

**Proceedings of the 1st Annual Regional Programme
Meeting of the Forages for Smallholders Project –
Phase II**



**'Scaling-up of participatory forage technology
development'**

**Samarinda, East Kalimantan, Indonesia,
15 – 19 January 2001**



SB
193
.933
C.2

**Proceedings of the 1st Annual Regional Programme
Meeting of the Forages for Smallholders Project –
Phase II**

**‘Scaling-up of participatory forage technology
development’**

Samarinda, East Kalimantan, Indonesia,
15 – 19 January 2001

C.2



alpha

Edited by R.L. Roothaert and J.N. Samson

CIAT, 2001

Opening Speech of Governor of East Kalimantan



Assalamualaikum Warahmatulahi Wabarakatuh

Honourable General Director of Cattle Raising Project
Honourable Representatives of Centro Internacional de
Agricultura Tropical (CIAT)
Chairman of DPRD of East Kalimantan
Chief District Office Department of Agriculture
Chief Department of Agriculture
Guests and participants

I invite all in happiness.

First of all, let us praise and thank God for allowing and providing us the time, venue and resources to attend this 1st Annual Regional Program Meeting of FSP Phase II.

Ladies and gentlemen

It is an honour for the local government of East Kalimantan Province to be chosen again as the venue for this year's international meeting of Forages for Smallholders Project participated by several countries such as the Philippines, China, Vietnam, Thailand, Lao PDR and by our very own representatives from Indonesia.

We would also like to take this opportunity to acknowledge the support and efforts given by the Forages for Smallholders Project for the realisation of this meeting.

God has given us a home we called Earth, enriched with various flora and fauna created for human benefits. With the right human interactions with nature and the environment, we can create a harmonic and prosperous life for all of us.

By carrying out this meeting to discuss the prospects of forages in Southeast Asia, it is perceived that this will not only serve as a starting point of co-operation and commitment of all country participants in the development of our forage resources, but it will as well aim to achieve a common goal of serving smallholder farmers the needed technology for their cattle production. I consider the activities conducted and extended by the Forages for Smallholders indeed helpful to our cattle raising industry in East Kalimantan, and in the nation. I hope the FSP project will remain in support of our meat production program in East Kalimantan as well as in support of our national programs for the years to come. We hope to achieve our objective of becoming sustainable and self reliant in terms of meat production by 2005 for the nation, and by year 2010 for East Kalimantan.

I am indeed grateful that FSP project has introduced all over Southeast Asia a grass varieties considered to be productive, floodwater tolerant and has a good rooting system. Its adoption in the districts of East Kalimantan has been considered to be a value added for our Agriculture sector. In that case, I will ask the husbandry official of East Kalimantan to develop that kind of excellent grass throughout East Kalimantan area in order to increase the quality and quantity of our livestock (cow, buffalo, goat and deer) production.

Based on our census, there is still about 5 million hectares of dry and marginal land in East Kalimantan potential for grazing. I find this an opportunity as well as a challenge for the livestock officials of East Kalimantan to motivate their farmers and businessmen to utilise and transform these marginal lands to productive grazing areas. By doing so, it will enhance the production of cattle.

To end my welcome address, let me say to you "Bismillahirrahmanirrahim" to officially open the 1st Annual Regional Program Meeting for FSP Phase II.

Wassalamualaikum Warahmatulahi Wabarakatuh

Governor of East Kalimantan

H. Suwarna Abdul Fatah

Introductory remarks

Honorable Governor of East Kalimantan Province, Honourable Head of Regional Office of Ministry of Agriculture of East Kalimantan Province, the representative of the Director General of Livestock Services, guests and participants,

On behalf of CIAT, the International Center for Tropical Agriculture, I also welcome all guests and participants to this meeting of the Forages for Smallholders Project. I have been here on two previous occasions and it is a pleasure to return and meet old friends.

We are grateful to the Governor of East Kalimantan and the Director General of Livestock Services for their permission and support in holding this meeting in Samarinda, to the Head of the Training Center for permission to use these facilities, and to the Organising Committee.

As mentioned, the theme of the Meeting is: **"Scaling-up of participatory forage technology development"**.

The points to note here are 'participation' and 'scaling-up'. By 'scaling-up' we mean "dissemination" or "extension" of forage technologies that have been developed by participation between researchers, extension staff and farmers.

The participants at this meeting represent the researchers and extensionists who are facilitators in the process. We are missing the **farmers** who are often the real innovators and the enthusiasts in the process of developing and expanding forage systems. However, we will be visiting some farmers during the week.

During the first phase of the Forages for Smallholders Project, we developed a group of enthusiastic researchers and extensionists who became 'champions' of participating with farmers in the development of new forage systems. Many of you are here to day which shows that you are indeed still enthusiastic. We are also happy to see some new faces. We hope that you become equally enthusiastic and experienced.

In the second phase of the project we need to involve a much larger group of persons **if** we are going to reach large numbers of farmers and have a large impact on improving farmers' incomes. Are you, the 'champions' of the farmer participatory process able to enlist the support and train others in the methods we use? How have you gone about passing on some of your responsibility to others?

This week we will hear how you have gone about the process of scaling-up or dissemination, the lessons you have learnt and the need in the coming years for making changes and new inputs. We might call this Monitoring and Evaluation (M&E), that is, what has been the impact of your efforts? We will hear what has been done in M&E and how we can make this process more useful to those collecting the information.

We talk about the **FSP Project**. What is a project? What are our roles in the project? What do we expect from a project? Training, new ideas, status, allowances? From the perspective of CIAT, we see a project as providing some new ideas, training people and providing some "seed" funds to introduce these ideas and training. However, we also hope that the Phase II of the project becomes fully integrated within your own programs with financial support by the governments in inputs to the project.

I take this opportunity of acknowledging that the Province of East Kalimantan has always been very supportive of the FSP project and made additional resources available for the operation of the project. We appreciate this. Thank you Honourable Governor and Staff in the Ministry of Agriculture.

It also suggests that there is an expectation by the Province that the project will bring something useful in terms of increasing the welfare of the farmers and increasing outputs of the Province. We only learnt yesterday that East Kalimantan imports 30,000 cattle each year to meet its needs. I believe that the project is contributing to these objectives. For example in one district, Sepaku, farmers now have 1,500 head of cattle. Unfortunately the demand for cattle has been so great they are selling their female cattle that are needed as breeders to increase livestock numbers.

I now wish to introduce the Coordinators of the FSP project:

Ralph Roothaert, Regional Coordinator FSP
Ibrahim, Coordinator Indonesia
Ed Magboo, Coordinator Philippines
Le Hoa Binh, Coordinator Vietnam
Chaisang Phaikaew Coordinator Thailand
Phonepaseuth Phengsavanh Coordinator Lao PDR
Yi Kexian Coordinator P.R. China

On behalf of CIAT, I thank all who are contributing to the project. In the short time I have been here, I can see that there has been a smooth transition from Phase I to Phase II of the project. On your behalf, I acknowledge the efforts that Ralph Roothaert, the Coordinator for the Forages for Smallholders project, in working with you to ensure this has happened.

Finally, I look forward to joining with you in a stimulating meeting and listening to your contributions and ideas.

Peter Kerridge, Coordinator CIAT-Asia

Table of Contents

Opening Speech of Governor of East Kalimantan	1
Introductory remarks	3
Table of Contents	5
1 Dissemination of forage technologies: how has it worked and what are the plans for 2001 and 2002?	8
1.1 Dissemination in China	8
1.2 Dissemination in Indonesia	11
1.3 Dissemination in Lao PDR	17
1.4 Dissemination in the Philippines	22
1.5 Dissemination in Thailand	30
1.6 Dissemination in Vietnam	34
2 FSP Forage multiplication systems - how have we moved forward since the beginning of FSP-phase I?	39
2.1 Forage multiplication systems in China	39
2.2 Forage multiplication systems in Indonesia	42
2.3 Forage multiplication systems in Lao PDR	44
2.4 Forage multiplication in the Philippines	46
2.5 Seed multiplication system in Thailand	48
2.6 Forage multiplication systems in Vietnam	51
3 Participatory research proposals	54
3.1 Guidelines on developing participatory research proposals	54
3.2 On-farm nurseries of fodder trees	54
3.3 Research issues	57
4 Indigenous Fallow Management Network	58
4.1 ICRAF South East Asia and National Partners work together on fallow management issues	58
5 Forage for Smallholders Project - Workplans for 2001	61
5.1 Workplan of Hainan Province, China	61
5.2 Workplan of East Kalimantan, Indonesia	64
5.3 Workplan of Lao PDR	67
5.4 Workplan of Bukidnon province, Philippines	70
5.5 Workplan of Cagayan de Oro City, Philippines	75
5.6 Workplan of Thailand	78
5.7 Workplan of Tuyen Quang Province, Vietnam	80
5.8 Workplan of Daklak Province, Vietnam	83

6	Concluding remarks	87
7	Appendices	89
7.1	Programme	89
7.2	List of Participants	91
7.3	Seed availability and requirements	94

List of Tables

Table 1.	Distribution of forage species by provinces.	8
Table 2.	Farmer Participatory Research commenced in Hainan Province in Baisha, Danzhou and Ledong Counties.	9
Table 3.	Villages in different provinces where farmer participatory research might be introduced.	10
Table 4.	Number of farmers adopting FSP forage technologies.	13
Table 5.	FSP staff in Indonesia.	15
Table 6.	Field Activities during the year 2000.	16
Table 7.	Number of staff in Lao PDR.	20
Table 8.	Number of farmers in 2000, Lao PDR.	20
Table 9.	Forage development at Malitbog, Bukidnon in year 2000.	25
Table 10.	Species of Forages planted on-farm in Malitbog, Bukidnon.	26
Table 11.	Forage development at Cagayan de Oro City, year 2000.	26
Table 12.	Species of Forages planted on-farm in Cagayan de Oro, Misamis.	27
Table 13.	Present Collaborators in the Philippines.	28
Table 14.	Livestock numbers in Nakornratchasima Province.	31
Table 15.	Livestock and farmers in 4 districts in Nakornratchasima Province.	31
Table 17.	Methods of planting and utilising forages at focus sites, Vietnam.	34
Table 18.	Farmers' preferences for species - results from participatory evaluation.	34
Table 19.	Site development from 1995 to 2000.	35
Table 20.	Results of dissemination in 2000.	36
Table 21.	Future Plans of FSP, Vietnam.	37
Table 22.	Ten new forage varieties released in China.	39
Table 23.	Planting materials production in CATAS (tons).	39
Table 24.	Forage species that farmers want to multiply.	40
Table 25.	Seed, cuttings and splits multiplication by farmers.	40
Table 27.	Price list of legumes in Cagayan de Oro.	47
Table 28.	Price list of vegetative planting materials in Cagayan de Oro.	47
Table 29.	Forage grass seed produced in the year 2000.	49
Table 30.	Forage legumes seed production in the year 2000 .	50
Table 31.	Seed production for other FSP countries in 1999.	50
Table 32.	Seed produced in 2000.	52
Table 33.	The demand of seeds for dissemination for the next two years.	52
Table 34.	The demand of vegetative planting material.	52
Table 35.	Plans of seed production.	53

1 Dissemination of forage technologies: how has it worked and what are the plans for 2001 and 2002?

1.1 Dissemination in China

Yi Kexian

1.1.1 Introduction

Farmer participatory research in forage technology development has only recently been commenced by CATAS in China. However, we have been involved in disseminating improved forage species from CATAS to districts in Hainan and to other provinces in the south of China.

CATAS has the national responsibility for identifying improved tropical forage germplasm. Our strategy has been to distribute the selection of new forage germplasm identified at CATAS to as many other provinces as possible.

We have selected persons with an interest in evaluating forages in their areas and then providing them for evaluation by farmers. Distribution has been made to several provinces mentioned in Table 1.

Table 1. Distribution of forage species by provinces

Province	Responsible staff	Number of species or varieties
Hainan	Mr.He Huaxuan	10
Guangxi	Mr.Wu Mei Yan Mr.Tian Yinong Mr.Li Yuyuan	14
Guangdong	Mr.Chen Shanyou	14
Fujian	Mr.Zhuo Kunshui	14
Sichuan	Mr.Zhou Jiashuo	12
Yunnan	Mr.Ma Kunpei	11

Participatory research started in several counties of Hainan province (Table 2). Farmer participatory research is facilitated by CATAS scientists in collaboration with staff from the towns. There are only two district staff involved at this time in Hainan.

Table 2. Farmer Participatory Research commenced in Hainan Province in Baisha, Danzhou and Ledong Counties.

Country	Town/District	Village	Number of farmers
Danzhou	1	1	5
Baisha	1	1	10
Ledong	1	1	5

1.1.2 Process of dissemination...distribution of species to provinces

Sites were selected where there were forage agronomy staff who indicated they wished to collaborate with the evaluation of new tropical forage varieties. They were sent seed and planting material. Guidelines were given for evaluation also. Some carried out the evaluation directly with farmers. Others carried out the evaluation on-station.

Follow up visits to some sites suggested some changes should be made in the future.



- In some cases forages were evaluated by farmers who did not need the forages.
- In some cases grasses were not planted correctly.
- In future more detailed instructions need to be provided on things such as sowing rate and planting depth and seedling maintenance.

In Hainan, where we have commenced farmer participatory research directly with farmers, the experience was different. We sought out the villages with the poorest people. Many farmers expressed interest but we could not work with large numbers at the beginning.

A decision was made to select key individuals in the village who could work with others, e.g. the head of the village. Then we agreed to work with some who even did not have animals but wanted to start feeding rabbits and goats, and then we selected the poorest among the group.

A group meeting was held to explain some knowledge about forages and how forages might be used and managed. Then they were asked how many varieties they would like to evaluate by showing them photos of forages and explaining what they might be used for.

When forages are sent to large farmers who have a real need, they can extend the forages very rapidly. Small farmers take longer to think and plan about extending the forage area because

they do not have as much knowledge, fewer resources and may not even have enough animals. Seed and planting material was then sent to the farmers and staff went to give instructions for planting and maintenance.

Follow-up visits showed that farmers had little knowledge of planted forages and how to manage them. Some did not follow suggestions and planted forages too deep so that they did not germinate. Others were wondering how large and fast the forages would grow. A visit was made to CATAS to show them what mature forages looked like.

1.1.3 Lessons learnt

Farmers who have not grown forages need time to learn how to grow and manage them as well as just being given instructions. It would have been best to have taken them on a field visit to the research station to show them the different forages before they were given the seed. Working with small farmers with limited experience is a much slower process than working with larger farmers who have had experience and strong need.

In future, we would select key farmers who appear to have a real need for more feed, that is, they have animals but not enough feed. They should also have some ability to overcome difficulties and problems. The poorest farmers may need other assistance than just giving them forages, e.g. a pair of rabbits. The farmers are still interested in working with us to increase the number of animals that they can sell to improve their lifestyle. We also want to continue working with them.

1.1.4 Future plans up to 2003

There is a need to train town, district, and province staff in farmer participatory research. Because of the early stage of the farmer participatory research process, we have not commenced farmer to farmer visits. We plan to commence this year.



Table 3. Villages in different provinces where farmer participatory research might be introduced.

Villages	2000	2001	2002
Hainan	3	6	12
Guangxi	1	3	5
Fujian	1	3	6
Sichuan	1	3	6
Yunnan	1	3	6

1.1.5 Questions and answers

- Q:** What is the state of your forage resources before FSP? **A:** We already have 400 accessions for evaluation which are used to cater semi-government companies demand. There is already an intensive processing of leaf meal in China.
- Q:** What is your criteria in the selection of farmers? **A:** We select the poorest of all poor in the area
- Q:** How much is the cattle population in China? **A:** Buffaloes and cattle are about 1.5 million
- Q:** How do you collect seed and leaves from *Stylosanthes* for leaf meal? Because in Indonesia, we find it difficult to collect it for feeding chickens. **A:** We harvest stylo seeds by hand, cut the material and dry, then thresh and cleans.
- Leaf meal from stylo is done by two big factories in China, the plantation is planted just around the factories
- Stylo is also popular feed for chicken in China because it provides carotene for better yolk color.

1.2 Dissemination in Indonesia

Ir. Ibrahim

1.2.1 Introduction

The size of East Kalimantan 1,5 times Java island and Madura

East Kalimantan consists of (Figure 1):

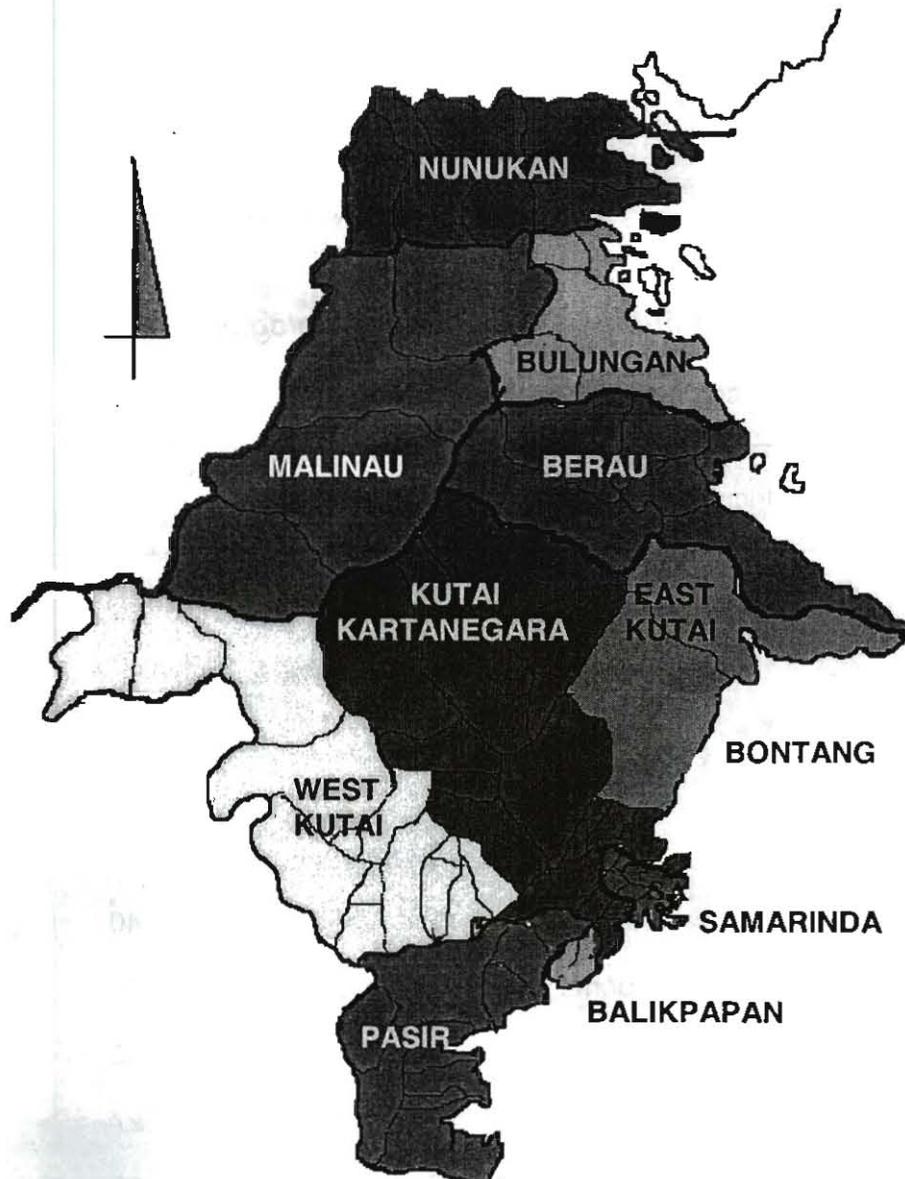
- **4 Municipalities**
 - Balikpapan
 - Samarinda
 - Tarakan
 - Bontang

- **8 Districts**
 - Pasir
 - West Kutai
 - Kutai Kartanegara
 - East Kutai
 - Berau
 - Nunukan
 - Bulungan
 - Malinau

1.2.2 FSP mandate area in the year 2000

- 2 municipalities - Balikpapan and Samarinda
- 4 districts - Paser, Kutai, Berau, and Bulungan
- Focus site 2 site locations
 - Sepaku II (Lestari Farmer groups)
 - Makroman (Maju And Sidodadi Farmer groups)

Map of east Kalimantan Province



1.2.2 FSP activities in the country

Training of technicians and development workers in the province.

