seed processing and storage
9. Link farmers to buyers for the sale of seed
10. Use local institutions, e.g. a seed CBO to ensure quality control of seed going to the open market

3.2 Needs assessment for new training/extension materials

There were two working groups composed of both extension workers and researchers. Each group was asked to assess information channels, i.e. where do extension workers get information and how do they pass it onto farmers? They were also asked to assess what types of media are most useful for extension workers and farmers, develop a training model, and prioritise information needs for extension workers and farmers on calliandra seed production.

Information pathways:



Dissemination media useful to:

Extension workers:
- Workshops and conferences
- Technical bulletins
- Simple field manuals
- Pamphlets
- Documentaries (video)
- Meetings and personal contacts

Farmers and CBOs:
- On-farm trials
- Demonstration plots
- Field visits
- Meetings
- Posters
- Simple manuals
- Mass media (i.e. radio, TV, newspapers, agricultural shows, calendars)

Example of a training model:

1. Target areas where calliandra is known to produce seed
2. Create awareness concerning seed production and give training to interested groups.
3. Set up demonstration plots for seed production using farmer's calliandra plots.
4. Give more detailed training on tree management, seed collection, handling and storage.
5. Provide information on marketing outlets for the sale of farmer's surplus seed.

Pay specific attention to:
- Appropriate training
- Knowing the value of calliandra seed
- The number of trees required for maintaining genetic quality
- On-farm seed storage
- Nursery site safety
- Networking between seed vendors and buyers

Ideas for the development of new extension material for east Africa from the calliandra manual

- Include details on seed production within a more generalised manual on calliandra utilisation.
- Include seed processing and on-farm storage within extension material.
- The combination of photographs and illustrations is useful.
- Conduct further research on the pollinators of calliandra in Africa and include details.
- Include a comprehensive list of regional suppliers of calliandra seed.

4.0 WORKSHOP EVALUATION

4.1 Organisers comments

The ICRAF organisers selected and invited the participants who included extension and community workers, and fodder and seed researchers. 25% of the participants were women. The group were very interactive and enthusiastic, and responded well in group discussion sessions.

It was clear from the participants' responses that all were familiar with the use of calliandra, particularly as a source of fodder for livestock. Many of the participants were engaged in, or planning to start, calliandra seed production activities. For example, participants were engaged in the on-station establishment of seed orchards (with high biomass producing provenances of calliandra), work with farmer groups engaged in seed collection,

and the development of on-farm nurseries and seed production. The majority of the participants felt that demand for calliandra seed outstripped current supply, but a need for more networking between seed suppliers and buyers was critical.

In the whole group discussion on day one, many of the participants outlined problems they had experienced with calliandra seed production. These included:

1. A reduction in seed production at a particular site from one year to the next
2. Low seed production at high altitude sites
3. Provenance variation for seed production

Points 1 and 2 are likely to be related to environmental factors, i.e. the drought experienced in Kenya in recent months, and sites above 1800m being less favourable for calliandra growth and seed production.

Provenance variation in calliandra seed production was noted by a number of the participants, with San Ramón being a significantly poorer seed producer when compared to Patulul. Provenance variation in flower and seed production has been observed in a trial plot in Sri Lanka, suggesting there is a genetic component to the control of flowering and fruiting in calliandra. During the visit to the orchards at Embu, variation in flower number, sex and structure could be observed between Patulul and San Ramón. Patulul was just beginning to come into flower, and the majority of flowers examined were bisexual. Flowering between trees in the San Ramón orchard was asynchronous (i.e. some trees had no flowers, whilst others had many closely compacted inflorescences), the flowers were smaller than those of Patulul, less exposed on the tree and there was a higher proportion of male flowers on the trees. Visitors have been observed on calliandra flowers in Embu and include bats at night and birds at sunrise in the Patulul orchard. The primary pollinator at this site is not clear given the limited study that has been undertaken, but it would seem likely that a combination of genetic variation for flower structure and production, provenance responses to the environment and pollinators may be responsible for the differences in seed production observed. Given that San Ramón has been determined as the 'best-bet' provenance for biomass (leaf and wood) production, and is likely to be promoted for planting, its ability to produce seed in exotic environments merits further study.

Participants from Cameroon were expected to attend the workshop, but at the last minute were unable to obtain their visas. Their experiences would have added a valuable dimension to the workshop, but the smaller than expected group seemed to benefit from the focus on east Africa, and the constraints they were collectively under.

