Farmer evaluation of forages in the Philippines: Progress, experiences, and future plans

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On-farm evaluation of forages in cooperation with the Forages for Smallholders Project (FSP) in the Philippines began in 1995. From then on, the work expanded to include seven sites located in the Visayas and Mindanao regions (Table 1).

Collaborators based at the sites include non-government organizations, state colleges/universities, local government units, and the Philippine Coconut Authority (PCA). These institutions have personnel based in the communities. These collaborators had previous working relationships with either the Southeast Asian Forage Seeds Project or the Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (PCARRD) through its Regional Forage Performance Trials (RPT) Network and Pilot Provincial Agricultural Extension Project (PPAEP). All had previous experience in research and development work either with forages or with farmers.

Table 1. Collaborators and location of FSP sites in the Philippines.

Site (start of work)	Collaborator	Forage-related activities
Guba, Cebu (June1996)	Mag-uugmad Foundation Incorporated (MFI)	Promotion of agroforestry technologies; facilitation of livestock dispersal
Matalom, Leyte (June 1995)	Farm and Resource Management Institute (FARMI), Visayas State College of Agriculture (ViSCA)	Development and promotion of upland agricultural technologies
Cagayan de Oro (Oct 1995)	City Veterinary Office	Livestock improvement and dispersal; livestock extension
Malitbog, Bukidnon (Oct 1996)	Office of the Municipal Agriculturist	Agricultural extension including livestock dispersal
Davao (Jul 1997)	Philippine Coconut Authority	Small coconut farmer development
Cotabato – 2 sites (Aug 1996)	Philippine Carabao Centre at University of Southern Mindanao; Gagmayang Kristohanong Katilingban – Kidapawan Diocesan Federation of Cooperatives	Forage research (USM); Cooperative development (GKK-KDFC)

Description of sites

Tables 2 and 3 provide brief descriptions of FSP sites in the Philippines. A more detailed description of these sites is shown in Appendix 1.

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Table 2. Physical characteristics of FSP sites in the Philippines.

Site	Latitude	Altitude (m)	Annual rainfall (mm)	Wet season (start-end)	Wet months (>50 mm)
Cebu	10° N	550	1500	Jun – Dec	12
Matalom	10° N	0 - 300	1970	Jun – Dec	12
Cagayan de Oro	8° N	185	1500	Jun – Nov	12
Malitbog	8° N	700	1830	Jun – Oct	12
Davao	7° N	175 - 360	2210	May – Oct	12
Carmen, M'lang	7° N	<200 m	1600	May – Nov	8

Most of the sites are upland, except for M'lang, Cotabato, which is rainfed lowland. The site in Davao is mainly under coconuts, while the others are planted mainly to annual crops. Soils are generally of the clay loam type, with pH varying from acidic to slightly acidic, and moderate to good fertility. Cagayan de Oro and Matalom have soils with pH higher than 7. All the upland sites vary in topography, from slightly undulating to steep. Altitude varies from less than 100 m to more than 500 m above sea level. Erosion is a problem at all upland sites. Matalom and, to a lesser extent, Cebu are prone to typhoons during the rainy season.

All sites have farms that are crop-based, but livestock play a vital role as source of draft power and cash income. Often, maize is the major food and rice is cultivated in valleys or flat areas. Farmers in M'lang and Carmen plant fruit tree, crops, rubber and sugarcane. Fruit crops, vegetables, and ornamentals are cultivated in Cebu and Davao. Farmers in Cagayan de Oro and Malitbog plant banana as a cash crop. Farmers in all sites (except those in Matalom) use fertiliser.

The sale of crops and livestock is a major source of cash income in most sites, except in Matalom where food crops are mostly for subsistence and farmers gain income from sale of other products like toddy, bamboo, etc., as well as remittances received from household members working off-farm. All the sites experience an increase in area devoted to crop production, thereby reducing the grazing areas available for ruminants.

All farmers raise carabao, cattle, and goats. Carabao and cattle (only in Cagayan de Oro and Malitbog) are used as draft animals except in Davao where farmers rely more on tractors. Goats are popularly raised for cash only in M'lang. In all sites, except Cebu and Davao (dairy animals), ruminants are tethered in vacant areas to graze on native vegetation with basically minimal or no supplementation.

Farmers in Davao raise dairy cattle. These animals are stall-fed and are provided with commercial feeds and cut herbage. Some farmers in Davao also practice semi-commercial poultry production. Farmers in Cebu also practice stall-feeding with forage but not commercial concentrates.