- 15 participants have been trained in Samarinda, collecting secondary data in new districts and sub districts.
- 3 persons attended inception meeting in Los Banos, Philippines, February, 2000
- 1 person attended the workshop on Gender analysis in Hanoi, Vietnam, March 2000.
- 2 persons attended workshop on Participatory monitoring and evaluation in Cagayan de Oro City, August 2000.

Districts activities

- Collecting secondary data
- To collaborate with District livestock services
 - to discuss the work plans
- to discuss training opportunities for development workers

1.2.3 Number of farmers adopting FSP forage technologies

Table 4. Number of farmers adopting FSP forage technologies.

District /Municipality	Sub districts	Villages	Farmer groups	No. of members	No. of farmers planting
Samarinda	Smd. Ilir	S. Sari	Srejeki	20	7
		Makroman	Lestari	28	10
Balikpapan	B. Utara	K. Joang	Wonoyoso	20	7
Pasir	Sepaku	Sepaku I	E. Makmur	33	15
		Sepaku IV	T. Harapan	34	25
Kutai	Loakulu	Loh Sumb.	Sari Tani	40	20
	Anggana	Sidomulyo	H. Makmur	25	12
	Samboja	T. Harapan	B. Karya	42	15
Berau	T. Bayur	Labanan	Karya tani	27	7
Bulungan	T. Palas	G. Putih	Simba	30	8
Total				301	126

1.2.4 Forages species that have been planted

- Grasses:
- *Andropogon gayanus* CIAT 621
 - *Brachiaria humidicola* CIAT 6133
 - *Brachiaria humidicola* cv. Tully
 - *Brachiaria brizantha* CIAT 6780
 - *Brachiaria decumbens* cv. Basilisk
 - *Paspalum atratum* BRA 9610
 - *Setaria sphacelata* cv. Splendida
 - *Panicum maximum* cv. Mott

- Legumes:
- *Stylosanthes guianensis* CIAT 184
 - *Centrosema pubescens* CIAT 15160
 - *Gliricidia*
 - *Calliandra calothyrsus*
 - *Leucaena leucocephala*
 - *Sesbania grandiflora*

1.2.5 Process of dissemination

How farmers or farmer groups are selected :

- Information from secondary data
- Information from sub-districts, villages and field workers.

Reasons for working with farmer groups:

- Easy to collect data in farmers meeting.
- Easy to give information.
- Farmer groups as learning cycle.
- Transparency.
- Easy to compare activities of each farmer.
- They have common interest.
- If somebody has a problem, there are many suggestions for solving problems.



Working with Individual Farmers:

- Direct contact with the household of the farmer.
- More opportunity for each farmer to give feed back; some farmers are more interested.
- Farmer needs to receive appreciation.
- First farmer to adopt the technology.

Starting the activities:

- Collecting secondary data: in which area is there potential to develop forage technologies?
- Key farmers talk about the benefit of forages and difference among forage species in the farmers meeting.
- Conducting participatory diagnosis and participatory planning.
- To make small plots in the farmer area.
- Field days and cross visits.
- Conducted participatory monitoring and evaluation.

Experiences on participatory approach in the field:

- In participatory approach we can not demand from the farmer to adopt our activity.
- We have to be patient and need time for the process developing the new technology.
- There is a need for small demonstration plots in the farmer land.
- There is a need for transparency to the farmer.
- There is a need for planting material to introduce forage species, such as seeds, cuttings, or splits.

Table 5. FSP staff in Indonesia.

Province	District	Hum. Res.	Area
Ibrahim	Pasir: Amiruddin	Heryanto Burhanuddin Masturi Cholid	Sepaku(CoorPs.Belengk. Sepakulil Sepaku I&IV
M.F.Anam	M.F.Anam Kutai Aji and Yuli	Sugeng W Tri B Murjani Nurmaliana Joko Widodo Mahmud	Loakulu (Co Loh Sumber Anggana Sidomulyo Samboja T.Harapan
	Balikpapan Bagyo R.	Maryana Dwi Ng.	Kr.Joang Kr.Joang
	Samarinda B.Sugiri	Tugiman(Co	Makroman
	Berau Rizani	Munaji	Labanan Jaya
	Bulungan Harto S.	Mujiono	Gn.Putih

Table 6. Field Activities during the year 2000.

Activities	Objective	Time	Involved staff	Farmer reaction
Collecting secondary data	To know the potential the new area	April - July	Development worker, Involved Staff Coordinator, FG	Farmers were interested in the new activity
Participatory diagnosis	Problems and solutions to make maps, seasonal calender, and to know farming system	April - August	Development worker, FG, key farmer, other stake holders	Farmers were interested in new approach. It provides transparency and feed back.
Participatory planning	To make Plans for Planting forages	April - July	Development worker, FG	Farmer ready to prepare the land and planting.
Forages extension	To increase the know-ledge about the forages species	April - December	The key farmer, Development worker, Coordinator, Farmers	Many questions and feed back.
Cross visits	Cross visits	September - October	Development worker, Farmers, other stakeholders	Farmers were very interested – some will develop the technology
Field day	To compare the result with their activities	August - October	Farmers, Development worker, Researchers	Farmers were interested and gave much feed back.
	Identification of sweet potatoes	July	Farmer, Development worker	Farmers found it suitable for ruminants feeding
	To emphasis growth of Imperata	July-August	Farmer crops, Development worker	Farmers oversowed Stylo in Imperata areas
	To distribute to the farmer	May-July	Farmers, Farmer groups, Development worker	Farmers raised tree seedling in poly-bags.
	To control erosion and improve the land	July-December	Farmers, Development worker	Farmers used forage strips and hedgerows on the contour.

1.2.6 Future Plans up to 2003

Development of staff

Scientists:	12
Development workers:	50
Other staff:	10

Scaling out

NGO's to work with:	5
Number of villages:	40
Number of districts:	12

1.2.7 Questions and answers

- Q:** What do you think are the common factors that affect the adoption of forage technology?
- A:** Time saved by the farmers from cut and carry system. Before they need to walk a long way, taking them about 1-2 hours walk.
- Q:** How are key farmers selected?
- A:** Usually, these are the farmers that lead the group. Other farmers who display large interest on the project can also be key farmers. There can be 2 – 4 key farmers in a farmers group. They are not always the chairman of the group.
- Q:** Less than 50 % in a group plant forages?
- A:** These are group of new farmers. Only a portion, the innovators begin evaluating in the first year
- Q:** How is technology disseminated?
- A:** Farmer to farmer. Farmer A to B and then key farmers from A visit B. Some farmers take the initiative in asking for assistance

1.3 Dissemination in Lao PDR

Phonepaseuth Phengsavanh

1.3.1 Overall strategy

The FSP is coordinated by two organization at National level; NAFRI and DLF. The Project is implemented in 3 provinces and 5 districts through PAFO and DAFO. In each district, teams of extension workers were formed, each team consisted of 2 persons responsible for 1 to 2 sub-districts with 10 -15 villages each.

Steps:

- Each team begins with 2 villages.
- We attempt to have team men and women.
- We build on past experience of FSP.
- Old villages are used as focus villages.

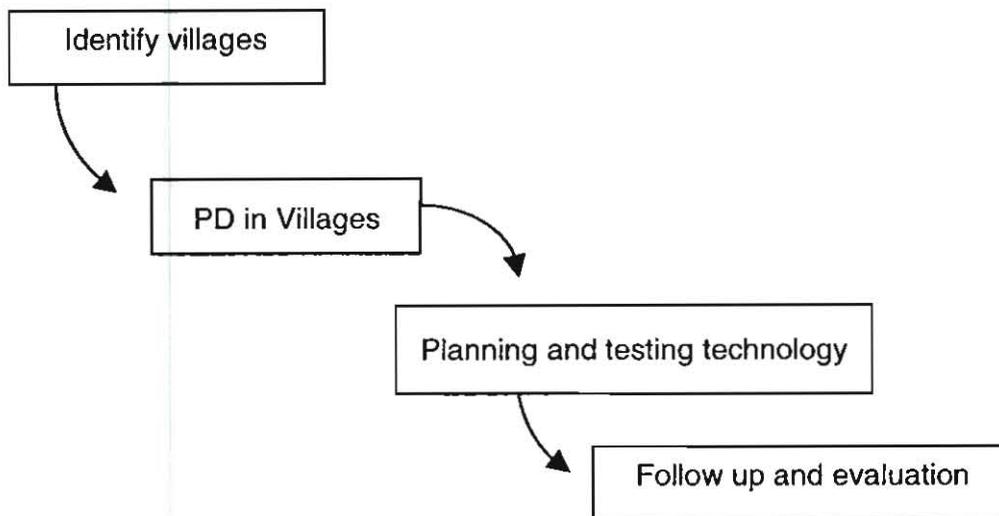
Training

- On-job training for National, Provincial and district on participatory diagnosis, participatory evaluation and basic agronomy.
- New trainees accompanied by experience persons to implement activities.

Seed multiplication

- On-station seed multiplication.
- On-farm seed multiplication.
- Farmer seed multiplication.
- Village nurseries.

1.3.2 Implementation of dissemination



Village and farmers selection

- Are there farmers in the community who recognise an important problem?
- Do these farmers feel this problem is important enough to commit their time in working towards a solution?
- Are there many farmers and other communities who have the same problem?
- Do we have potential solutions to offer which can provide substantial benefits?
- Are there active local people are committed to work with farmers to solve this problem
- Are there farmers who already trying to solve this problem?
- Are there farmers who may champion these technologies?

How did we start?

- Contact with local development workers, who have deep understanding and situation of the areas.
- Secondary information collecting.
- Follow by visits to the villages.

- Problem and opportunity diagnosis.
- Offer technical options to farmers (If any).

Follow up

- Working closely with farmers (during trial period of new technologies).
- Evaluation of new technologies that tried by farmers.
- Planning.

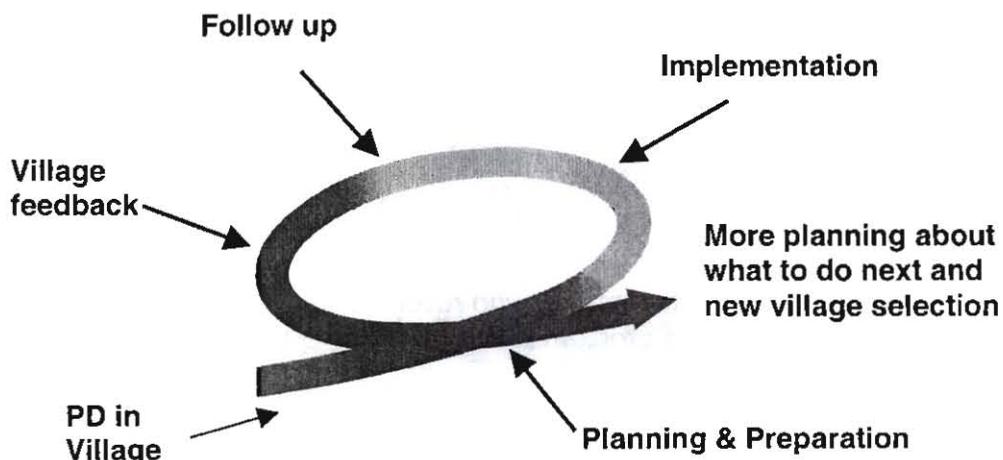
Training

- 1 training of Basic agronomy and technology option.
- Forage species.
- Technical options for farmers.
- 1 training of Participatory Research.
- Basic skills in working with farmers.
- Participatory evaluation.



Cross-visits for district staffs

- 5 cross visits for district staffs from one to another districts were organized to share experiences and help each other.



The implementation cycle for dissemination used in Lao.

Table 7. Number of staff in Lao PDR.

Provinces	1999	2000
Luangphabang	4	11
Xiengkhuang	3	8

Table 8. Number of farmers in 2000, Lao PDR.

	In the beginning of wet season	At present
Luangphabang	262	170
Xiengkhuang	135	120
Savannakhet	5	5
Drop out		92



1.3.3 Experiences and recommendations

- Careful site and farmer selection are essential at the early stages of on farm technology development.
- Basic communication skills; such as listening, questioning, facilitation; and regular visits with farmers were important.
- Quick support/ action to farmers after visiting were needed.
- Start working with small number of farmers that you can manage and support well. Farmers sometimes would like to look at the success of their neighbour first.
- In Laos, farmers have used a range of forages for different use rather than one particular species.
- There are many different potential benefits of forages on farm but the entry point is almost always as a livestock feed.
- Getting local development workers actively involved was essential. It is not enough just to have good people in districts, but it is important to get them involved.
- Local success, experience and farmers innovation need to be documented.
- Create opportunities for experienced people to mentor new staff.

1.3.4 Future plans

Dissemination

- New site selection, introduction visits to farmers in target villages.
- Problem and opportunity diagnosis.
- Offering technologies to farmers and farm visits.
- Cross visits for district development workers.
- Farmer cross visits (farmer to farmer).

Training

- Formal and On-job training for new staffs on:
 - Technology development / technology options.
 - Participatory approaches.
- Farmer meeting and training on techniques and technologies.

Where will we work?

- 3 provinces,
- 5 districts
- 20 villages

Who will we work with?

- Provincial and district agriculture office, Rural development office, Lao Women Union.
- Projects and organisation (EU, UNDCP, GTZ).
- Number of staff in each district that will full time to work with project is targeted at 6 people; 40-50 villages with about 600-800 farmers.

1.3.5 Questions and answers

- Q:** In year 2000, how many farmers are new? **A:** 25% new farmers. Luang Phabang has 170 at present but will look for 60 to 70 new farmers.
- Q:** What is the impact of this program in terms of production? **A:** Mostly used forage to try to solve problem in the dry season. We cannot show effect on livestock yet. Forages are also being used for sick cattle and young cattle
- Q:** How do you offer technology options for the community? Is it through linkages with the government and other institutions? **A:** We make linkages with the National Government. We try to offer a lot of options, not only FSP. We try to prioritize the best technology for the farmers' development.
"We need something to offer the farmers, and not just collect data from them."
- Q:** Do you work with individuals or groups? **A:** We do not have the time to go to each individual farmers. Therefore we try to work with groups or champion farmers who can extend the knowledge.

First we work with the community and then an interest group. After this, we work with group and individuals but wish to work more with groups.
- Q:** Any incentive for the participation of women? **A:** Women farmers have to be recognized as an important component of the farming system because most of the young livestock are being taken care of by them.

1.4 Dissemination in the Philippines

Ed Magboo, Judith Saguinhon and Perla Asis

1.4.1 Introduction

The forages for smallholder project (Phase II) which is now being supported by Asian Development Bank (ABD) through its technical assistance program took off from FSP-Phase I which was then supported by AusAID and ACIAR. The current project focuses on expanding the gains of FSP-Phase I in terms of forage development at smallholder farms in the uplands. In the Philippines, the activities for 2000 were initiated in two existing focus sites and several expansion sites. The FSP-Phase II in the Philippines is still being co-ordinated by PCARRD with the local government units of Bukidnon and Cagayan de Oro City as the principal collaborators, and by CIAT at the regional level.

1.4.2 Forage technology development and dissemination

The project is being implemented following the basic principles of bottom-up-participatory process. On every activity, the basic principles were adhered too. Hence, the basic methods such as participatory diagnosis, participatory planning and consultative meetings and workshops were used in the process.

Malitbog, Bukidnon

- Selection of new barangays.
- Participatory diagnosis & planning.
- Informal training with farmers.
- Forage establishment by farmers.
- Farmer to farmer visits.
- Technicians training.
- Farmers cross visit.



Cagayan De Oro

- Expansion of forage planting by farmers.
- Informal training with farmers.
 - › animal feeding
 - › milk production
 - › milk processing
- Animal health services.
- Technicians training.
- Farmers cross visits.

Impasugong, Bukidnon

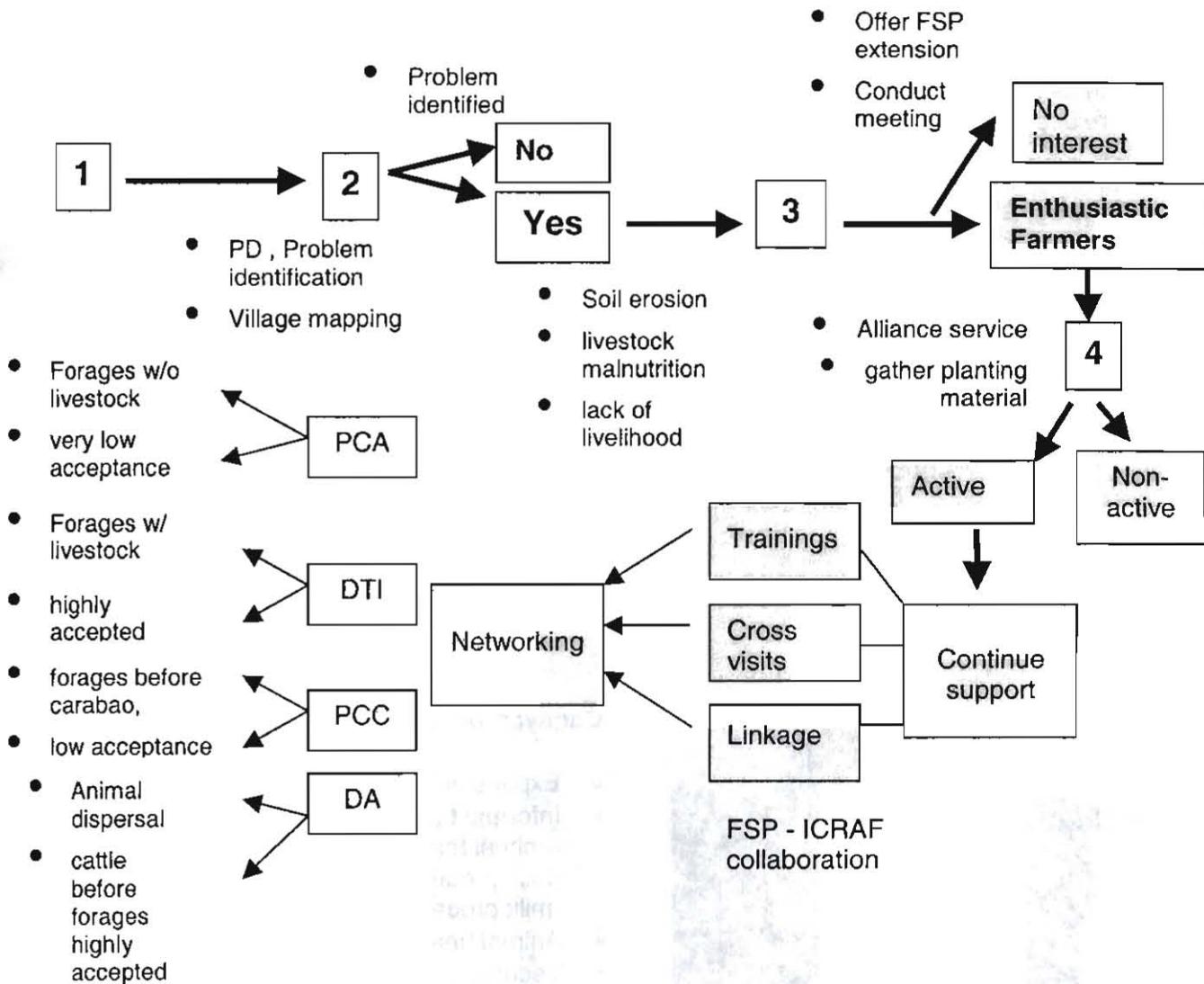
- New Municipality.
- Technicians training.
- Activity planning.