4.2 Summary of participants evaluation

Expectations

The participants' main expectations for the workshop were as follows:

1. Increase knowledge of calliandra seed production on-station, on-farm and within communities
2. Increase knowledge of seed orchard design, pollen contamination, seed quality and seed marketing and distribution
3. Have the opportunity to share experiences
4. Get ideas for dissemination materials

The participants felt they had achieved expectations 1, 3 and 4 without any reservations. Some people felt that expectation 2 on calliandra seed production had only been achieved partially. This resulted from the fact that there is a lack of firm evidence for the pollinator of calliandra in Kenya, and this was felt to limit decisions concerning pollen contamination.

Workshop evaluation

The group as a whole was asked what they liked best about the workshop and how they would improve it if it were to run another time. The following responses were obtained:

What the group liked best about the workshop	**How the workshop could be improved**
• Presentations • Informative materials • Size of the group • Field visit • Good interaction with farmers • Time management was good • Participants were very interactive • Gender balance good • Sharing of experiences	• More time for group activities & field visit • Workshop in the field location (i.e. not at ICRAF HQ) to enable more interactive and practical work • Observe bad farms as well as good • Bigger vehicle required for field visit • Improve logistics – hotel arrangements were confusing • Participants should be invited to ICRAF 'Tree Seed Supply Workshop' • Aim for 50:50 gender balance

The Patulul seed orchard of calliandra at KARI's Agricultural Research Station at Embu, Kenya

A community nursery of leucaena and calliandra seedlings sited near Embu, Kenya

Annex 1

List of Participants

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Annex 2

Programme Schedule

Time	Activity	Speaker
Day 1 – November 28, 2000		
08:00	Pickup from hotel and transfer to ICRAF campus	
08:30	Welcome by host organisation	Tony Simons, ICRAF
08:45	**Introduction** To explain the purpose of the training event, give participants time to introduce themselves to each other and identify their interests, and discuss expectations for the workshop.	Jo Chamberlain, CNRD
09:30	**Reproductive biology and seed production** Reproductive biology: its relevance to seed production of *Calliandra calothyrsus* and agroforestry trees species	Jo Chamberlain, CNRD
10:30	Break and group photo	
11:00	Participants experiences with reproductive biology and seed production in *Calliandra calothyrsus*	Participants
11:30	Breeding, sexual and pollination systems and seed dispersal mechanism of *Calliandra calothyrsus*	Jo Chamberlain, CNRD
12:30	Lunch	
14:00	**Seed production and seed orchard design** Seed production in *Calliandra calothyrsus* and seed orchard design	Jo Chamberlain, CNRD
15:00	Working group session Group discussion to explore how seed production areas of *Calliandra calothyrsus* can be designed to meet the needs of different end users	Facilitated by Jo Chamberlain and James Were
16:00	Break	
16:30	Group presentations	Working groups
17:30	Close	

Time	Activity	Speaker
Day 2 – November 29, 2000		
08:00	Pickup from hotel and transfer to Embu	
10:00	Break and introduction to field visit	Charles Wambugu
10:30	Field visit to seed orchards of *C. calothyrsus* to allow a review of the previous days training and discussion of ICRAF/KARI/KEFRI activities.	Jonathan Muriuki
13:00	Lunch at Isaak Walton Inn	
14:00	Visit to on-farm Calliandra activities of the peri-Embu and SLP project	Jonathan Muriuki and Paul Tuwei
16:00	Return to Nairobi	
Day 3 – November 30, 2000		
08:00	Pickup from hotel and transfer to ICRAF campus	
	Introduction to seed manual	
08:30	Review of *Calliandra* seed production manual and its use in the development of additional training and extension materials	Jo Chamberlain, CNRD
	Needs assessment for new training/extension materials	
09:00	Working group session – - Prioritise training needs regarding *Calliandra calothyrsus* seed production - Develop samples of a practical training model for field workers and farmers	Facilitated by Jo Chamberlain and James Were
10:30	Break	
11:00	Continue working group	Working groups
11:30	Group presentation of results from working group session	Working groups
12:30	**Summary and evaluation** Assess usefulness of the workshop and develop action plans	
13:00	**Closing** Comments from CNRD Comments for ICRAF	 Jo Chamberlain, CNRD James Were, ICRAF
13:15	Return to hotel	