Table 3. Description of soils and farming systems at FSP sites in the Philippines.

Site	Soil Characteristics	Farming system
Cebu, Visayas	• Sandy clay • PH 4.8-6.5 • Moderate fertility • Well-drained • Eroded; rolling to steep topography	• Both upland cropping and agroforestry (tree farms, hedgerow) system • Small area and intensive • Crops: maize, vegetable, fruit trees, flowers • Crops are fertilised and sold for cash • Animals include carabao (draft), cattle and goats • Ruminants are stall-fed with herbage from hedgerows; little grazing
Matalom, Leyte, Visayas	• Clay loam • Two soil types: • Acid (pH4.8-<7) • Low P and high Al saturation, • Calcareous (pH>7) • Well-drained • Eroded; rolling to steep	• Upland cropping (crop-fallow rotation) • Crops: maize (calcareous), rainfed rice (valleys and flat areas), upland rice (acid), root crops and coconut • Crops not fertilised; mainly for consumption • Animals include carabao (draft), cattle, goats • Ruminants tethered to graze on native vegetation with no or minimal supplementation
Cagayan de Oro, northern Mindanao	• Clay loam • pH 5.8-8.8 • Good fertility • Well-drained • Eroded • Rolling to steep	• Upland cropping • Crops: maize, banana, coconut, root crops • Crops fertilised and for cash • Animals include carabao (draft), cattle (draft), horses, goats • Ruminants tethered to graze on native vegetation with no or minimal supplementation
Malitbog, Bukidnon, MIndanao	• Clay-loam • pH 5.6 • Low N and P • Well-drained • Eroded • Rolling to steep	• Upland cropping • Crops: maize, banana, coffee, coconut, vegetables, root crops • Crops fertilised and for cash • Animals include carabao (draft), cattle (draft), goats • Ruminants tethered to graze on native vegetation with no or minimal supplementation
Davao, Mindanao	• Clay-loam • pH 5.1-5.6 • Fertile • Well-drained • Eroded • Rolling to steep	• Under coconut • Crops: coconut, maize, banana, fruit trees, vegetables, flowers • Crops fertilised and for cash • Animals include carabao (less use for draft), cattle (beef and dairy), goats • Ruminants (except dairy cattle) tethered to graze on native vegetation with no or minimal supplementation • Dairy cattle stall fed with forages with concentrate supplementation
Carmen, North Cotabatu, Mindanao	• Clay-loam • pH 6.5 • Fertile • Well-drained • Eroded • Rolling to steep	• Upland cropping • Crops : corn, upland rice, coffee, coconut, vegetables, fruit trees • Crops fertilised and for cash • Animals include carabao (draft), cattle, goats • Ruminants tethered to graze on native vegetation with no or minimal supplementation
M'lang, North Cotabatu, Mindanao	• Clay-loam • pH 6.5-7 • Fertile • Well-drained • Flat	• Rainfed lowland • Crops: maize, rice, rubber, sugarcane, fruit trees • Crops fertilised and for cash • Animals include carabao (draft), cattle, goats • Ruminants tethered to graze on native vegetation with no or minimal supplementation

Table 4 shows a summary of the problems identified by farmers and those addressed by on-farm activities in the respective sites. Insufficiency of feed was a problem cited in all sites. This was the result of increased animal population and more area being devoted to crops. Unavailability of feed was a problem especially in the dry season in most sites. In M'lang, lack of feed persists during the cropping season, when most areas are planted to crops. Soil erosion, despite being evident in all upland sites, was recognized as a problem only in Malitbog and Davao.

Table 4. Summary of problems identified[1] by farmers during participatory diagnosis and addressed[2] by the FSP.

Problem	Cebu	Matalom	Cagayan de Oro	Malitbog	Davao	Carmen	M'lang
Lack of feed due to limited grazing area	✗ ✔	✗ ✔	✗ ✔	✗ ✔	✗ ✔	✗ ✔	✗ ✔
Lack of feed in dry season	✗ ✔	✗ ✔	✗ ✔	-	-	✗ ✔	✗ ✔
Uncontrolled grazing	-	✗ ✔	✗ ✔	✗ ✔	✗ ✔	✗ ✔	✗ ✔
Increase in unpalatable weeds	-	-	✗ ✔	✗ ✔	-	✗ ✔	-
Diseases in animals	-		-	-	-	-	✗
Poor animal performance	-	✗	-	-	-	✗	-
Unavailability of adapted forages	-	-	-	-	✗ ✔	-	-
High cost of concentrates	-	-	-	-	✗ ✔	-	-
Lack of food	-	-	-	✗	-	-	-
Low crop production	-	-	-	✗	-	-	-
Increasing need for fertiliser	-	-	-	-	✗	-	-
Disease in crops	-	-	-	-	✗	-	-
Soil erosion	-	-	-	✗ ✔	-	-	-
Flooding in cropped areas	-	-	-	-	✗	-	-
Low market price	-	-	-	-	✗	-	-
Lack of capital	-	-	-	-	✗	-	-