Manolo Fortich, Bukidnon

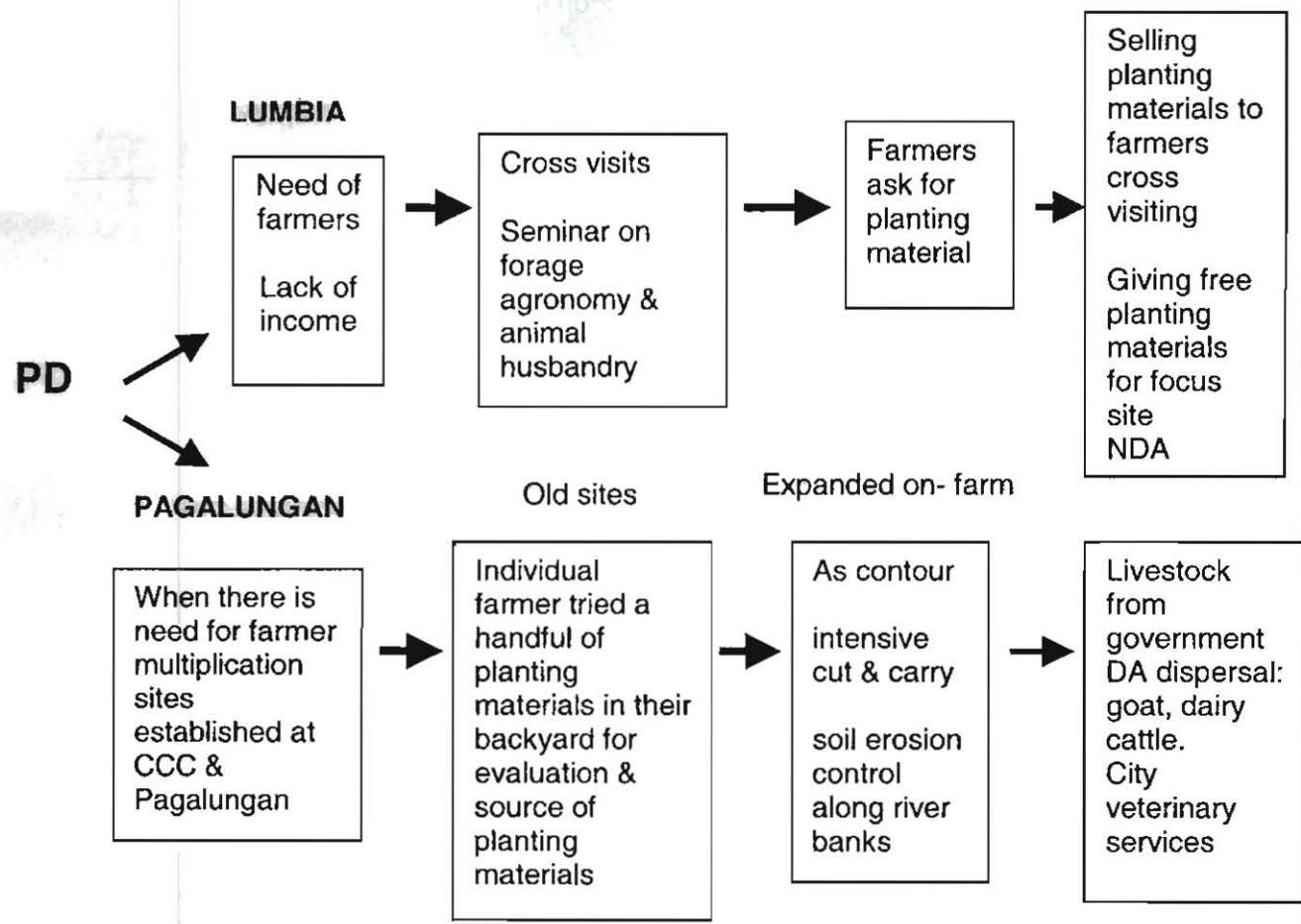
- New Municipality.
- Technicians training.
- Activity planning.
- Benchmark data gathering.



1.4.3 Process of dissemination in Malitbog, Bukidnon



1.4.4 Process of dissemination in Cagayan de Oro, Bukidnon



1.4.5 Impacts of forage technology dissemination

Table 9. Forage development at Malitbog, Bukidnon in year 2000.

Barangay (village)	No. of farmers involved		No. of species planted per farm	Area planted per farm
	Year 2000	Phase I and II		
San Luis	62 (8*)	100	1-12	1 row (50 m) – 3600 m ²
Silo-o	(4*)	20	1-9	2 – 300 m ²
Sta. Inez	(1*)	13	2-13	2 – 500 m ²
Poblacion	(1*)	1	4-10	6-50 m ²
Patpat	3 (1*)	3	5-12	30-1,000 m ²
Mindagat	(1*)	1	2-5	30-250 m ²
Omagling	22 (2*)	24	2-7	3 row (30 m)- 4 row (250 m) & 15 – 300 m ²
Kalingking	2 (1*)	2	2-10	6-600 m ²
Total	89 (19*)	164		

* 'Phase-I farmers' expanding existing forage areas.

In Malitbog, Bukidnon (Table 9) a total of eighty-nine farmers were reached out to plant forages in 8 villages. Most of these farmers are former collaborators (FSP-I) who expanded planting forages in their farm and the rest, are some new farmer-collaborators. Overall, there were now 164 farmers planting forages. These include farmers that started planting forages since 1995 when FSP-Phase I started. It can be noted that the farmers were planting a range of species (1 to 12 species, Table 10). There was a very wide variation with regards to area planted to forages, ranging from a single row of 50 meters to as much as 3,600 m². The project is now working in 8 barangays of Malitbog, Bukidnon.

Table 10. Species of Forages planted on-farm in Malitbog, Bukidnon.

Grasses	Legumes
1. <i>Brachiaria brizantha</i>	1. <i>Arachis pintoii</i> CIAT 22160
2. <i>B. decumbens</i>	2. <i>Centrosema pubescens</i>
3. <i>B. ruziziensis</i>	3. <i>Stylosanthes guianensis</i>
4. <i>Pennisetum purpureum</i>	4. <i>Flemingia macrophylla</i>
5. <i>Panicum maximum</i> CIAT 6299	5. <i>Gliricidia sepium</i> (Retalhuleo)
6. <i>Paspalum atratum</i> BRA 961	6. <i>Leucaena leucocephala</i>
7. <i>Andropogon gayanus</i>	7. <i>Desmodium cinerea</i>
8. <i>Setaria sphacelata</i>	

Table 11. Forage development at Cagayan de Oro City, year 2000.

Barangay (village)	No. of farmers involved		No. of species planted per farm	Area planted per farm
	Year 2000	Phase I & II		
Pagalungan	47 (+15*)	57	1 - 12	2 - 10,000 m ²
Tagpangi	7	7	1 - 3	10 - 10,000 m ²
Indahag	10 (+2*)	10	1 - 5	100 - 3,000 m ²
Dansolihon	15	18	2	200 - 1,000 m ²
Lumbia	26 (+14*)	26	1 - 12	50 - 10,000 m ²
San Simon	38 (+7*)	38	1 - 8	2 - 5,000 m ²
Total	128 (+38*)	156		

* 'Phase-I farmers' expanding existing forage areas.

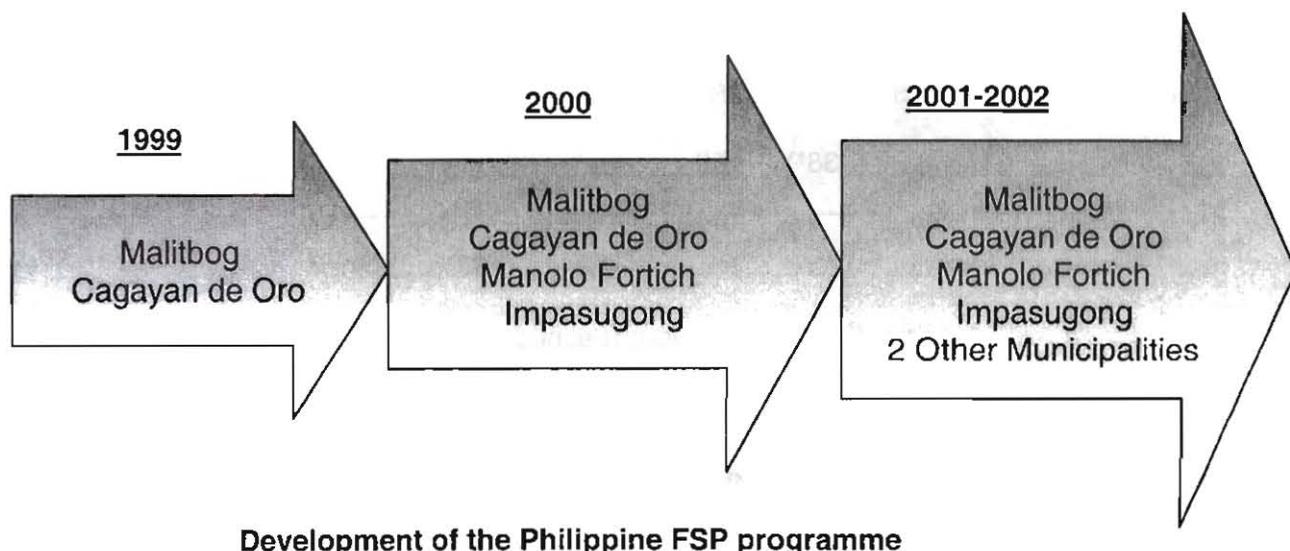
In Cagayan de Oro City, 156 farmers, were reached out by the project during the year 2000. Several were former farmer-collaborators expanding their forage area; also included are the 15 farmers of Pagalungan from the original site of FSP-Phase 1. Hundred twenty-eight new collaborators were reached. The choice of forage species planted varies from 1 to 12 species from farm to farm (Table 12). The area planted per farm ranges from 2 m² to about 10,000 m².

Table 12. Species of Forages planted on-farm in Cagayan de Oro, Misamis Oriental

Grasses	Legumes
1. <i>Pennisetum purpureum</i>	1. <i>Calliandra calothyrsus</i>
2. <i>Paspalum atratum</i> BRA 961	2. <i>Desmodium cinerea</i>
3. <i>Brachiaria brizantha</i>	3. <i>Arachis pintoii</i> CIAT 22160
4. <i>Panicum maximum</i> (Tanzania)	4. <i>Centrosema pubescens</i>
5. <i>Setaria sphacelata</i>	5. <i>Leucaena leucocephala</i>
6. <i>Brachiaria decumbens</i>	6. <i>Stylosanthes guianensis</i>
7. <i>Tripsacum laxum</i>	7. <i>Gliricidia sepium</i>
8. <i>Desmanthus virgatus</i>	

It can be noted from the two sites that the variation in term of area planted to forages was greater in Malitbog, Bukidnon than in Cagayan de Oro City. There were more small plots planted to forages in Malitbog than in Cagayan de Oro. It appeared that in Malitbog farmers were still in the initial nursery trial stage, while in Cagayan de Oro more farmers were now in the forage utilization stage. This situation was affected by the fact that more animals were distributed in Cagayan de Oro than in Malitbog. These animals came from the livestock development program of Philippine Carabao Center, the National Dairy Authority and the local government itself of the Cagayan de Oro. This aspect of forage development in the barangay needs more attention. Some researchers are of the opinion that forage technologies in the Philippines need a carrying program like livestock development in order to be adopted by farmers.

1.4.6 Linkages made for the extension of forage technologies in the new sites



As early as March 2000, linkages were conducted through personal visits and meetings with the local executives, i.e. Mayors and the Municipal agricultural Officers. Among the municipalities visited and established contact were Manolo Fortich and Impasugong. These were the prospected expansion sites.

Table 13. Present Collaborators in the Philippines.

Municipality	No. of Collaborators
Malitbog, Bukidnon	1 Municipal Agricultural Officer; 3 Agricultural Technicians
Cagayan de Oro City	1 City Veterinarian; 4 Agricultural Technicians
Manolo Fortich, Bukidnon	1 Municipal Agricultural Officer; 3 Agricultural Technicians
Impasugong, Bukidnon	1 Municipal Agricultural Officer; 3 Agricultural Technicians

1.4.7 Plans for 2001-2002

Forage technology development

- The activity will focus on the introduction and management of forage legumes for animal feeding; emphasis will be on tree legumes (*Leucaena*, *Calliandra* and *Trichantera*) and *Arachis pintoi*.

Forage technology dissemination

- Continue the existing program in the present focused areas.
- To consider two (2) more new areas.
- Farmer to farmer cross-visits.

Capability Building

- Development planning for technicians and farmer leaders.
- Farmer leader cross-visit to Batangas and neighbouring areas.
- Farmers seminars.
- Bi-annual meeting of the present collaborators

Networking

- Continue the regional networking activities

1.4.8 Issues

- Part-time participation of Technicians.
- Lack of livestock development program that the forage program could support.
- Low priority of forage program in the LGU development concerns.
- Lack of computer systems to facilitate communication.

1.4.9 Questions and answers

Q: We would like to know how you introduce legume trees in the Philippines? Because in Laos, we failed in introducing legumes to farmers.

A: We have multiplication plots with key farmers, other farmers were invited to see and were given planting materials.

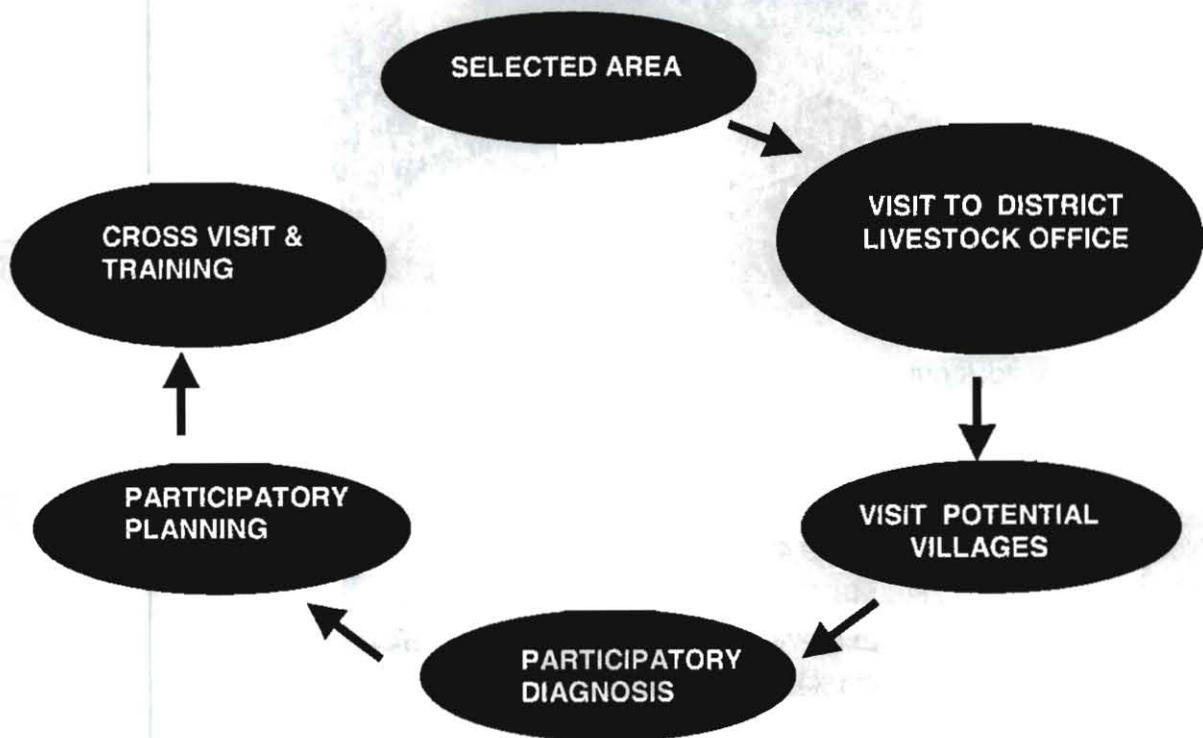
We have a long experience working with legume shrubs in the Philippines. 90 legume trees can support the one year feed requirement of one cattle.

- Q:** How do you distribute legume trees to farmers? Our experience was not good, we were not able to establish tree legumes well.
- A:** Farmer grew them in poly bags and found this method better for distribution.
- Q:** Do you give incentive for the farmers?
- A:** We have not given any monetary incentive, so far we just provide them with seeds and polyethylene bags for the nurseries. We also give them training. If farmers are able to establish seedlings they can sell half to other farmers at P5.00 (US\$ 0.10) per seedling.
- Q:** How often do you cut the *Leucaena* in your country?
- A:** Based on the Batangas experience in the Philippines, farmers cut it every six months. But then it can all depends on the situation of the area
- Q:** How do you set up demonstrations
- A:** Community group (*Alayon* - self help) plant together in one multiplication plot which becomes the source of the village.
- Q:** Why does the government give dairy carabaos to farmer? Isn't it more difficult for to manage rather than goats or beef cattle?
- A:** Farmers decide what project they want to engage in. Some farmers who preferred carabao were able to join a cross-visit to the Philippine Carabao Center (PCC). They have learned that carabao milk is easier to sell and more expensive.
- Q:** How do you deal with trouble makers in farmer groups?
- A:** We have to talk to them one-on-one. If they are just asking for attention, then we give them some attention

1.5 Dissemination in Thailand

Ganda Nakamanee

1.5.1 Process of dissemination



Why Northeast?

- The Northeast region has the highest ruminant population.
- 54% of the farmers are in the Northeast.

Nakornratchasima Province

- It is located in the Northeast of Thailand
- It comprises 26 districts with 3,269 villages

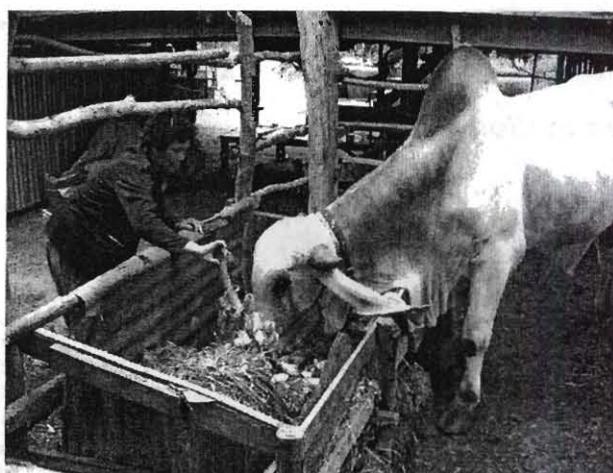


Table 14. Livestock numbers in Nakornratchasima Province.

	Beef cattle (head)	Farmers	Dairy cattle (head)	Farmers
Northeast	2,219,437	389,223	67,536	3,571
(% of nation)	(48%)		(24%)	
Nakornratchasima	258,078	27,108	40,544	1,511
(% of Northeast)	(11%)		(60%)	

Table 15. Livestock and farmers in 4 districts in Nakornratchasima Province.

District	Beef cattle (head)	Farmers	Dairy cattle (head)	Farmers
Dankhuntod	23,415	878	-	-
SungNuen	16,810	2,170	2,217	103
Seekew	19,828	804	1,658	68
Serngsang	2,103	222	579	42
Total	63,156	4,074	4,454	213

Table 16. Number of new farmers and forage systems practised.

	No. of farmers participated in participatory diagnosis	No. of Villages	Forage System
Dankhuntod	26	5	Grazing
Seekew	29	3	Grazing
SungNuen	7	1	Cut & carry for dairy cattle
Total	62	9	

How are farmers selected?

- Farmers who raise dairy and beef cattle.
- Farmers who realise that improved forage species can overcome their problems, and they try to solve their problem by themselves

1.5.2 Present Collaborators

Experienced staff in the project

- 3 researchers in forage agronomy and animal husbandry.
 - > 1 person at Pakchong Animal Nutrition Research Centre
 - > 2 people at Forage Research Section, Animal Nutrition Division, Bangkok.