Annex 3

Participants' intentions following their attendance at the Calliandra workshop

Name	Sphere of influence	Action Plan
Anne Mbora ICRAF, Nairobi	Research with farmers from 2001	I will use what I have learnt at this workshop: • In managing the ICRAF calliandra seed orchards, and improving seed production. • In on-farm research work starting next year in peri-urban areas of Nairobi, Kiambu, Embu and Meru.
Lillian Akot Shea Project, Uganda	Communities in three districts of Uganda	• Because of shortage of calliandra seed in the area, the workshop will help me to establish seed orchards of both calliandra and other agroforestry tree species. • Some farmers are being supplied with cattle, but there is a shortage of fodder, so I will also educate communities on the different uses of agroforestry tree species.
Patrick Kagorora AFRENA, Uganda	Eight groups of farmers	My work involves promoting biodiversity in the Mabira forest buffer zone in Uganda. I carry out the dissemination of agroforestry technologies to improve productivity and farm incomes. What I have learnt will help me to: • Achieve self-sufficiency in seed production. Calliandra seed is currently being bought from external sources. • The biology has helped me to answer questions on why there may be low seed production, and selecting a site for a seed orchard. • I can now site community and on-station orchards at recommended distances to avoid contamination. • I will emphasise the minimum number of trees required for seed production in order to get seed for other farmers.
James Were ICRAF, Nairobi	More than 500 farmers	I will use what I have learnt at this workshop: • To establish calliandra seed production stands in two more locations (Machakos and Kitui) to see the effect of site on seed production. • Produce a pamphlet on calliandra seed processing and better utilisation. • Carry out more research to establish what the pollinators of calliandra are in Kenya. • Investigate the effect of soil fertilisation on calliandra seed production. • Make available more calliandra seed to my clients.
Jonathan Muriuki ICRAF, Nairobi	Numerous farmers	I will use what I have learnt at this workshop: • For the improvement of seed production stands at Embu. • To introduce the seed concept (production, collection and supply) at the nursery level where I am currently more involved. • Develop strategic partnerships with other stakeholders in order to monitor seed supply. • Observe pollination trends and possibilities. • Encourage on-farm seed production, especially in the peri-Nairobi area.
Stephen Ruigu ICRAF, Maseno	17 villages	• Relocation of the Patulul seed orchard to an area more favourable for seed production. • Start research to identify the pollinators of calliandra in western Kenya. • Increase the size of the seed orchard, so that it becomes a more favourable food source for pollinators. • Ensure adequate isolation of seed stands. • Conduct a management trial on seed production, e.g. the effect of soil fertilisation.

Rhona Ayesiga AFRENA, Uganda	37 groups/250 farmers	I will use the workshop information to: • Start training farmers on seed production for the sustainable supply of seed. • Obtain and store seed for the various institutions/ collaborators that need it. • Continue setting up community seed orchards at a spacing of 3 x 3 m as those I had set up were at 2 x 2 m. • Observe the difference in seed production at different altitudes.
Joseph Machua KEFRI, Maseno	50 groups.	My main area of research is the promotion of leguminous tree species for nitrogen fixation and mycorrhiza enhancement. This involves working with extension workers and farmers in the propagation of leguminous trees and their inoculation with microsymbionts. In most cases the propagation materials are lacking and farmers cannot afford to buy seed. I have therefore started setting up seed orchards on-station and extending the knowledge to on-farm orchards. From this workshop, I will be able to increase the seed production from calliandra orchards, by improving pollination and soil fertility.
Patrick Musamula Floral Products, Kenya	75 farmers	I will: • Invite the farmers and brief them on the application of reproductive biology to improving seed production from calliandra seed stands. • Use the information as a reference for future work involving planning for the production of seed on-farms, and for training other interested stakeholders, e.g. schools, extension workers and other organised groups.
Paul Tuwei KEFRI, Embu	20,000 farmers	I will use what I have learnt at this workshop: • To encourage farmers to increase the number of trees for seed production. • Improve the siting of seed orchards. • Pass the information learnt to my colleagues and extension agents and thus de-mystify the pollination of calliandra.
Peter Angaine KEFRI, Nairobi	Numerous groups	I am involved in seed production and distribution both locally and internationally. I will use the information to establish calliandra seed orchards, which I hope will be more productive than our current seed orchards (under KFSC/KEFRI). I will also advise our clients (mainly farmers) on the best way to establish calliandra seed production units on their farms.
Josephine Wanjiku KEFRI, Nairobi	5 farmer groups and extension agents from government ministries	The farmer groups I am involved with are raising calliandra and other tree species in their own nurseries. On out-planting, I will be able to advise them on how to manage calliandra for seed production on-farm. I will also sensitise farmers on the value and storage of calliandra seeds. I will use the information in the development of agroforestry training materials of which seed production is a topic to be included.