[1] ✗ = Problem identified by farmers.
[2] ✔ = Problem addressed by on-farm activities.

In most sites, farmers considered the feed unavailability problem to have just started. Consequently, most farmers (except in Cebu) still have access to other farmers' grazing area and restrictions have not been implemented. Thus, in most sites, uncontrolled grazing becomes a big problem for farmers who have tried to establish forages. In addition, farmers in Cagayan de Oro, Malitbog, Davao, and Carmen reported an increase in unpalatable weeds in the grazing areas, pointing out that some degree of overgrazing has occurred.

Farmers in Davao expressed a need for adapted forages. These farmers have tried establishing plots of Napier grass for their dairy cattle. They observed that this species was not able to persist under their management system (cut-and-carry with some degree of uncontrolled grazing).

Farmers in the sites have evolved some coping mechanisms in times of feed unavailability. These include taking the animals to far-away areas to graze and gathering tree leaves, banana trunks, and green forage as feed for animals.

More details on the results of the PDs are included in Appendix 2.

Activities conducted in the sites

Activities vary in terms of nature and time (Table 5). The basic procedure involves consulting the farmers (PD and planning), followed by the establishment of initial testing and multiplication area, and then individual testing by farmers. In between these stages, field days, trainings, and cross-visits are done. Regular meetings with farmers provide a venue for sharing experiences (participatory evaluation) and are a means for maintaining the initial testing area. Likewise, visits to farmers were done to gather feedback.

Table 5. Summary of activities at FSP sites in the Philippines.

	Cebu	Matalom	Cagayan de Oro	Malitbog	Davao	Carmen	M'lang
Type of Activity (no. of farmers)							
Communal – formal[1]	-	✔ (3)	✔ (6)	✔ (4)	-	✔ (1)	✔ (1)
Individual – formal[1]	✔ (4)	✔ (10)	✔ (12)	-	✔ (1)	-	-
Individual – informal[2]	✔ (30)	✔ (21)	✔ (300)	✔ (15)	-[3]	✔ (2)	-[3]
Method of planting material distribution							
Field days	✔	✔	✔	✔	-	-	-
Individual contact	✔	✔	✔	✔	✔	✔	✔
Possible forage types/options							
Grasses for cut-and-carry							
- in hedgerows	✔	✔	✔	✔	✔	✔	✔
- in blocks	✔	✔	✔	✔	✔	✔	✔
Grasses for grazing	-	✔	✔	✔	✔	✔	✔
Herbaceous legumes							
- for grazing	-	✔	✔	✔	✔	✔	✔
- as cover crops	✔	✔	✔	✔	✔	-	-
- for soil improvement	✔	✔	✔	✔	-	-	-
- as relay to main crop	-	-	-	-	-	-	-
Tree/shrub legumes							
- in hedgerows	✔	✔	✔	✔	✔	✔	-
- in fence lines	✔	✔	✔	✔	✔	✔	✔
- in blocks	-	✔	✔	-	-	-	-

[1] Technicians and farmers together decide on what species and what option to test.
[2] Farmers chose the species and option by themselves.
[3] To be started.

The initial testing and multiplication areas were established and managed by farmer groups. The decision on which species to try is made after consultation between collaborators and farmers. These areas were very useful for conducting field days and trainings. Farmers look at the species and decide for themselves which ones they would like to try individually.

There were some cases when farmers and collaborators agreed to collaboratively set up more formal forage experiments, testing them for a certain option. This usually involves key farmers who test a range of species for a specific purpose. These experiments are used not only for the purpose of demonstration but also as basis of comparison among species. These farmers live far from the initial testing area and are requested to join when farmers in nearby areas choose only a limited range of species. The major criteria for selecting farmer-cooperators were their interest and the availability of their areas to try out the forages. Whenever possible, innovative farmers who possess leadership skills and good communication abilities were chosen.