New staff in the project

- 1 animal husbandry officer (assistant scientist) Pakchong Animal Nutrition Research Centre (Needs on site training, cross visit to Los Banos, Philippines and Xieng Quang, Lao)
- 5 district livestock officers:
 - 1 from Dankhunted District
 - 2 from Seekew District (to be trained on farmer participatory research, forage agronomy)
 - 2 from SungNuen District (to be trained on farmer participatory research, forage agronomy)

Problems

- Multiple responsibilities of FSP - staff
- Limited no. of staff

1.5.3 Future Plan up to 2003

- 30 staff will be developed
 - > 3 scientists
 - > 2 officers
 - > 20 development workers
 - > 5 "farmer to farmer" development workers
- Targeted villages
 - > Dairy cattle (4 villages in 2 districts)
 - > Beef cattle (10 villages in 3 districts)
- Staff opportunities
 - > Most staff have been trained in forage agronomy and animal nutrition. The FSP team in Thailand has good skills to carry out research in these fields.
 - > Researchers, officers and farmers are experienced in seed production technologies.

- Skills in working with farmers
 - forming groups.
 - developing leadership.
 - open ended discussions.
 - monitoring and evaluation.
 - practical experience with farmer participatory research.

- Plans for cross visits
 - 8 cross visits for farmers from new sites to Sung Nuen district.
 - 1 cross visit for farmers from project site to Khon Kaen province (visit seed producers).

- Plans for training
 - 11 training courses for farmers on forage agronomy: establishment, management and utilisation.
 - 1 training course for farmers on forage seed production.



1.5.4 Questions and answers

- | | |
|---|--|
| Q: What are the criteria for area selection? | A: Areas that experience lack in good quality roughage during dry season |
| Q: Are you working with farmers for producing seed or feeding animals? | A: Mainly for feed. At present we do not have farmers who can produce the seed of new <i>Brachiaria</i> selections. |
| Q: When carrying out PD, why only carry out with 5 to 10 farmers? | A: That is not the number of farmers in PD but the number who wish to try to solve the problems. Usually there are at least 20 farmers in a PD. |
| Q: What forage species do farmers like? | A: We have not introduced new species yet. They are still under evaluation. We are taking farmers to others who use different species |

1.6 Dissemination in Vietnam

Le Hoa Binh

1.6.1 Introduction

- Pasture and forage research and development still in an initial stage.
- Few forage species used by farmers. *Pennisetum purpureum*, *Panicum maximum*, *Digitaria decumbens* in high scale, intensive production sites.
- At M'Drak (Daklak) farmer keep some hectares of the land, in Tuyen Quang some thousand m².
- Before 2000, 12 new forages species were imported and given to the farmers for sowing on their farms.
- The site based on participatory diagnosis :
 - 1 district in Daklak (M'Drak)
 - districts in Tuyen Quang (Han Yen and Yen Son).

Table 17. Methods of planting and utilising forages at focus sites, Vietnam.

Ways of planting forages	M'Drak	Tuyen Quang
Intensive plots for cut and carry feed.	X	X
Intensive grazed plots	X	
Fencing	X	X
Contour rows for erosion control		X
Forages planted for which animals		
Cattle and buffalo	X	X
Pigs		X
Fish		X

Table 18. Farmers' preferences for species - results from participatory evaluation.

Forage Species	Tuyen Quang	M'Drak
<i>Brachiaria brizantha</i> CIAT 6780	X	X
<i>Brachiaria decumbens</i> cv Basilisk	X	X
<i>Panicum maximum</i> TD58	X	X
<i>Paspalum atratum</i> BRA 9610	X	X
<i>Stylosanthes guianensis</i> CIAT 184	X	X
<i>Calliandra calothyrsus</i> CPI 115690		X
<i>Gliricidia sepium</i> "Retalhuleu"	X	X
<i>Leucaena leucocephala</i> cv Tarramba		X

Table 19. Site development from 1995 to 2000.

	Daklak Province	Tuyen Quang Province (since 1997)
Total no. of Districts:	2 (Madrak, Eakar)	3 (HanYen, YenSon, Son Duong)
Of which new districts	1	1
Total no farmers:	215	361
Of which new farmers	125	205
Technology:	Cut and carry, grazing	Cut and carry, hedgerows, living fence
New technique	Live fencing, cover crops	Cover crops
New staff in project	13 extension worker 2 university 1 DARD	12 extension workers

1.6.2 Process of dissemination

- Forage technologies were developed in:
 - 6 villages of two districts in Daklak province
 - 6 communes of 3 districts in Tuyen Quang province
- The disseminating process started in March 2000:
 - Collection and analysis of secondary information:
 - Area of agricultural land
 - Farming systems
 - No. of livestock
 - Feeding systems of livestock
 - Site visits of working group to choose new site
 - Carrying out participatory diagnosis
 - Farmers cross visits to focus sites
 - Participatory evaluation
- Forming districts' working groups. Working groups include Development workers, staff of the Agriculture and Rural Development Department and some key farmers. The working groups contact different communes.
 - Farmer participatory research training course for staff.
 - Training courses for new farmers groups
 - Distribute seed and material planting
 - Visit site, collect feedback
- Better site selection should focus on areas where
 - There is a real need for livestock feed (quality and quantity).
 - Farmers receive considerable income from livestock.



- Farmers have the capacity to solve the livestock feed problem (land, labour, fertiliser, fencing).

1.6.3 Results of dissemination

Table 20. Results of dissemination in 2000

Activities	Results
<ul style="list-style-type: none"> • Collection of secondary data • Interim working group visits site. • Participatory diagnosis • Farmer cross visits 	<ul style="list-style-type: none"> • 9 participatory diagnosis were carry out in 9 villages of 4 districts M'Drak, Ea Kar (Daklak), Son Duong, Yen Son (Tuyen Quang) • More than 205 farmers visit focus site (150 farmers in Daklak and 145 farmers in Tuyen Quang). • 9 new sites were identified where farmers wanted to plant forages.
<ul style="list-style-type: none"> • Formation of working groups in new sites. • Two training courses on farmer participatory research. 	<ul style="list-style-type: none"> • In each group there are 2 or 3 district extension staff and 3 commune farmer development worker from the focus site. • 31 people from 2 provinces were trained in farmer participatory research. They are the people from: District working groups, Department of Agriculture and Rural Development, University and some people from other projects.
<ul style="list-style-type: none"> • Selection of new farmers • Training courses for farmers. 	<ul style="list-style-type: none"> • Working with village farmer groups to identify the farmers who are interested to develop forage technologies: 270 farmers registered and attended training courses (125 farmers in Daklak and 145 farmers in Tuyen Quang). • 16 training courses were organised (6 in Daklak and 10 in Tuyen Quang).
<ul style="list-style-type: none"> • Distribution of seed and material to the farmers, after they chose the particular forage species. • Village development workers visit and guide farmers in setting up nurseries and transplanting of seedlings. • Using forages and participatory evaluation 	<ul style="list-style-type: none"> • New farmers use different forage technologies (Cut and carry, fencing, cover crop, hedgerows). • Average area per household: <ul style="list-style-type: none"> - Cutting system: 200 m² - Cover cropland: 1000 - 2000 m² - Live fencing: 50 - 100m.

1.6.4 Experiences and lesson learnt

- There is a need to have seeds for dissemination as soon as possible in order to help farmers plant forages on time. Production of seed in country and importation.

- Identification of new sites and organisation of farmer participatory research training courses as soon as possible in the year, which will help us to organise participatory diagnoses.
- Farmer training courses, distribution of seed and planting materials, should take place before sowing season.
- Training of the head of hamlet is very important.
- Building the working groups on forage technology in districts and scaling-up the knowledge is very important for dissemination of forage technologies.
- Organising short farmer meetings in each group at the time of transplanting is very good for success. They get more information and exchange experiences.

1.6.5 Future plans

Table 21. Future Plans of FSP, Vietnam

	Daklak		Tuyen Quang		Vietnam	
	2001	2002	2001	2002	2001	2002
Number of new villages	3	3	4	6	7	9
New districts	Cujut, Buon Don		Chiem Hoa	Na Hang	Cujut, Buon Don, Chiem Hoa	Na Hang
Number of new farmers	100	100	200	200	300	300
Staff development	18	12	12	15	30	27
Cross visits	10	10	15	15	25	25
On-farm multiplication of seed and planting material (no. of farms)	15	20	10	15	25	35
Seed import (kg)*	30	20	38	32	68	52
Training staff (2 training courses on farmer participatory research and seed production and supply systems)					4	4
Meeting of staff in the network, 2 time per year					2	2
Report, 3 monthly					4	4

* *Panicum maximum*, *Paspalum atratum*, *B. Brizantha*, *Setaria splendida*, stylo 184, *Calliandra calothyrsus*

1.6.6 Questions and answers

Q: Why are leucaena and calliandra not adopted in Daklak?

A: It is due to the acidic soil of Daklak

Q: What is the role of the head of hamlet? How is head of hamlet identified?

A: They are the key farmers or leaders of all farmers. Head of hamlet can be determined if farmer is the most active, can get collaboration from rest of the farmers and knowledgeable in agriculture. Could also be a

contact farmer, engaged in development tasks.

It is important to invite the head of hamlet. Training courses become easier to conduct because hamlet facilitates the meeting and call on other key farmers.

We consider the importance of head of village. It's important that heads understand what is going on as they can be a negative influence.

There can be more than one hamlets in one village.

Q: What kind of training do you give the farmers?

A: We train them on forage agronomy, animal nutrition, PD process and the importance of forages and benefits they can get from it.

Q: How are planting materials distributed?

A: New farmers get their planting materials from the farmers they visited. Some seeds are also collected from FSP multiplication plots and given to farmers

Q: What is the role of working groups in forage development?

A: Working groups such as district officers, commune workers, researchers, key farmers , etc. are the prime mover of forage technology development. Efforts and success of the forage development depends on the linkages facilitated by these working group. In Daklak, they have stronger working groups compare to M'drak and Tuyen Quang.

2 FSP Forage multiplication systems - how have we moved forward since the beginning of FSP-phase I?

2.1 Forage multiplication systems in China

Yi Kexian

2.1.1 Introduction

Tropical forage germplasm collection and evaluation is one of the important research programmes conducted at CATAS, China. More than 500 new species or accessions including grasses, legumes and shrub legumes have been introduced and evaluated on-station in CATAS in recent 10 years. Ten new varieties selected from this germplasm have been released, and 3 more will be realised this year.

Table 22. Ten new forage varieties released in China.

Species	Released name	Origin
<i>Leucaena leucocephala</i>	Reyan 1	
<i>Stylosanthes guianensis</i>	Reyan 2	CIAT184
<i>Brachiaria decumbens</i>	Reyan 3	CIAT606
King grass	Reyan 4	
<i>Stylosanthes guianensis</i>	Reyan 5 Black seed	CIAT184
<i>Zoysia sp.</i>	Reyan 6	
<i>Stylosanthes guianensis</i>	Reyan 7	L7 (new selection)
<i>Panicum maximum</i>	Reyan 8	CIAT6901
<i>Panicum maximum</i>	Reyan 9	

Table 23. Planting materials production in CATAS (tons).

Species	Variety	1996	1997	1998	1999	2000
<i>Leucaena leucocephala</i>	Reyan 1	0.5	1	1.5	1.5	1
<i>Stylosanthes guianensis</i>	Reyan 2	5	6	8	20	20
<i>Brachiaria decumbens</i>	Reyan 3	0.1	0.1	0.5	0.5	1
King grass	Reyan 4	20	100	150	150	500
<i>Stylosanthes guianensis</i>	Reyan 5	0.001	0.1	0.5	2	3
<i>Stylosanthes guianensis</i>	Reyan 7					0.01
<i>Panicum maximum</i>						0.2
<i>Paspalum atratum</i>				0.01	0.1	0.5
<i>Melinis minutiflora</i>		1	1	1	2	2
<i>Macroptilium sp.</i>		0.2	0.5	0.5	1	1

Table 24. Forage species that farmers want to multiply.

Grasses	Legumes	Shrub legumes
King grass	<i>Stylosanthes guianenses</i>	<i>Leucaena leucocephala</i>
Elephant grass	CIAT 184	<i>Cratylia argentea</i>
<i>Melinis minutiflora</i>	<i>Stylosanthes hamata</i>	<i>Gliricidia sepium</i>
<i>P. maximum</i>	cv.Verano	
<i>B. decumbens</i>	<i>Arachis pintoii</i> cv.Amarillo	
<i>B. brizantha</i>	<i>Macroptilium atropurpureum</i>	
<i>P. atratum</i>		
<i>Setaria sphacelata</i>		

2.1.2 Process of forage multiplication

From on-station to on-farm

How did the process of on-farm multiplication start:

1. Germplasm collection
2. Evaluation on-station and on-farm
2. Original material propagation on-farm
4. Other farmers



Table 25. Seed, cuttings and splits multiplication by farmers

Province	Number of farmers	Species
Hainan	7	King grass, Elephant grass, <i>P. maximum</i> , <i>B. decumbens</i> , <i>P. atratum</i> , <i>Stylosanthes guianensis</i> CIAT 184, <i>Arachis pintoii</i> , <i>Leucaena leucocephala</i> , <i>Cratylia argentea</i>

Opportunities

- Farmers may use the seed and planting material for self expending.
- Farmers may sell seeds or planting material to other farmers or private companies.

Problems

- Lack of knowledge for forage seed and planting material production.
- Bad management.
- Low seed yield and quality.



- No facilities for seed storage.

2.1.3 Plans for future

- Training for seed production
- Quality control of seeds, germination rates

Table 26. Amounts of seeds needed in the next two years.

Species (kg)	2000	2001	2002
King grass	1000	3000	10000
<i>P. maximum</i>	10	30	100
<i>B. decumbens</i>	10	30	100
<i>P. atratum</i>	15	30	100
<i>Stylosanthes guianensis</i> CIAT184	25	70	200
<i>Arachis pintoi</i>	50	150	500
<i>Leucaena leucocephala</i>	25	70	200
<i>Cratylia argentea</i>		20	50

2.1.4 Questions and answers

Q: How did you start the process of seed production on-farm at the beginning?

A: Talking with a group of farmers who have planted forages or have some knowledge of forage production, then we can find the potential of seed production and which farmer is interested in forage seed production. After that we give the farmers some seeds or original material e.g. seedling or cuttings as well as some suggestions or important steps for seed production.

Q: Do farmers need to store the forage seeds?

A: In the south of China, generally forage seeds matures in December. The dry season is from November to May. That means farmers have to keep the seeds for about 6 months for planting before the next rainy season comes. In other cases if the farmers who produce forage seeds also need storage seeds before they sell out. Even during the dry season, the humidity in Hainan is over 85%, it could be easy to destroy the seed germination rate.

Q: Can forage be planted all the year around?

A: The limitation for forage planting is water in Hainan. So it is best to plant forage in the wet season from June to October.

Q: How many kilos of stylo CIAT184 can be produced and how much does it cost?

A: 150 kg/ha on-farm production and productive cost is about 4.8US\$/kg. \$6/kg price of seed when sold to big farmers or private farms.

Q: Do some farmers can get income from seed and

A: Yes! Some farmer in China can sell his forage seeds, e.g. Stylo, or planting material, e.g. Kinggrass

planting material production and selling?

cuttings, to other farmers who pay. But if the neighbours or relatives ask the farmer to give a small quantity of seeds or planting material, normally it is free.

Q: Has China been exporting seeds?

A: Yes, but not much. For instance, only 2kgs had been exported to Laos since 1997.

2.2 Forage multiplication systems in Indonesia

Ir. Ibrahim

2.2.1 Introduction

Indonesia has 8 breeding livestock and forages multiplication stations. They are distributed in the province in Indonesia. Only two stations, LILI and Serading stations, are able to produce seeds, especially legumes seeds. Others only produce cuttings and splits.

BPT-HMT Lili and BPT-HMT Serading

Lili and Serading are national multiplication stations which can produce seeds. The legume species which can be produced are:

- *Stylosanthes guianensis* CIAT 184
- *Centrosema pubescens* CIAT 15160
- *Gliricidia*
- *Leucaena leucocephala*
- *Sesbania grandiflora*
- *Calliandra calothyrsus*

Forages Species that are in high demand by farmers

Grass species	<i>Brachiaria humidicola</i> CIAT 6133 <i>Brachiaria humidicola</i> cv. Tully <i>Brachiaria brizantha</i> CIAT 6780 <i>Brachiaria decumbens</i> cv. Basilisk <i>Paspalum atratum</i> BRA 9610 <i>Setaria sphacelata</i> cv. Splendida <i>Andropogon gayanus</i> CIAT 621 <i>Panicum maximum</i> cv. Mott
Legumes	<i>Centrosema pubescens</i> CIAT 15160 <i>Stylosanthes guianensis</i> CIAT 184 <i>Gliricidia sepium</i> <i>Sesbania grandiflora</i> <i>Calliandra calothyrsus</i> <i>Leucaena leucocephala</i>

2.2.2 Process of forage multiplication

From On Station To On Farm

When we start the dissemination of forage technologies to the new areas, we discuss with farmers or farmer groups. The next step is to try to make forage nurseries. When the nurseries are established, they can produce the cuttings or splits that are needed.

Farmers and Farmer groups in East Kalimantan Province only produce cuttings and splits of grasses:

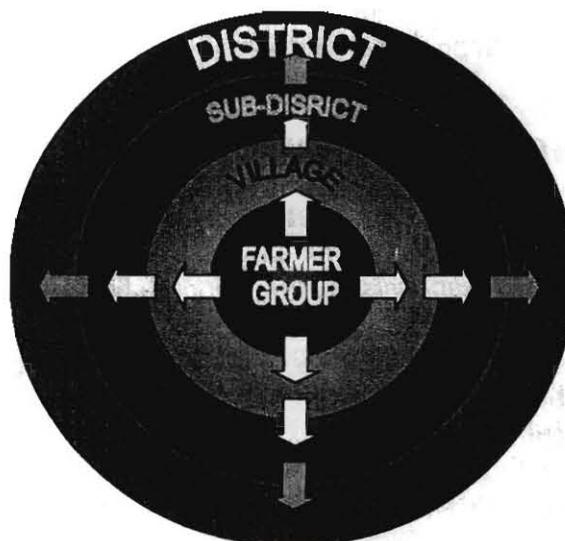
Brachiaria humidicola CIAT 6133
Brachiaria humidicola cv. Tully
Brachiaria brizantha CIAT 6780
Brachiaria decumbens cv. Basilisk
Paspalum atratum BRA 9610
Andropogon gayanus CIAT 621
Setaria sphacelata cv. Splendida
Panicum maximum cv. Mott



2.2.3 Plans for the future

- Number of farmers and farmer groups with forage multiplication plots: 15 farmers and 10 farmer groups.
- Farmers and farmer groups will sell the cuttings or splits to another project and especially to the farmers in the new areas.
- During the year 2000, farmers and farmers group have sold 320.000 cutting with a quota system.
- The role of seeds or cuttings is very important for introducing forage species to new farmers. The new farmers need to understand the results and benefits from forage activities. Therefore, small plots are still needed as a strategy for dissemination and scaling-up forage technologies.

2.2.4 Strategy for scaling-up



2.2.5 Questions and answers

Q: What do farmers prefer to use for multiplication? **A:** In East Kalimantan, farmers prefer cutting and splits because they grow fast and quickly.

Q: How are forages marketed? **A:** In Makroman, there is a system of selling planting materials. For instance, if there is an order of planting materials, half of the quota comes from the members of the farmer group and half from individual farmers. The money earned by the members of the group will be collected as the group's fund for other activities. Individual farmers are paid separately.

2.3 Forage multiplication systems in Lao PDR

Soulivanh Novaha

2.3.1 On-station propagation

- Lao-Australian livestock project experience
- Livestock Research Center
- Northern Cattle Station

Reasons of failing of seed production in station are:

- Forage species were not suitable to demand
- No study of farmers' problems and needs

Problems of importation of seed:

- Since seed production in country is very small quantity and demand for seed is increasing, most of the forage seeds are imported from other countries.
- To overcome this problem, Livestock Research will conduct experiment on promising species in both on-station and on-farm

2.3.2 On-station seed production

On-station propagation at the present at Livestock Research Center

- *Brachiaria ruziziensis* (1-2 tones)
- *Stylosanthes guianensis* (30-60 kg for the first year)

Ruzi grass is not so commonly used by farmers now, Livestock Research Center has planned to conduct experiment on some more species, such as:

- *B. brizantha*
- *B. decumbens*
- *Panicum maximum* TD 58

2.3.3 Forage species that farmers want to multiply

Grasses: *Brachiaria* spp., *Panicum maximum*

Legumes: *Stylosanthes guianensis*

2.3.4 Plans for the future

- Seed production and training of staff will be done concurrently.
- LRC staff will then work with farmers to conduct experiments on-farm.
- Some farmers have started to collect seeds for their own use. At the same time of forage species evaluation, most of farmers also look at the potential for seed production of each species.

2.3.5 Questions and answers

Q: How many forages have been successfully evaluated and adopted in Laos?

A: Only 5 species are evaluated to be persistent in Laos soil condition

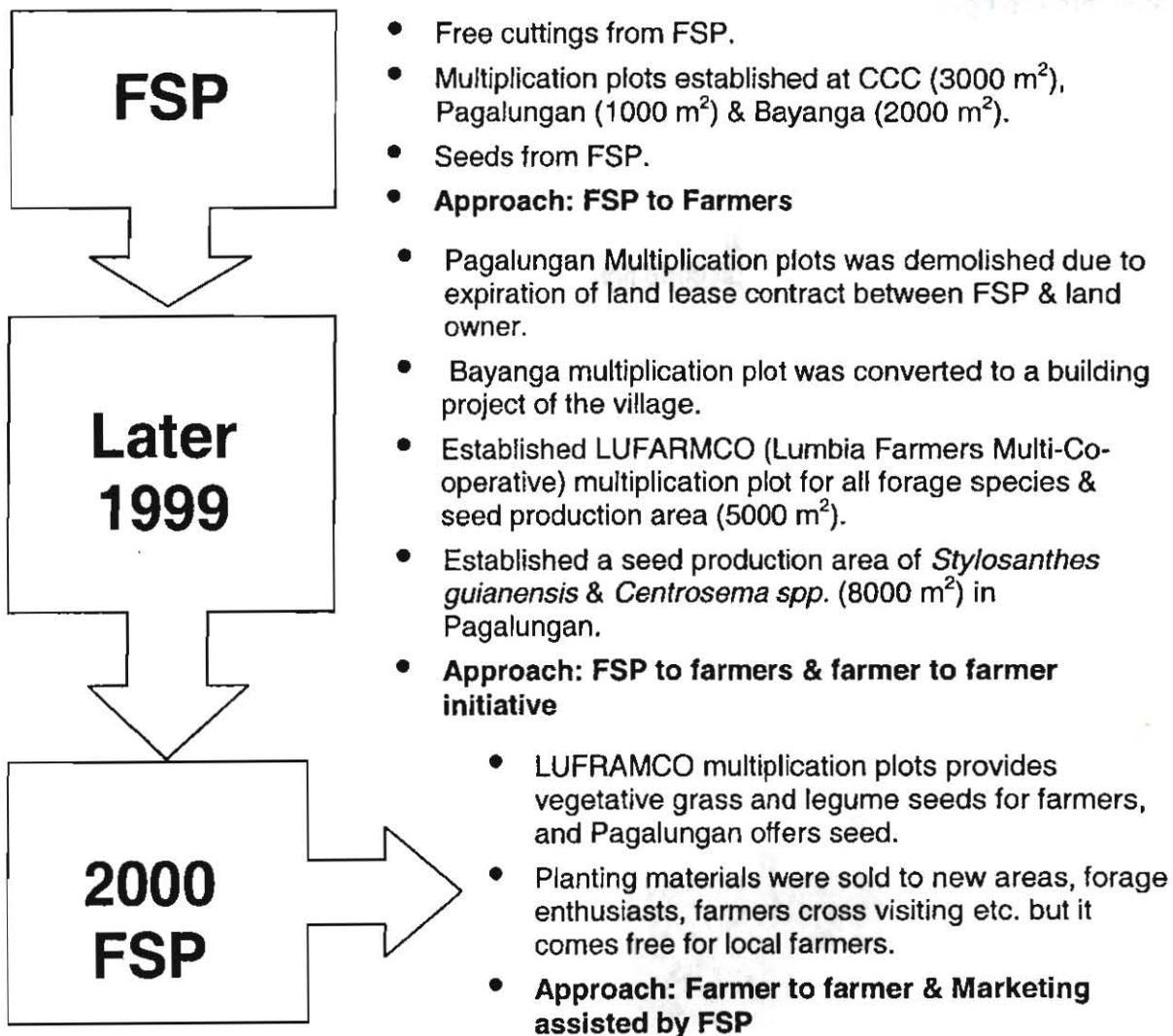
2.4 Forage multiplication in the Philippines

Perla Asis



2.4.1 Process of forage multiplication

Cagayan de Oro Experience



2.4.2 Sales from forage market in Cagayan de Oro

Time: February- December
Amount: \$98.2 (PhP 4,910)

Breakdown:

\$26.3 Bought by FSP for establishment of new site
\$69.1 Buyers from different towns and villages
\$2.8 revolving fund

Table 27. Price list of legumes in Cagayan de Oro.

Seeds	Unit price (1 pack = 30g)
<i>Gliricidia</i>	\$0.20
<i>Calliandra</i>	\$0.20
<i>Desmanthus</i>	\$0.20
<i>Stylosanthes</i>	\$0.20
<i>Desmodium</i>	\$0.20
<i>Leucaena</i>	\$0.20
<i>Centrosema</i>	\$0.20

Table 28. Price list of vegetative planting materials in Cagayan de Oro.

Vegetative materials	Unit price per sack
<i>Pennisetum</i>	\$0.40
<i>Setaria</i>	\$0.60
<i>Brachiaria</i>	\$0.60
<i>Paspalum</i>	\$0.60
<i>Panicum maximum</i>	\$0.60

2.4.3 Issues

- Farmers lack technical know how on seed production.
- Market prospects for farmers.
- Facilitating role of extension workers.
- Credit support for interested farmers to start seed production. Marketing assistance (eg. transportation).

2.4.4 Questions and answers

Q: What is the preference of farmers in multiplying/

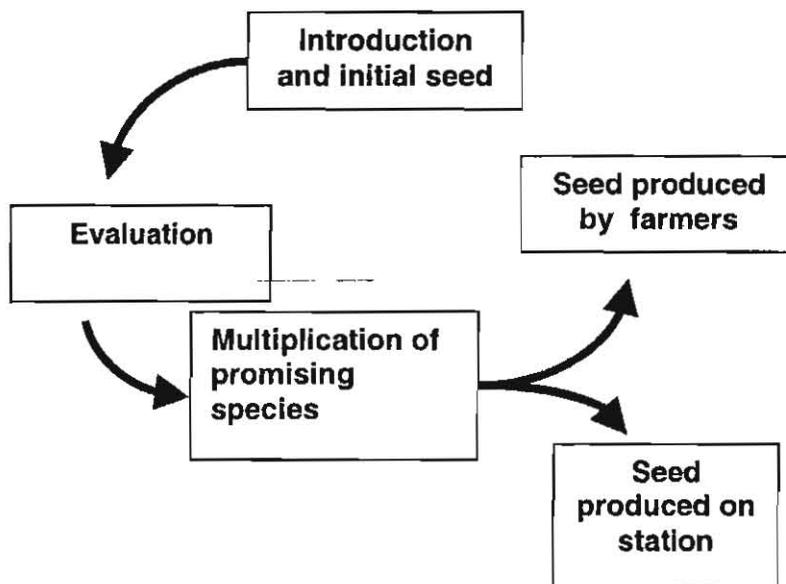
A: Farmers use vegetative materials for forage expansion. They find it easier to use the vegetative

expanding their forage?

material than seeds because they have little knowledge on the germination process of seeds. Cutting survives better than seeds. Farmers use seeds for legumes since its easier to carry. Seeds are expensive.

2.5 Seed multiplication system in Thailand

Ganda Nakamanee and Chaisang Phaikaew



Producers

- Government stations
- Small farmers

Programs with small farmers

- Farmer selection
- Farmer training
- Farmer contracts for buying back forage seed at a guaranteed price.
- Program supervision

Production site Northeast Thailand

- 14° to 19° N; 100-300 masl.
- 1186 mm. rainfall with sharp wet and dry season which facilitates the seed harvesting and drying operation.
- Sandy soil, with low pH (4.6-5.8) and low N, P and S.

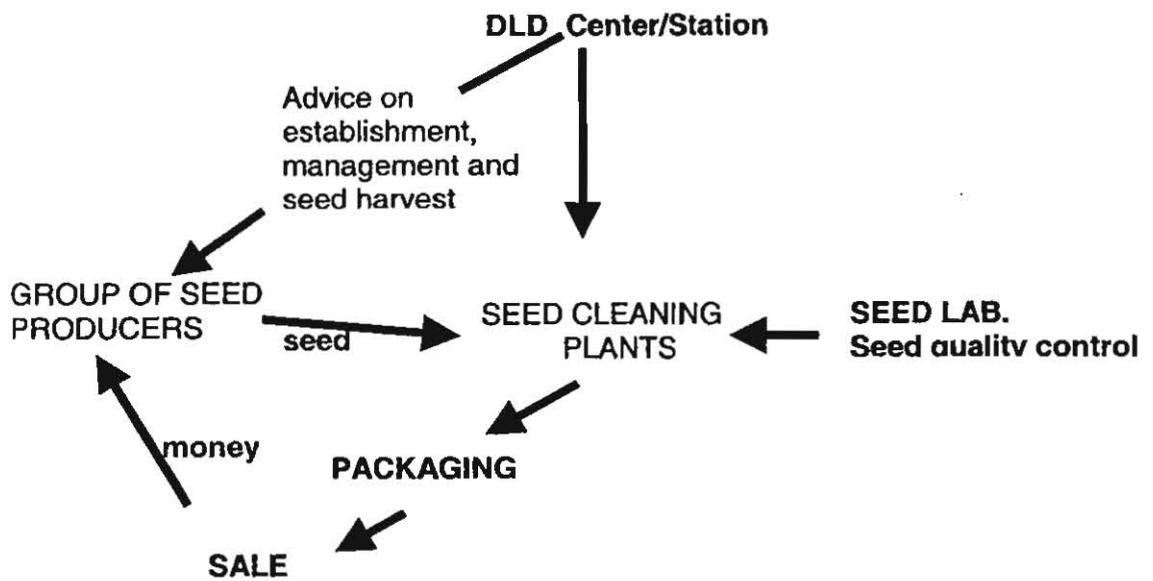


Table 29. Forage grass seed produced in the year 2000 (kg).

Species	DLD	Farmers	Total
<i>Brachiaria ruziziensis</i>	67,410	52,500	119,910
<i>B. brizantha</i>	42	-	-
<i>Panicum maximum</i>	17,765	10,000	27,765
<i>Paspalum atratum</i>	25,017	3,000	28,017
<i>P. plicatulum</i>	13,985	-	-
<i>Setaria sphacelata</i>	330	-	-
<i>Chloris gayana</i>	2,314	-	2,314

Table 30. Forage legumes seed production in the year 2000 (kg).

Species	DLD	Farmers	Total
<i>Stylosanthes hamata</i>	3,000	49,000	52,000
<i>S. guianensis</i> CIAT 184	3,521	15,000	18,521
<i>Centrosema pascuorum</i> cv. Bundey	29,268	24,000	53,268
<i>Desmanthus virgatus</i>	1,104	-	1,104
<i>Arachis pintoi</i>	117	-	117

Table 31. Seed production for other FSP countries in 1999 (kg).

Species	Seed produced
Grasses	
<i>Bracharia brizantha</i> 'Marandu'	100
<i>B. brizantha</i> 'Serengeti'	15
<i>B. brizantha</i> 'Karanga'	35
<i>B. ruziziensis</i>	5
<i>Panicum maximum</i>	100
<i>Paspalum atratum</i>	100
Legumes	
<i>Centrosema macrocarpum</i>	14
<i>C. pubescens</i> 'Barinas'	4
<i>Desmanthus virgatus</i> 'Chaland'	5
<i>Stylosanthes guianensis</i> 'Stylo 184'	200

2.5.1 Questions and answers

- Q:** How long has Thailand been producing seeds? **A:** The seed production system is over 20 years old; it evolved from pure research to enterprise.
- Q:** How does the government help small farmers sell their produce? **A:** The government develops the market for forage seeds. The government buys farmer seeds by quota depending on purchase order. But now, the government are encouraging farmers to do their marketing.
- Q:** How do you classify seeds produced? **A:** Purity should be more than 80% to qualify as good seeds.

2.6 Forage multiplication systems in Vietnam

Le Hoa Binh and Troung Tan Khanh

2.6.1 Introduction

Planting forage for animal was developed in Vietnam some decades ago but only in some cattle stations. The improved species were imported and planted by both seed and vegetative material depending on the species and planting condition. Some studies before indicated that some species such as *Panicum maximum* and *Ruzi grass* are capable of producing good seeds in Vietnam. Forage technology development with smallholder is really new before FSP came in.

2.6.2 Forage multiplication prior to 2000

In FSP phase I, forage multiplication depends on the seeds provided from project. Problems with this are:

- Seed come late compare to the sowing season.
- Small quantity of seed.
- Seed quality (some cases).
- High risks (ants, surface flow, sowing technique).

From the demand of expanding forage area, some farmers started collecting the seed of some species (*Stylosanthes sp.*, *Panicum maximum*) and some others used stems and splits.

In 1998 FSP subsidised an experiment about the *Brachiaria* seed production and some demonstrations on other grasses and legumes. The results of the experiment was that almost all the adopted species can produce seeds in Vietnam. The forages tried were: *Panicum maximum*, *B. decumbens*, *B. brizantha*, *Paspalum atratum*, *Stylosanthes guianensis* and *Gliricidia sepium*.

2.6.3 Forage multiplication in 2000

Farmers emphasised the need for on both seed and vegetative planting material.

Seed production

- 10 demonstrations on forage seed production on-farm.
- Species that the farmers would like to be multiply are: *Panicum maximum*, *B. brizantha*, *Paspalum atratum* and *Stylosanthes guianensis*

Table 32. Seed produced in 2000.

Species	Quantity (kg)
<i>B. brizantha</i>	3
<i>P. maximum</i>	5
<i>Stylosanthes guianensis</i>	3 (estimate)
<i>Paspalum atratum</i>	1

The seeds that farmers produced was used to expand their forage area and to sell to FSP. Farmers also produce stem and splits for expanding their forage area and selling to FSP for dissemination. More than 45000 stem and splits were sold to FSP.

2.6.4 Forage multiplication opportunities and problems

Opportunities

- Almost all adopted species can produce seed and cuttings in some places in the country.
- The demand of planted forages is increasing.
- Some projects are willing to buy seed from farmers.
- Farmers started to be interested in planting forages by vegetative planting material.

Problems

- There is a lack of technology for seed production and seed stocking.
- There is no seed market yet from farmer to farmer.

2.6.5 Plans for future

The importance of seed and vegetative planting material:

- Seeds are very important for introducing forage technologies to the farmers in new sites
- Vegetative materials are potential to expand forage area old farmers

Table 33. The demand of seeds for dissemination for the next two years.

Year	No of villages	No. of Farmers	Area (m ²)	seed needed (kg)
2001	20	400	300	72
2002	30	600	300	108

Table 34. The demand of vegetative planting material.

Year	No. of farmers expanding	Area per farmer	Material needed (stems)
2001	300	200	900,000
2002	350	200	1,000,000

Table 35. Plans of seed production.

Year	No. of farmers	Species
2001	25	B. brizantha, B. decumbens, Ruzi, P. maximum, Paspalum atratum,
2002	35	Stylo 184, Leucaena leucocephala, Gliricidia sepium, Flemingia macrophylla

Other plans:

- To encourage all farmers to produce vegetative materials for expanding their forage area and other new farmers in their villages.
- Planting materials will help farmers expand their area and be able to distribute the surplus to other farmers through seed sales. It will help to open a seed market in the local areas.
- There is a need to subsidise the district extension office to buy the seed from farmers, then sell the seed to other farmers
- In 2001, most multiplied seed will be sold to the FSP for dissemination through extension officers, who will sell or distribute to other farmers and places.
- In the long term, there will be a market between farmers, and between farmers and extension officers.
- Farmers are essential in developing forage multiplication systems.
- Seeds are a very efficient way of introducing forages to new farmers.
- Seeds will be needed in the next two years.

2.6.6 Questions and answers

Q: Which forages do farmers like to multiply?

A: *P. maximum, B. brizantha, P. atratum and S. guianensis.*

Q: What is the preference of farmer in multiplying of forages?

A: Seed is much preferred by farmers in Daklak because they are easier to carry and planting especially for farmers with large plot. Unlike vegetative materials, it will require farmers to cut and carry large amount of vegetative materials to their plots. However, it is only at the start that farmers use seeds, after sometime they shift to using splits in their expansion area.

3 Participatory research proposals

Ralph Roothaert

3.1 Guidelines on developing participatory research proposals

3.1.1 Idea

- researcher
- development worker
- donor
- farmers



3.1.2 Draw a research protocol

- justification
- hypothesis
- objectives
- collaborators
- methods
 - › participants, process
 - › replicates
 - › site(s)
 - › plant species
 - › treatments
 - › materials
 - › measurements
 - › duration
 - › data analysis
- output
- follow up
- references



3.1.3 Review

- Supervisors of National Institutions and FSP need to review the proposal.
- An operational budget has to be allocated.

3.2 On-farm nurseries of fodder trees

3.2.1 Justification

- Fodder trees provide high quality green feed during dry season.
- No availability of seedlings in village.
- Many fodder tree species establish better when planted as seedlings in stead of direct seeded in the field.
- On-farm nurseries promote sustainability.

3.2.2 Hypothesis

- Farmers in S.E. Asia are willing and able to produce fodder tree seedlings on-farm.
- Success rate of production of seedlings depends on the species and farmers' practices.

3.2.3 Objectives

- To evaluate the performance of different fodder tree species in nurseries on-farm.
- To evaluate two nursery techniques.
- To evaluate farmers' practices.

3.2.4 Collaborators

- Farmers
- FSP staff
- PCARRD, NIAH, NU, DLF, NAFRI, DLD, PANRC, CATAS, CIAT

3.2.5 Methods

Participants, process

- group meetings, characteristics of species
- 3 male and 3 female farmers per site

Sites

- Cagayan de Oro, , Luang Phrabang, Pakchong

Species

- *Albizia saman*
- *Calliandra calothyrsus* Prov. Patalul or ex-Kenya
- *Chamaecytisus palmensis*
- *Cratylia argentea*
- *Crotalaria goodiiiformis*
- *Desmodium cinerea*
- *Enterolobium cyclocarpum*
- *Erythrina edulis*
- *Erythrina peoppigiana*
- *Erythrina subumbrans*
- *Erythrina variegata*
- *Gliricidia sepium* Prov. Retalhuleo
- *Indigofera constricta*
- *Indigofera lupatana*
- *Leucaena collinsii* subsp. *Collinsii*
- *Leucaena leucocephala* K 636
- *Leucaena pallida*
- *Leucaena trichandra* 53/88
- *Macaranga tanarius*
- *Mimosa scabrella*
- *Morus alba*
- *Paraserianthesis falcataria* (formerly *Albizia* f.)



- *Sesbania grandiflora*
- *Sesbania sesban*
- *Streblus asper*
- *Trema orientalis*
- *Trichanthera gigantean*

Treatments

- nursery technique:
 1. seedlings in polythene bags
 2. seedlings in raised seedbeds
- gender
- site

Measurements

- preferences of farmers
- number of seeds distributed per farmer
- number of seeds germinated
- number of seedlings raised
- destination of seedlings

Materials

- polythene bags
- seeds
- farmer's labour input

Data analysis

- matrix ranking
- reporting farmer evaluations
- SPSS

3.2.6 Outputs

- Journal paper
- SEAFRAD Newsletter
- Progress reports

3.2.7 Follow up

- Evaluation of on-farm biomass production of fodder trees
- Palatability
- Animal growth rates
- Other trials

3.2.8 References

- ICRAF Agroforestree Database (CD)
- Gutteridge and Shelton (1994)
- Roothaert (2000)

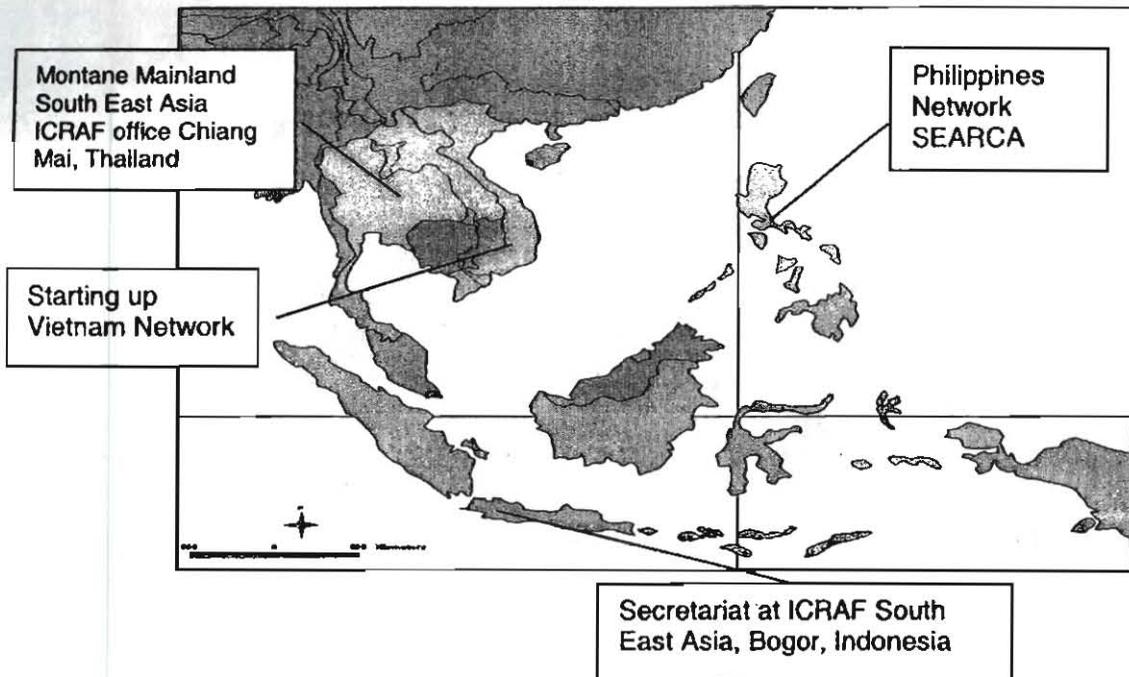
3.3 Research issues

The following issues were a result of a brainstorming session. It was noted, however, that these issues need to be verified with other stakeholders who were not present at the workshop, such as farmers, and other field workers.

- **Mortality in young goats (Indonesia)**
 - Lack of legumes.
 - Diseases.
- **High mortality in young cattle (Indonesia)**
 - Poor nutrition (low milk production).
- **Productivity of natural grasslands (Lao)**
 - Potential for cattle production.
 - How can it be improved by supplementation?
- **Fallow improvement by forages (Lao)**
 - Can overcome degradation, shorten fallow.
- **Greater range and higher quality forage dry season (Vietnam)**
- **Better quality forage for fattening cattle (Vietnam)**
- **Mixtures of fodder tree with napier - demonstration with cattle, goats (Philippines, Indonesia)**
- **Why is there low adoption of legumes by dairy farmers? (Thailand)**
- **Low acceptance of Gliricidia as a feed (Vietnam)**
- **Different forages for soil erosion control (Philippines)**
- **Use of indigenous trees (Laos, Vietnam)**
- **Effect of Setaria on fertility of cattle**

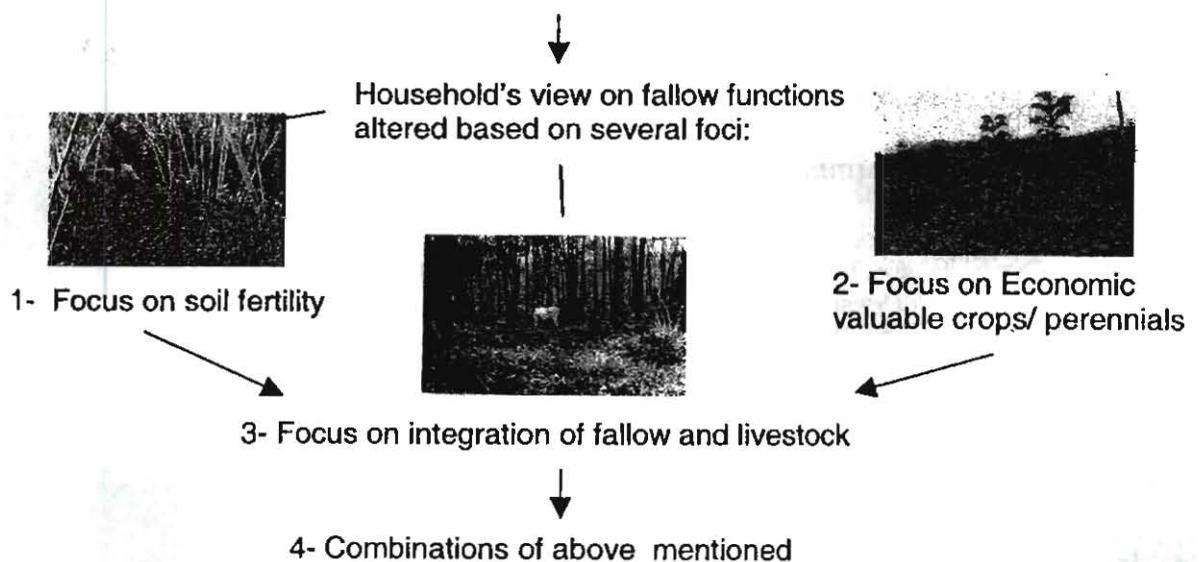
4 Indigenous Fallow Management Network

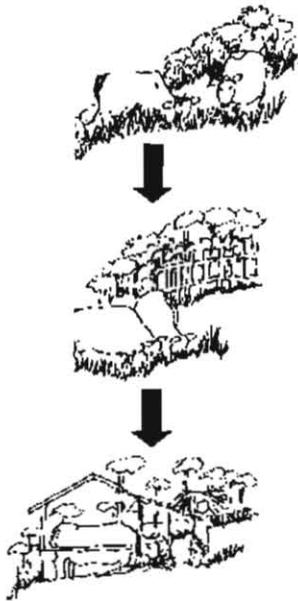
4.1 ICRAF South East Asia and National Partners work together on fallow management issues



4.1.1 Intensification of fallow systems

Social, economic, political and environmental change leads to intensification pressures of fallow systems.





Intensification systems with ruminants

1 Traditional shifting cultivation.

Ruminants graze the fallow, or herded during planting season of rice (Karen)

2 Fence in/fence out

If land becomes a constraining factor and livestock competes with fallow/crops;

3 High land pressures/

labour, time constraints:

Cattle in semi-zero grazing units, with or without fodder banks

Especially when (upland) farming systems come under increasing pressure, “alternatives”, like the second and particular the third phase of intensification with livestock, cattle (beef or dairy) may provide advantages to satisfy/improve livelihoods:

- As **draft power** for the swidden field in flat lands.
- **Relative high profit** compared to labour-input.
- Animals **store “wealth”** ; “cashed in” when needed.
- Produces **manure** to improve crop production.
- As means of **transportation** for crops and people.
- Helps **suppress** potentially difficult **weeds** (*Imperata*).
- **Provides** milk , meat, eggs, and other **products** for the family, which can be sold.



4.1.2 In Indonesia: link beef with small scale dairy?

• Small scale dairy farming:

- Concentrated on Java
- Except for specific areas, under current conditions little scope for dairy sector on Java, because :
 - small land size
 - Low prices
 - Increasing costs (Crisis)
 - Forage shortages
 - Diversification strategy

- Incorporating forest plantations to plant forages.

- **Moving out of Java**

Linking with work on beef cattle farming systems

- **Practical/ realistic**

- Most fodder research has been done on outer islands, common problem of forages.
- More land available for on farm forage growing
- Households are mainly farming households
- Households themselves have initiated their own solutions and adapted outside technologies a their own (e.g. Timor, Bali).

- **Moral?**

- Krismon in particular has hit the outer/eastern Islands hard, where malnutrition through lack of milk powder has occurred (UNICEF, 1999).
- Most "aid" has so far concentrated on Java, Sumatra.

This may lead to a more integrated approach for the sector

4.1.3 Concluding remarks

We would like to work together and learn from other organisations (FSP) to strengthen the knowledge in Indonesia and the region on forages and farming systems which include livestock.

- Information exchange
- Training courses (on farm seed collection, and so on)
- Link with on farm work of FSP
- Joint research?

5 Forage for Smallholders Project - Workplans for 2001

5.1 Workplan of Hainan Province, China

Location in Haikou Province	Component (Activities)	Activity schedule 2001				Expected outputs
		Jan -- Mar	Apr- Jun	Jun - Sep	Oct - Dec	
	1. Development of forage technology					
CATAS	1.1 Shrub legume experiment with promising species, chemical analysis, commence in 2001	X	X	X	X	Preliminary identification of the best ones suitable in Hainan province.
CATAS	1.2 New stylo evaluation for anthracnose resistance ,planted in 2000.		X		X	Preliminary information on anthracnose resistance of 22 stylo varieties.
Baisha (2) Danzhou (1)	1.3 Continue and evaluate farmer participatory research evaluation of grasses, legumes and shrubs in 3 villages with 15 farmers Commenced in 2000 (Live fencing and boundary planting of King grass and shrub legumes with 5 farmers, Baisha)		X	X		Identification of suitable species, report (Yield and performance in dry season).
Danzhou or Dongfang	1.4 Stylo inter-cropping in fruit plantation with 5 farmers	X			X	Ground cover, yield, green manure and soil improvement
Baisha	1.5 Use of shrub legumes feeding and fattening goats and rabbits with 5 farmers		X	X	X	Estimate of animal and farmers economic performance.

Location in Haikou Province	Component (Activities)	Activity schedule 2004				Expected outputs
		Jan -- Mar	Apr- Jun	Jun - Sep	Oct - Dec	
Danzhou	1.6 <i>Arachis</i> for green cover and animal production with 5 farmers		X	X	X	Forage potential and animal productivity fed <i>Arachis</i> .
	2. Dissemination					
	Collection of secondary data	X				Reports on natural conditions, population, land-use, agricultural data, organisations, services etc.
Hainan	New site selection of villages/ communes	X				6 new villages selected.
	Participatory diagnosis	X				Participatory Diagnosis and report.
	Participatory planning	X				3 days (1 day per commune).
	Participatory monitoring and evaluation				X	Description of suitable species and technologies.
	Farmer to farmer visits			X		90 farmers from 6 village with established forage exchange information.
	3. Multiplication					
	Buy some grasses and shrub legume seeds from Vietnam and Indonesia	X				
	Build up seed supplies of shrub legumes		X	X	X	5-10 kg of seed per species obtained.
	Seed production of promising new <i>Stylo</i> accessions		X	X	X	500-1000 grams of new accessions.

Location in Haikou Province	Component (Activities)	Activity schedule 2001				Expected outputs
		Jan -- Mar	Apr- Jun	Jun - Sep	Oct - Dec	
	Seed production of <i>P. maximum</i> , <i>B. decumbens</i> , <i>B. brizantha</i> , <i>Setaria sphacelata</i>		X	X	X	2-5 kg of each species.
	Planting material nursery of King grass, Elephant grass cv.Mott, <i>Panicum maximum</i> , <i>Gliricidia sepium</i> , <i>Cratylia argentea</i> , <i>Arachis pintoii</i> and <i>Leucaena leucocephala</i> (on-station)		X	X	X	10000 cutting and seedlings for <i>Gliricidia</i> , King grass etc.
	4. Training					
	Farmers field visits and training		X			6 days training (2 days per commune).
	Training manual and material translation and publication	X				Translate in Chinese and publish.
	Visits of extension workers to other FSP sites in Hainan to exchange experiences			X		8 staff visit.
	Farmers training on animal production and management	X				10 farmers.
	10 farmers training on forage agronomy	X				100 farmers trained.
	5. Networking					
	Seafarad contributions		X		X	Two articles.
	Quarterly reports to regional coordinators	X	X	X	X	4 reports, email.

Location in Haikou Province	Component (Activities)	Activity schedule 2001				Expected outputs
		Jan -- Mar	Apr- Jun	Jun - Sep	Oct - Dec	
	Networking with PR group led by Prof. Li Xiaoyun					Collaborative projects
	Workshop with counties	X				Improved knowledge of FSP project and extension of FSP outputs Sensitisation of county staff in the province

5.2 Workplan of East Kalimantan, Indonesia

Location in East Kalimantan	Component (Activities)	Activity schedule 2001												Expected outputs
		J	F	M	A	M	J	J	A	S	O	N	D	
Focus village	1. Development of forage technology													
Sepaku II, Makroman	4 Field days for 9 new groups.			X	X	X								4 field days conducted in Sepaku and Makroman.
Sepaku II	Over sowing of <i>Imperata</i> areas.	X	X	X	X	X								2 ha of improved <i>Imperata</i> areas on communal land and on 10 farms.
Sepaku II, Makroman	Evaluation of species for erosion control (<i>Brachiaria spp.</i> , <i>Paspalum atratum</i> , <i>Andropogon Gayanus</i>).		X	X	X									Species tested on 10 farms.
Sepaku II, Makroman	On-farm planting tree legumes for dry season's feeding.			X	X	X	X							Planting of tree legumes seedling realised.
Sepaku II, Makroman	Participatory research using forages strips and hedgerows on contours.			X	X	X	X				X	X	X	Farmers have adopted forages strips and hedgerow on contours.
Sepaku II, Makroman	Gender activities in food crops and forages.		X	X	X									To increase of cash income.

Location in East Kalimantan	Component (Activities)	Activity schedule 2001												Expected outputs	
		J	F	M	A	M	J	J	A	S	O	N	D		
Sepaku II , Makroman	Evaluation of sweet potato for feeding livestock			X	X	X	X								Farmers gain knowledge for alternative feeding. Evaluation is reported.
Sepaku II, Makroman	On-farm grazing models			X	X	X	X					X	X	X	To find kind of species for grazing models.
Sepaku II, Makroman	PME exercises	X	X	X	X	X	X	X	X	X	X	X	X	X	12 PMEs conducted
New Sub-district	2. Dissemination														
Samarinda Ilir (new village), Sepaku (new villages), Pasir	Selection of new sites, collection of secondary data	X	X	X	X	X									2 new districts and 9 new sub-districts identified
	participatory diagnosis and participatory planning with 15 villages		X	X	X	X									Farmers' problems and solutions identified
Belengkong, Waru, Balikpapan Utara, Loa Kulu, Anggana Samboja, Sanga-sanga, Melak, BarongTongkok, Muara Wahau Sangata, Benga	6 Field day to old villages for 11 farmer groups				X	X	X	X							6 field days conducted in old villages (like Loh Sumber, Tanjung Harapan)
	Cross visit for new farmer groups, FW and technicians to the nearest focus sites					X	X	X							Increased knowledge of new farmers (15 farmer groups, about 50 farmers), field workers and technicians (15) in forages.
	Cross visits and assistance of experience farmer in focus site to new areas			X	X	X	X	X	X						Key farmers of focus sites have visited new sites and helped new farmers.
	On-farm planting of sweet potatoes for livestock feeding (cattle and goats)	X	X	X	X	X									Planting of sweet potatoes realised.
Lon Kaliurang Teluk Bayur, Talisayan	Meetings of leaders and key farmers of different farmer groups to discuss strategies for scaling up				X				X				X		Meetings every two months with villages within close proximity.

Location in East Kalimantan	Component (Activities)	Activity schedule 2001												Expected outputs
		J	F	M	A	M	J	J	A	S	O	N	D	
Tanjung Palas	Radio and TV broadcasting on FSP activities.			X				X			X			3 interviews.
	Regional competition in Forage management												X	To build of motivation in Forages.
	3. Multiplication													
Focus site and new areas	Production of vegetative planting materials on communal and individual nurseries.	X	X	X	X	X				X	X	X		2000 cuttings supplied to each new farmer (about 300 farmers, 15 groups).
	To purchase seeds and root cuttings	X	X	X	X	X	X				X	X	X	1000.000 root cuttings have to prepared for new farmers.
	Assistance in planting of new multiplication plots at key farms		X	X	X	X	X	X	X	X	X	X		7 new multiplication plots established
Sepaku II, Makroman	Obtaining of root cuttings and seeds		X	X	X	X					X	X		Planting material obtained from farmers in focus site.
Sepaku II, Makroman	Establishment of tree seedlings in poly-bags				X	X	X							80 % tree seedling germinate and distributed
Sepaku II, Makroman	Production and distribution of planting material of fodder sweet potato.													Five farmers have received planting material.
	4. Training													
	To make VCD on forage management					X								A tool for extension programs.
Sepaku II, Makroman	Training of key farmers in forage agronomy				X									15 key farmers trained.
Sepaku II, Makroman	Training of key farmers in animal nutrition and health					X								15 key farmers trained.
	In country workshop for exchange of experiences of field worker and technicians									X				1 workshop organised.

Location in East Kalimantan	Component (Activities)	Activity schedule 2001												Expected outputs	
		J	F	M	A	M	J	J	A	S	O	N	D		
	Training on farmer participatory research and forage technology for technicians in new areas						X					X			30 technicians and field workers to be trained..
	Training of animal nutrition and animal health for field worker and technicians								X						15 technicians and field worker to be trained.
	English training in Lao PDR							X							1 field worker to be trained.
	5. Networking														
	Contribution to SEAFRAD newsletter				X			X							2 contributions.
	Involvement in national workshops and seminars							X					X		2 workshop.
	Attendance of regional and international workshops													X	1 workshop.

5.3 Workplan of Lao PDR

Location In Lao PDR	Components (activities)	Activity Schedule 2001												Expected outputs	
		J	F	M	A	M	J	J	A	S	O	N	D		
Focus districts:	1. Development of forage technology														

Location in Lao PDR	Components (activities)	Activity Schedule 2001												Expected outputs
		J	F	M	A	M	J	J	A	S	O	N	D	
Pek , Xieng Ngeun, Chomphet, Luangphabang and Khanthabouly	Individual meetings with farmers on management and evaluation of fodder practices: 1. Planning 2. Establishment 3. Harvesting 4. Evaluation			X			X		X		X		X	Three provinces, five districts, 20 villages visited. Article in SEAFRAD newsletter on farmers' innovations.
Pek , Xieng Ngeun, Luangphabang	Survey of indigenous plants used for forage in the different areas.			X								X		Identification of native forages.
Xiengkhouang and Savannakhet	Establish productivity of the degraded grassland.					X	X	X	X	X	X	X	X	Preliminary report on productivity Improvement of grassland.
Pek	Fodder trees evaluation on farms, on-farm tree nurseries.			X			X	X	X	X	X	X	X	6 Nurseries established on-farm.
Luangphabang	<i>Sesbania sesban</i> and <i>Stylosanthes guianensis</i> for fallow improvement in shifting cultivation.			X			X	X	X	X	X	X	X	Planning and evaluation in one village.
	2. Dissemination													
Pek , Xieng Ngeun, Chomphet, Luangphabang and Khanthabouly	Site selection, secondary data collection.			X										2-3 new villages in each district.
	Participatory Diagnosis.			X										Identification problems and opportunity.
	Offer technology options to farmers through farm visits by extension workers.					X								2-3 new villages in each district.
	On-farm activities in new selected villages.					X	X	X	X	X	X	X	X	Farmers have planted test plots of forages in 2-3 new villages in each district.

Location In Lao PDR	Components (activities)	Activity Schedule 2001												Expected outputs	
		J	F	M	A	M	J	J	A	S	O	N	D		
	Follow up visit by extension workers and sometimes national coordinator. Planning for next year..						X		X			X		X	2-3 villages in each district.
Idem	Farmer cross visits.					X			X						Selected farmers in 2-3 villages in each district visit experienced farmers.
	3. Multiplication														
Nam Suang	Experiment on seed multiplication of promising species on-station.						X	X	X	X	X	X	X	X	Seeds of promising species are locally available.
Pek , Xieng Ngeun, Chomphet, Luangphabang	On farm seed production.						X	X	X	X	X	X	X	X	Report on evaluation.
Pek , Xieng Ngeun, Chomphet, Luangphabang	Village nurseries for vegetative planting material.						X	X	X	X	X	X	X	X	Planting materials are available in 10 villages.
	4. Training														
	Participatory research for new development workers (joined with FSLP).					X									Increased capability of 10 development workers.
	Participatory extension methodology and social equity (joined with FSLP).			X											Increased capability of 4-5 development workers.
	Forage Agronomy and technology option (joined with FSLP).					X									Increased capability of 10 development workers.
	Cross visit / on-site training for development workers.		X				X								2 new staff trained.

Location In Lao PDR	Components (activities)	Activity Schedule 2001												Expected outputs	
		J	F	M	A	M	J	J	A	S	O	N	D		
	Other training (English, computer, Farming systems and management)														1 person trained.
	5. Net working														
	Contribution to SEAFRAD newsletter.				X								X		Contribution to 2 newsletters
	Maintenance regional communication network. Telecommunication and mail.						X	X	X	X	X	X	X	X	Contacts maintained.

5.4 Workplan of Bukidnon province, Philippines

Location in Bukidnon	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
Focus site Malitbog Municipality	1. Development of forage technologies					
Kaluluwayan San Migara Mindagat	a) Evaluation of tree legumes suitable for integration into existing Farming System with focus on animal feeding.	X	X	X	X	Suitability/ adaptability of tree legumes for animal feeding.
San Migara Sabangan Tagmaray Mindagat	b) Evaluation of forages suitable for soil conservation as integrated into existing farming system.			X	X	Suitability/ adaptability of forages for soil conservation

Location in Bukidnon	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
Siloo, Sabangaan, tagmaray, Patpat, Omagling	c) Monitoring and evaluation	X	X	X	x	Six monthly and annual reports
Omagling, San Migara, Tagmaray, Sabangaan, Siloo, Mindagat, Kalingking	d) Planning with core group of farmers on issues related to forage expansion	X	X	X	X	Report on expansion issues
Malitbog municipality	2. Dissemination of forage technologies in selected sites					
New sitios in the existing barangays covered by the program	a) Selection of new sites		x	x	x	Names of new sites, number of new farmers
	b) Conduct of participatory diagnosis and participatory planning through farmers meeting in new sites	X	X	X	X	Report of the participatory diagnosis and participatory planning on the role of forages into their farming system.
	c) Gender analysis		X	X	X	Report on gender analysis
Manolo Fortich municipality	Demonstration on the integration of tree-legumes into existing farming systems by :					Tree legumes nurseries in 8 barangays, 8 farmers on farm, adaptable cutting management
	a. Nursery establishment	X	X			
	b. Field Transplanting		X	X		
	c. Cutting management				X	
	Conduct of participatory diagnosis & PP	X	X		X	Problem diagnosed & plans.
	Multiplication Plots Establishment	X	X	X	X	Seed multiplication plot with 12 farmers.

Location in Bukidnon	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
	Framers cross visits		X		X	
	Expansion of Forage Area			X	X	
	Technicians' & farmer leaders' training on participatory development planning			X		
	Course on Forage Agronomy & Use of PRA tools			X		
	Improve animal feeding practices		X		X	
	Seed production at smallholder farms			X		Smallholder seed production.
	Demonstration on the integration of tree-legumes into existing farming systems by :					
	Nursery establishment	X	X			Tree legumes nurseries in 6 barangay.
	Field Transplanting		X	X		6 farmers on farm.
	Cutting management				X	Adaptable cutting management.
Impasugong municipality	Conduct of participatory diagnosis & PP	X	X		X	Problem diagnosed & plans.
	Multiplication plots establishment.	X	X	X	X	Seed multiplication plot 8 farmers.
	Framers cross visits.		X		X	
	Expansion of Forage Area.			X	X	Extensively in 6 barangays.
	Technicians' & farmer leaders' training on participatory development planning			X		24 Technicians/ farmer-leaders trained.
	Improve animal feeding practices.		X		X	150 farmers.
	Seed production at smallholder farms.			X		Smallholder seed production.

Location in Bukidnon	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
	3. Development of forage multiplication systems					
	Establishment of communal nurseries as source of vegetative planting materials in new sites: San Migara (existing), Mindagat, Sabangan (existing), Tagmaray (existing), Kaling-king (existing), Silo-O (existing), Villa Nazareth (existing), Dambaan, Bilayong (existing), Patong, Paitan, Mabuhay Zigzag, Kalipai.			X	X	Established at least 8 multiplication plots as communal nurseries.
Kaluluwayan	Establishment of tree nurseries		X	X	X	6 on-farm tree nurseries.
	4. Capacity building					
Silo-o, Mandanisiao Zigsag Poblacion Villa Nazareth Tapisawon Sagaysayan Bikayong Patong	a) Farmers training on livestock production and management, forage agronomy, soil and water conservation and farming system development.			x	x	Trained at least 50 farmers.
(at least 4 Barangays)	b) Farmers' Field Day within municipality.			x	x	4 Farmers' field days conducted.
	c) Farmer to Farmer cross-visits outside municipality.			x	x	8 cross-visits to farmers outside the municipality conducted.
	d) Training workshop on farmer participatory research and Gender analysis.			x		Workshop held for 12 Development Workers within the municipality and 2 from Cagayan de Oro.

Location in Bukidnon	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
	e) Workshop on exchange of experience, strategies and logistics for development workers and some key farmers.			x	x	Greater understanding of the technology transfer process among development workers (1 joint session with Cagayan de Oro).
	f) Increased no. of development workers to be involved in FSP.					3 new development workers involved.
	g) Data analysis and processing.					Workshop attended by at least 3 development workers.
	Cross visit of farmers to Batangas.					Practical exposure to intensive cattle fattening with leucaena.
	5. Networking					
	a) Participation to locally conducted scientific congress and agricultural fairs.			X	X	At least 2 congress/fairs.
	b) Contribute an article to SEAFRAD Newsletter.			X	X	2 articles contributed.
	c) Facilitation of key farmers to be endorsed as members of the Barangay Development Council.			X		10 key farmers to be endorsed.

5.5 Workplan of Cagayan de Oro City, Philippines

Location in Cagayan de Oro	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
	1. Development of forage technologies					
Pagalungan Lumbia San Simon, Dansolihon, Mambuaya	Evaluation of tree legumes for integration into the existing farming system to be utilised for <ul style="list-style-type: none"> • Animal feeding • Soil conservation (Nursery establishment, grafted-leucaena, Calliandra, Gliricidia, Trichanthera, Mulberry)	X	X	X	X	Report on adaptability and suitability of tree legumes for animal feeding and soil conservation.
	Participatory research on the establishment of on-farm fodder tree nurseries with new species.	X	X	X		6 on-farm nurseries established, data on germination, survival and management collected and analysed.
All areas	Expansion of forage areas.	X	X	X	X	60-70 farmers have expanded cultivated forage area.
	2. Dissemination of forage technologies to new sites					
San Simon, Dansolihon, Mambuaya, Tagpang, F.S. Catanico, Baikingon	Selection of new sites		X	X	X	8 new farmer groups evaluating forages
	Conduct participatory diagnosis and planning.		X	X	X	Problems on the role of forages into their farming system identified.

Location in Cagayan de Oro	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
Pangalungan, Lumbia, Dan Solihon, Mambuaya, San Simon	To conduct a livestock field day.		X	X	X	Farmer to farmer sharing of experiences (25-30 farmers per barangay).
	3. Development of forage multiplication systems					
San Simon, Dansolihon, Mambuaya, Tagpang, F.S. Catanico, Baikingon	Establishment of forage nurseries by new farmers.		X	X	X	
Pagalungan, Lumbia	Seed production for herbaceous and tree legumes on farm (Calliandra, Leucaena, Stylo 184, Centrosema).	X	X	X	X	At least 2 farmer groups producing seeds.
CCC site in Lumbia	Seed production of K636 at CCC.	X	X	X	X	Maintenance of Leucaena K636 plot at CCC for seed production.
Pagalungan, Lumbia	Grafting/ marcotting of leucaena KX2 hybrid.		X	X		Enhancement of skills in vegetative propagation and production of mother plant grove (2 farmers).
Lumbia, Mambuaya, Dansolihon, San Simon, Pangalungan	Establishment of multiplication sites on farm for vegetative propagation.		X	X	X	2 sites for each barangay established multiplication sites.

	4. Capacity building					
All sites	Key farmers training on forage agronomy, utilization and animal nutrition.			X	X	3 key farmers per barangay trained.
Lumbia, Pangalungan	Key farmers training new farmers on forage technologies and multiplication.	X	X	X	X	At least 50 farmers trained.
	Farmer cross visits within the City and other provinces.			X	X	At least 4 groups of 20 farmers each.
Batangas	Cross visit of farmers to Batangas.			X		Practical exposure to intensive cattle fattening with leucaena.
	Cross visits for agricultural technicians.			X		Capability enhancement for 5 agricultural technicians participated in the cross visit.
	Workshop on exchange of experience, strategies and logistics for development workers and some key farmers.			X		5 people of City Vet Office. Greater understanding of the technology transfer process among development workers (1 joint session with Malitbog).
	Training in participatory research and forage agronomy for development workers.			X		2 new staff trained.
	5. Networking					
	Participation to local conferences and agricultural fairs.		X		X	Participated in at least 2 conferences by 5 agricultural technicians.
	Contribute articles to SEAFRAD Newsletter.		X	X	X	Contributed 3 articles.
All sites	Facilitating access to livestock and livelihood programs.	X	X	X	X	1 module each for cattle, buffalo and goat dispersal program.

5.6 Workplan of Thailand

Sites/District	Component (activities)	Activity schedule				Expected outputs
		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
Sung Nuen Seekew Dankhuntod	Developing of forage technology					
	Participatory planning		X			Plan formulated by farmers
	Participatory evaluation		X			Identify desirable/ undesirable of forage characteristics of forage species
	Stylo and Lablab evaluation (on-station)		X	X	X	Alternative stylo variety of 184, Lablab varieties for dry season forage and for silage making
	Integrated use of improved forages, cassava and legume hay for beef fattening (with R. Howeler)		X	X	X	Farmers integrated feeding technology for beef fattening
	PME exercise (more valuable in old sites)					The project sites monitored and impact assessed
Sung Nuen Seekew Dankhuntod	Dissemination of forage technology					
	Selection of new sites	X				- 4 new sites selected
	Collection of secondary data	X				- land use, age data, organisation, services
	Participatory diagnosis		X			- 4 reports of participatory diagnosis conducted
	Farmer visit to station		X			- 6 visits of 70 farmers in 2001 and 100 farmers in 2002 farmers learned more on forage species
	Farmer visit to farmer		X			- 6 visits of 70 farmers in 2001 and 100 farmers in 2002 to experienced farmers
	Participatory planning		X			- 4 participatory planning conduct

Sites/District	Component (activities)	Activity schedule				Expected outputs
		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
	Participatory evaluation			X	X	- desirable/undesirable of forage characteristics of forage species identified
	3. Multiplication					
	Prepare planting material		X			Planting material will be available for farmers
	- distribute planting material and planting		X			A set number of farmers will establish forage on farm
	- farmer visit to farmer (seed producer)		X	X	X	A set number of farmers will gain more choice o seed production
	Production of seed on station and for other FSP countries and freight		X	X	X	Planting material will be available for farmers and FSP countries (separate contract)
	Experiment on seed production and management of <i>Brachiaria brizantha</i>	X	X	X	X	<i>Brachiaria brizantha</i> seed production technique developed
	4. Training					
	- farmer training					Farmers trained in forage establishment and utilization
	- training course on forage agronomy and PR for district livestock officer				X	- 20 district livestock officers trained in forage agronomy and farmer participatory research
	cross visit for project staff and district livestock officers		X			increase capability of extension staff (6 times)
	on site training on participatory diagnosis		X			increase capability of 5 local staff to conduct participatory diagnosis with farmers and invited FSP expert
	English course for project staff				X	increase capability of local staff in communication in English

	5. Networking					
Sung Nuen Seekew	Attendance of regional and international workshops	X	X			Papers presented.
Dankhuntod	Editorship of SEAFRAD newsletters		X		X	Two issues edited and distributed.

5.7 Workplan of Tuyen Quang Province, Vietnam

Location in Tuyen Quang	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
Focus communes:	1. Development of forage technology					
Tu Quan	Evaluate Stylo 184, <i>S. hamata</i> , <i>V. unguiculata</i> , <i>Wynn cassia</i> , <i>A. pinto</i> With 5 farmers		X	X	X	Farmer evaluation: Vigor, Cover %, Weed %.
Phu Lam	Introduction of shrub legumes for shade, and in boundary areas (<i>Gliricidia</i> , <i>Leucaena</i> , <i>Calliandra</i>) with 5 farmers	X			X	Farmer evaluation: Height, Yield of leaf, Acceptance animals.
Duc Ninh Phu Lam	Study natural feed resource, in forest reserve as complimentary feed source to agricultural land (RR in collaboration with Thai Nguyen Univ.) with 10 farmers		X	X	X	Knowledge of availability & use of natural feed resources at different times of the year.

Location in Tuyen Quang	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
Phu Lum Duc Ninh	Selection of forage species for pig (stylo, ramia, <i>Trichanthera gigantea</i> , sweet potato) and fish (Cf. <i>Brachiaria</i> (Toledo & ruzi & setaria) with <i>P. atratum</i> , <i>P. max.</i> , with 10 farmers		X	X	X	Farmer evaluation. Preference by pig and fish.
All	Obtain information on value of forages for feeding fish, pigs and cattle, taking quality into consideration.	X	X	X	X	Improved relation between area of forage planted livestock production.
All areas	Monitoring and evaluation of forage development .					M&E reports.
2. Dissemination						
Districts						
Yen Son Ham Yen Son Duong Chiem Hoa Na Hang	Collection of secondary data.	X				Reports on natural conditions, population, land-use, agricultural data, organisations, services etc.
	Selection of villages/ communes.	X				29 new villages selected for 2001 and 2002.
	participatory diagnosis's in 8 new villages in 2001, 15 in 2002.	X				Reports on participatory diagnosis's in new villages.
	New farmers visit focus communes.		X			300 farmers from 14 villages visited focus communes in 2001 and 350 farmers from 15 villages in 2002.
	Participatory planning. Follow-up visits.		X			14 village groups in 2001 15 village groups in 2002
	Farmer training in planting Moved to 'Training'.		X			300 farmers trained in 2001 350 farmers trained in 2002
	Participatory evaluation.				X	Description of suitable species and technologies in villages with established forages.

Location in Tuyen Quang	Component (activities)	Activity Schedule 2001				Expected outputs
		Jan - Mar	Apr - Jun	Jul - Sept	Oct - Dec	
	Field visits of farmers from focus communes to new farmers after 6 months.			X	X	Report on exchange of ideas between farmers
	3. Multiplication					
All districts	Buy seed of grasses and legumes from Thailand and China					47 Kg seed purchased
All districts	Production and sale of cuttings by farmers					170,000 splits grasses 10,000 stakes of Gliricidia
Yen Son Ham Yen	Seed production of grasses and legumes		X	X	X	20 kg <i>P. maximum</i> 10 kg <i>P. atratum</i> 40 kg <i>V. unguiculata</i> Stylo 'black' seed var. Wynn cassia
	4. Training					
	Training technicians in communication, participatory diagnosis and forage technology.		X			12 people from province, districts and communes are trained in farmer participatory research each year .
	Training exercise in M&E through carrying out M&E at one site, with Daklak, Hue.		X			Key personnel trained in implementing M&E in 2001.
	Field days .		X			300 farmers attend field days each year
	Farmer training in management of fodders and animal management.		X	X		200 farmers trained in forage agronomy and animal management each year.
	Courses in seed production.			X	X	30 farmers trained in seed production.
	English training in Laos.		X			Site manager trained .

5. Networking					
Quarterly reports to national and regional coordinators.	X	X	X	X	
Printer for Site Manager, maintenance 2002 (Computer has been provided).		X			
Internet connection.		X	X	X	Contact maintained with other FSP staff in Vietnam and regional coordinator.
Management of research and dissemination.	X	X	X	X	Well managed project.

5.8 Workplan of Daklak Province, Vietnam

Sites in Daklak Province	Components (activities)	Activity Schedule								Expected outputs 2001	
		2001				2002					
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D		
Focus commune: Cu Roa	1. Development of forage technology										
	Arachis for grazing -Planted 2000. In 2001: Evaluate with five farmers.		X	X			X	X			Farmer evaluation Cover % Botanical composition
	Sowing and planting of strips with improved forages in natural grassland Planted 2000, under grazing In 2001: Evaluate with 5 farmers.	X			X	X			X		Farmer evaluation Vigour Spread from rows
	Stylo in coffee. Est. 2000. 2001. Plant Wynn cassia, Arachis & evaluate with 10 farmers.	X	X		X	X	X		X		Farmer evaluation Cover Yield

Sites in Daklak Province	Components (activities)	Activity Schedule								Expected outputs 2001
		2001				2002				
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	
	Live fencing and boundary planting of shrub legumes. Established in 2000. In 2001: Increase planting & evaluate in 2 villages.	X	X		X	X	X		X	Farmer evaluation. Yield green matter. Leafiness in dry season.
	In 2001: Survey productivity of native grassland.	X		X	X	X		X		Estimate of DM in wet and dry season & species composition using Botonal ; nutritive value
Ea Kar	In 2001: Use of forages for fattening cattle. cf. traditional fattening, 6 farmers			X	X	X	X	X	X	Estimate of animal performance Economic performance.
	In 2001: Demonstration of feeding Gliricidia to cattle-wilting & increasing % in ration, 3 farmers.	X	X							Information on improved consumption/ intake. .
New communes/districts	2. Dissemination									
Ae Kar, Cujut, Buon Don	Collection of secondary data.	X								Reports on natural conditions, population, land-use, agricultural data, organisations, services etc.
	Selection of villages/communes.	X								10 villages selected
Ae Kar District	PD's in 6 new villages - 2001 PD's in 4 villages - 2002	X				X				Reports on PD's in new communes.
Cujut	PD's in 2 new villages - 2001 PD's in 4 villages - 2002	X				X				Reports on PD's in new communes.
Buon Don	PD's in 2 new villages -2001 PD's in 4 villages - 2002	X				X				Reports on PD's in new communes.
	Farmer Field days		X				X			10 villages in 2001 12 villages in 2002

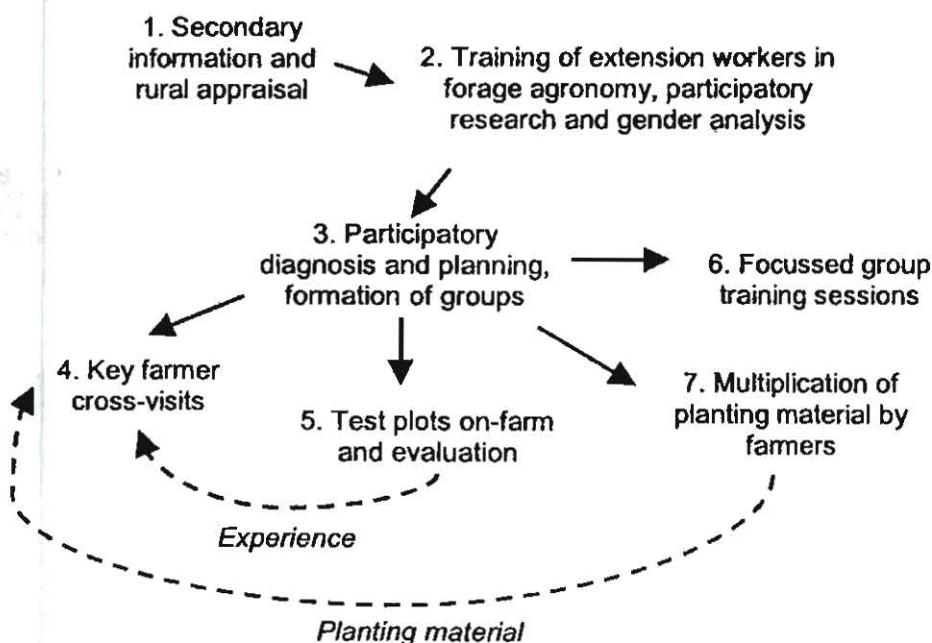
Sites in Daklak Province	Components (activities)	Activity Schedule								Expected outputs 2001
		2001				2002				
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	
	Participatory planning		X				X			10 villages in 2001 12 villages in 2002
	Farmer training		X				X			300 farmers trained in planting & managing forages 10 courses in 2001 12 courses in 2002
	Participatory evaluation			X	X			X	X	Description of suitable species and technologies 12 villages old forage areas 01 10 villages 2002
	Farmer-to farmer visits				X				X	300 farmers with established forages exchange information 300 farmers in 2001 300 farmers in 2002
	3. Multiplication									
Daklak province	Buy seed of 8 grasses and 8 legumes from Thailand, Indonesia & China	X				X				52 kg seed 2001 60 kg seed 2002
Cu Roa Ae Kar	Production and sale of cuttings by farmers of Pm, Bd, Bb, Br, P. atratum and Gliricidia stakes		X				X			Approx. 160,000 splits and stakes sold to FSP and other farmers
Cu Roa	Seed production of P. max, B. briz., P. atratum, Stylo, Gliricidia by 10-15 farmers.			X	X			X	X	10-15 farmers producing and selling seed
	4. Training									
	Training technicians in communication, PD and forage technology		X				X			Staff from prov. Dist. and communes are trained 17 in 2001, 17 in 2002

Sites in Daklak Province	Components (activities)	Activity Schedule								Expected outputs 2001
		2001				2002				
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	
	Training exercise in M&E through carrying out M&E at one site				X					Staff from Daklak, Hue and Tuyen Quang trained in PM&E in 2001
	Cross site visit-farmers & staff from Daklak to Tuyen Quang									6 staff visit Visit report
	10 Field days									See dissemination
	10 Farmer Training courses in agronomy									See dissemination
	6 Farmer training course on animal. nutrition and animal management.		X	X			X	X		Groups from district and commune staff trained 10 in 2001, 12 in 2002
	5. Networking & management									
	Quarterly reports to national and regional coordinators									4 reports
	Workshop with Province				X					Improved knowledge of FSP project and extension of FSP outputs in the Province
	Internet connection	X	X	X	X	X	X	X	X	Good communication with regional coordinator.
	Efficient management of research and dissemination	X	X	X	X	X	X	X	X	Efficient management of research and dissemination
	Printer, Computer purchased		X							

6 Concluding remarks

Scaling-up and participatory approaches were the theme of our meeting. Which one comes first, and are they separable? FSP started with participatory research to develop forage technologies, and we believe that a solid relationship with farmers is needed before you can attempt to scale-up. The teams in Indonesia, Lao, Philippines and Vietnam do have this solid background and have been successful in meaningful scaling-up. China and Thailand, on the other hand, still have to invest in the establishment of focus sites where farmers become confident enough to act as agents in the process of scaling-up. Building confidence among resource poor farmers requires good facilitation of field workers, and it requires patience. Not surprisingly, one of the problems mentioned in Thailand was the lack of trained field staff and their allocation of time to this new process. It stresses the importance of training, and our network should be used to exchange skilled trainers to train other trainers. Training activities are therefore a priority for China and Thailand. This initial investment might seem much and slow, but it pays off. In Indonesia, Lao, Philippines and Vietnam, the investment was made several years ago, and it is resulting in an exponential scaling-out, with more and more farmers developing forage technologies on their farms. A striking similarity emerging from the presentations, was the central role of the experienced and enthusiastic farmers in the focus sites, whom we called key farmers. When cross visits were made, i.e. farmers visiting other farmers, key farmers played a vital role in educating the new farmers. In some countries, key farmers acted as extension workers and visited farms in new areas (Indonesia); in other countries farmers from new areas visited key farmers in focus sites. Sometimes both happened. Common criteria for identifying key farmers were: head of a group, having good ideas, enthusiastic, they identify themselves, successful farmer, good communication skills, having time and good relationships with other farmers. Figure 1 shows a usual flow of activities in scaling-up.

Figure 1. Flow diagram of activities in the scaling-up process of forage technologies happening in FSP. Activities 4 -7 sometimes happen simultaneously or in a different order.



During the discussions, different views were presented on the issue of payment of honoraria to farmers. In Indonesia, Philippines and Vietnam farmers receive money for their services from the project, in Thailand, Lao and China they didn't. There was confusion about who should get payment and how much they should get. Lack of standards for payment was considered a problem in some places. In some cases, farmers who carry out extension work were compensated for the time they spent, equivalent to the amount of money they would earn working on their own farm. This seems to be a formula that can easily be worked out in each country, while in some countries the standards are higher than in other countries. FSP would support this system, but the rates and payments need to be transparent in order to promote acceptance at the national host institutions. Expenses of transportation and food were also covered by the project. Connected to this, the issue of allowances for field workers was brought up. The difference between farmers and field workers, however, is that field workers do receive a salary already, which is not discontinued when they go to the field, unlike the interruption of farmers' daily work. Field workers do get incentives from FSP in terms of lunches, and participation in training courses. Only in Lao, the salary of field workers is too low to sustain someone's life, and a formula has been developed to supplement their salary based on field visits.

As FSP Phase I had sometimes been criticised for not addressing gender issues enough, there is a risk that Phase II will be criticised for not working enough with marginalised ethnic groups. Participants of the workshop gave reasons for not working with these groups, such as: they are difficult to gather in a meeting, they have different activities, their livestock keeping is not intensive, they don't use animal draught power, they have difficult attitudes, and they are very poor. Which of these arguments are facts and which are prejudices? In fact, some could be used as arguments in favour of working with them (they are very poor). Luckily, not all votes were negative, and in Lao for instance, minority groups are the main target group of the project.

In 1996, during FSP phase I, an international workshop took place in Thailand about forage seed supply systems (Horne, Phaikaew and Stür, Eds.). Although the workshop in Thailand concentrated largely on seed production rather than on production of vegetative planting materials, it was concluded that vegetative material was preferable for remote smallholder farms, due to logistical and institutional difficulties associated with seed production. Since then, it has become apparent that the role of vegetative planting materials has become more important, in both remote and accessible areas. Together with this shift, we see a shift from on-station to on-farm production of planting materials. The drive for scaling-up has certainly enhanced the decentralisation of planting material production, as its availability is essential for the process. Vegetative material is now the most important source of planting for new farmers in the Philippines and Indonesia. In Thailand and Vietnam the weather is dry enough to allow good harvesting and handling of grass seeds. Farmers produced 37 % of the registered forage seed trade in Thailand in 2000. In Vietnam, a market for forage seeds has still not formed though. In Indonesia and the Philippines, vegetative planting materials and seeds are sold by farmers on a small scale. A summary of amounts of seeds produced and amounts of seeds required was produced during the meeting, to assist co-ordination of importation (Appendix 7.3).

A start was made during the workshop to plan activities for the next year, and these workplans were still further developed during some months immediately after the workshop (Chapter 5). It was felt that one day was not enough and more time should be reserved for this in the next workshop. Lao PDR was chosen to host the annual meeting in 2002.

Ralph Roothaert

Regional Co-ordinator FSP

7 Appendices

7.1 Programme

Monday, 15 January

Arrival of Participants in Samarinda

Tuesday, 16 January

08.00 – 08.30 Registration (Jindra Samson and Ralph Roothaert)

08.30 – 08.45 Opening (Governor of East Kalimantan)

08.45 – 09.30 Introduction (P. Kerridge, R. Roothaert)

Break

Dissemination of forage technologies: how has it worked and what are the plans for 2001 and 2002?

10.00 – 10.45 Laos

10.45 – 11.30 Thailand

11.30 – 12.15 Indonesia

Lunch

13.30 – 14.15 Philippines

14.15 – 14.45 China

14.45 – 15.30 Vietnam

Break

15.45 – 17.00 General discussions about dissemination strategies

19.00 Welcome dinner

Wednesday, 17 January

Forage multiplication systems – how have we moved forward since the beginning of FSP – phase I?

Presentations:

08.00 – 08.15 Vietnam

08.15 – 08.30 China

08.30 – 08.45 Philippines

08.45 – 09.00 Indonesia

09.00 – 09.15 Thailand

09.15 – 09.30 Laos

Break

10.00 – 12.30 Group discussions on role of seeds, problems with seed procurement, improvement of multiplication systems.

Lunch

Participatory research in forage technology development

13.30 – 14.30 Presentations by RLR, PCK, Paul Burgers

14.30 – 15.45 Group discussions (2 countries per group)

Break

16.00 – 17.00 Group presentations

Evening: Exploring nightlife in Samarinda

Thursday, 18 January

Field trips

Friday, 19 January

Local frameworks for participatory monitoring and evaluation

Presentations:

08.00 – 08.15 Indonesia

08.15 – 08.30 Thailand

08.30 – 08.45 Laos

08.45 – 09.00 Vietnam

09.00 – 09.15 China

09.15 – 09.30 Philippines

Break

Workplans for 2001 to 2002

10.00 – 11.15 Country teams will discuss their workplans for 2001 and 2002 with PCK, Tony Perez, JS and RLR. Ideas and recommendations from the workshop are considered for incorporation in the workplans.

Lunch (11.15 – 13.00)

13.00 – 15.00 Workplans and ME frameworks are further developed on a country basis.

15.00 – 15.45 *Open, announcements*

15.45 – 16.00 Closing

7.2 List of Participants

China

Mr. Yi Kexian
Tropical Forages Division
Tropical Field Crops and Animal Husbandry
Institute
CATAS
571737 Danzhou, Hainan
P.R. China
Fax: (86-890) 330-0157 /0440
Email: mucao@public.dzptt.hi.cn or
yikexian@yahoo.com.cn

Mr. He Huaxun
Tropical Forages Division
Tropical Field Crops and Animal Husbandry
Institute
CATAS
571737 Danzhou, Hainan
P.R. China
Fax: (86-890) 330-0157 /0440

Indonesia

Ir. Ibrahim
Dinas Peternakan TK.I Kaltim
Jalan Bhayangkara No. 54,
Samarinda, East Kalimantan 75121
Tel: (62 541) 743921/741642
Email: ibrahimfsp@smd.mega.net.id

Mr. Munief Muchsinin
Kepala Dinas
Dinas Peternakan
Jl. Bhayangkara No. 54
Samarinda, East Kalimantan 75121

Ir. Don Utoyo
Director of Livestock Development
DGLS
Jl. Harsono RM No. 3
Pasar Minggu, Jakarta 12550
Tel/Fax (62-21) 781 5872

Dr. Sofjan Sudardjat
Directorate General for Livestock Services
Jalan Harsono Rm No. 3
Ragunan, Jakarta Selatan 12550

Mrs. Maimunah Tuhulele
Pd. Jati Murni
Blok I/12
Pd. Gede , Bekasi 17431

Leonard Mangetan
Livestock Services
East Kalimantan Province
Jl. Bhayangkara No. 54
Samarinda 75121
East Kalimantan
Tel (62 541) 741 642/743 921
Fax (62 541) 736 228

Ir. Jacob
Livestock Services
East Kalimantan Province
Jl. Bhayangkara No. 54
Samarinda 75121
East Kalimantan
Tel (62 541) 741 642/743 921
Fax (62 541) 736 228

Sugeng Widodo
Agricultural Extension Worker in Loakulu
c/o Dinas Peternakan Kecamatan Loakulu

Ir. Husaini
Livestock Services Pasir District
Jl. Rm Notosunardi
Tanah Grogot
Tel (62 543) 21763

Ir. Hafidz Anwar
Livestock Services Kutai District
Jl. Jenderal A. Yani
Tel (62 541) 661 333

Ir. Suprayitno
Livestock Services Berau District
Jl. Pemuda No. 683
Tanjung Redeb
Tel (62 554) 21159

Dr. Indrawanto
Livestock Services
Bulungan District
Jl. Sengkawit, Tanjung Selor
Tel (62 552) 21249

Dr. Wippartono
Livestock Services Tarakan Municipality
Jl. Mulawarman GG. Damai RT 74
Takaran
Tel (62 551) 21291

Ir. Rini Purwanti
Livestock Services
Samarinda Municipality
Jl. Mt. Haryono, Samarinda
Tel (62 541) 744 614

Dr. Jularno
Livestock Services Balikpapan Municipality
Jl. Milono, No. 30
Samarinda
Tel (62 542) 422 520

Ir. Hamlah
Livestock Services East Kalimantan
Province
Jl. Bhayangkara No. 54
Samarinda
Tel (62 541) 741 642

Dr. Sugiman Yusriadi
Livestock Services East Kalimantan
Province
Jl. Bhayangkara No. 54
Samarinda
Tel (62 541) 741 642

Tugiman
Agricultural Ext. Worker in Makroman
c/o Dinas Peternakan Kota Samarinda
Jl. Mt. Haryono, Samarinda

Heriyanto
Agricultural Extension Worker in Sepaku
c/o Balai Penyuluhan Pertanian (BPP)
Sepaku

Mahmud
Agricultural Worker in Tanjung Harapan
c/o Dinas Peternakan Kecamatan Samboja

Cholid
Agricultural Extension Worker in Sepaku IV
and I
c/o Balai Penyuluhan Pertanian Sepaku

Murjani
Agricultural Extension Worker in Anggana
c/o Dinas Peternakan Anggana

Paul Burgers
ICRAF Southeast Asian Regional
PO. Box 161
Bogor 16001
Tel (62-251) 625 415
Fax (62 251) 625 416
Email: p.burgers@cgiar.org

Dede William
ICRAF Southeast Asian Regional
PO. Box 161
Bogor 16001
Tel (62-251) 625 415
Fax (62 251) 625 416

Laos

Dr. Peter Kerridge
CIAT
P.O. Box 783
Vientiane
Tel (856-21) 222 796
Fax (856-21) 222 797
Email: p.kerridge@cgiar.org

Mr. Phonpaseuth Phengsavanh
Forages and Livestock Systems Project
P.O. Box 6766
Vientiane
Tel (856-21) 222 796
Fax (856-21) 222 797
Email: fsplao@laotel.com

Mr. Soulivanh Novaha
Agriculture and Forestry office
Xiengkhuang Province
Lao PDR

Philippines

Dr. Ralph Roothaert
CIAT, c/o IRRI
DAPO Box 7777
Metro Manila
Tel. (63-2) 845 0563
Fax (63-2) 845 0606
Email: r.roothaert@cgiar.org

Dr. Tony Perez
Asian Development Bank
6 ADB Avenue
Mandaluyong City
0401 Metro Manila
Tel (63-2) 632 6957
Fax (63-2) 636 2401
Email: aperez@adb.org

Ms. Jindra Samson
CIAT, c/o IRRI
DAPO Box 7777
Metro Manila
Tel. (63-2) 845 0563
Fax (63-2) 845 0606
Email: j.samson@cgiar.org

Mr. Ed Magboo
Livestock Research Division
PCARRD
4030 Los Baños, Laguna
Philippines
Tel: (63-49) 536 0020
Email: ecmagboo@pcarrd.dost.gov.ph or
ecmagboo@laguna.net

Ms. Judith Saguinon
Local Government Unit
8513 Malitbog, Bukidnon

Dr. Perla Asis
City Veterinary Office
Cogon Market
Cagayan de Oro City
Email: perla_asis_fsp@yahoo.com

Thailand

Mrs. Chaisang Phaikaew
Division of Animal Nutrition
Department of Livestock Development
Phya Thai Road

Bangkok 10400
Tel (66 2) 251 1941
Fax (66 2) 250-1314
Email: fspthai@ksc.th.com

Mrs. Ganda Nakamanee
Pakchong Animal Nutrition Research Center
Pakchong
Nakornratchasima 30130
Tel (66-44) 311 612
Fax (66-44) 314 776
Email: pcanrc@loxinfo.co.th or
ganda57@hotmail.com

Vietnam

Mr. Le Hoa Binh
National Institute of Animal Husbandry
Ministry of Agriculture and Rural
Development
Thuy Phuong, Tu Liem
Hanoi
Tel (84 4) 8385 022
Fax ((84 4) 838 9775
Email: fspvietnam@hn.vnn.vn

Mr. Truong Tan Khanh
Tay Nguyen University
Highway No. 14, Km 4
Buon Ma Thuot, Daklak
Vietnam
Tel (84 50) 853 781
Fax (84 50) 857 409
Email: TanKhanh@dng.vnn.vn

Ms. Vu Thi Yen
Livestock Officer
DARD
Tuyen Quang
Vietnam
Fax (84-27) 822 704

7.3 Seed availability and requirements (kg)

Species	Amount available	Seed requirements per site or country								Total Re-quest	Availa-ble minus re-quest
		C. de Oro	Malit bog	Laos	Dak-lak	Tuyen Quang	East Kalim antan	China	Thai-land		
Thailand											
<i>P. maximum</i> TD58	100	10	10	30	8	4		1		63	37
<i>B. ruziensis</i>	1000			30	2	1				33	967
<i>B. brizantha</i> "Marandu" 6780	30	4		8	6	8	3	1		30	0
<i>B. brizantha</i> "Serengeti" 6387	15	4		3	3	2		1		13	2
<i>B. brizantha</i> "Karanga" 16835	15			3	2	2	2	1		10	5
<i>P. atratum</i>	1000	20	10		8	3	2			43	957
<i>S. sphacelata</i> "Kazangula"											
<i>C. gayana</i>											
<i>C. pubescens</i> "Barinas" 15160	10	5		4	1			1		11	-1
<i>C. macrocarpum</i>	10	5		4	1					10	0
<i>C. pascuorum</i>	50				1			1		2	48
<i>D. virgatus</i>	50	10								10	40
<i>S. hamata</i>	1000				2	3				5	995
<i>S. guianensis</i> CIAT 184	500	10	10	30	11	10				71	429
<i>L. leucocephala</i> 'Cunningham' type	100	5		2				1		8	92
Vietnam											
<i>B. brizantha</i> 6780		Not available for distribution									
<i>B. decumbens</i> (Basilisk)		Not available for distribution									
<i>B. ruziensis</i>		Not available for distribution									
<i>P. maximum</i> TD58		Not available for distribution									
<i>P. atratum</i>		Not available for distribution									
<i>S. guianensis</i> CIAT 184		Not available for distribution									
<i>L. leucocephala</i> (Cunningham)		Not available for distribution									
<i>G. sepium</i> (Ret.)	10	5						5		10	0
<i>F. macrophylla</i>	100						2			2	
Indonesia											
<i>S. guianensis</i> CIAT 184		10	20				20			50	
<i>L. leucocephala</i> (K636)		10	20		1	6	5	5		47	
<i>C. pubescens</i> "Barinas" 15160							20			20	
<i>G. sepium</i> (Ret.)		10	20			2	5	5		42	
<i>C. macrocarpum</i>							2				
<i>S. grandiflora</i>		5	5				5			15	
<i>D. virgatus</i>								1			
<i>M. atropurpureum</i>				2						2	
<i>C. calothyrsus</i>		15	5		1	2	5			28	
China											

<i>B. decumbens</i>	500	20	5	30	4	1	2			62	438
<i>P. maximum</i>	500										
<i>M. minutiflora</i>	1000										
<i>P. atratum</i>	100										
<i>S. guianensis</i> CIAT 184	20,000										
<i>S. guianensis</i> 'black seed'	1000	20	20	2	2	2	2		2	50	950
<i>S. hamata</i>	1000										
<i>S. scabra</i>	10						2		1	3	7
<i>L. leucocephala</i> (Rey)	100	10				1				11	89
<i>M. sphyaria</i>	1000										
<i>C. cajan</i>	1000	5		2			2		2	11	989
<i>M. atropurpureum</i>	500										
TOTAL		183	125	150	53	47	80	22	5	662	