Planting materials were distributed either during field days or upon individual requests. The latter seems to lead to better establishment, since the farmer is usually ready at the time he makes the request for planting materials. This was done in cases when farmers wanted a large amount of planting materials.

On the other hand, farmers always ask for planting materials during field days. In such cases farmers are advised to prepare an area before the field day. Otherwise, they request the farmers to plant a few hills near their house, later to serve as source of planting materials if farmers want to expand forages on their farm.

More details on the activities at each site are shown in Appendix 3.

Progress of forage technology development, evaluation, and adoption

General observations

The pace and progress of on-farm work varied between sites because of the different starting times of the activities. Sites that started early are already into individual farmer testing and into trainings and field days as well as participatory evaluation of most forages except legume trees (still in nursery). On the other hand, sites that commenced on-farm work more recently are still in the initial testing and multiplication stage. Sites that began work between these two periods are in the process of maintaining their initial testing areas as well as finding more farmers to test the forages.

In sites that started early, a major proportion of the work consists of informal testing with individual farmers since the more formal initial testing and multiplication areas (Matalom, Cagayan de Oro and Malitbog) have already been established. The other sites are still in the more formal stage of initial evaluation and multiplication.

Collaborators observed that it takes time for establishing forages with farmers. Factors like farmer availability and occurrence of dry periods often slow down the process despite frequent visits and careful scheduling.

Farmers, who have a strong need for forages, are the ones who establish forages , first; they even approach the technicians and get their planting materials ahead of their scheduled date. On the other hand, there are farmers who get planting materials only because of peer pressure. And then there are also the 'wait-and-see' types of farmers. Farmer visits, field days, trainings, and cross-visits were very useful in sustaining the interest of farmers. During these activities, farmers and technicians share ideas, learn from each other, and plan activities.

It was also observed that more farmers who obtained planting materials come from places where livestock dispersal programs exist. This implies that forage technology development would be facilitated if implemented with a livestock improvement program. Moreover, successful forage establishment was facilitated in cases where strong farmer organizations exist. The existence of *alayon* (mutual help groups) was a big factor in the rapid establishment of forages in individual farmers' fields. The same factor was instrumental in the establishment and maintenance of the initial testing and multiplication plots.

Farmers' feedback

Farmers reacted well to the participatory approach. They felt involved and free to choose whatever species, options, and establishment method they wanted. Involving these farmers in field days and in training other farmers has been beneficial for both trainees and trainers as well.

In establishing a structured forage set-up farmers thought that establishment of forage mixtures as designed by technicians was complicated. This aspect has to be considered when establishing species mixtures on-farm.

In terms of individual forage species, farmer preferences varied with sites. At the early stages (initial testing and multiplication), farmers tended to prefer species which grew well and showed good yield potential. Their major criteria were adaptability to local conditions and ability to provide an adequate amount of herbage.

When farmers tested forages on their own farms and started to feed them to their animals, new criteria surfaced. For grazing species, farmers realized the value of grazing tolerance, ability to spread and produce ground cover, and palatability to

animals. For instance, Matalom farmers found *B. humidicola* to spread fast, to tolerate close grazing, and to be palatable.

Arachis pintoi was found to thrive well under shade, making it useful as a cover crop (in Cagayan de Oro and Cebu) and was palatable to rabbits (in Davao). A farmer in Malitbog observed improved egg production when his ducks started feeding on *A. pintoi*.

Farmers favoured tall and upright grasses like Napier (King, cv. Mott and Florida), *P. maximum*, *Setaria sphacelata* var*. splendida*, *Brachiaria brizantha* and *B. decumbens* as cut-and-carry species because of their good yield and palatability. In addition *S. sphacelata* var. *splendida* was found to have good regrowth/tillering ability and good tolerance for occasional flooding and did not cause itchiness when cut.

Two farmers in Malitbog (*P. maximum* CIAT 6299) and the farmer group in Cagayan de Oro (Napier grass) evaluated the effect of fertilisation on the cut-and-carry species. They observed that yield was increased and they were able to take cuttings as frequently as every 2 weeks.

Brachiaria brizantha CIAT 6780 was observed to be affected by *Rhizoctonia* (or *Cercospera*?) in some sites. A rare case of bacterial and fungal infection occurred in upright grasses like Napier, *B. brizantha* and *P. maximum* CIAT 6299 at the initial testing and multiplication area of Matalom. The case occurred in the dry season with the species left uncut for a long time. The symptoms were alleviated and did not recur at the start of the wet season and thereafter.

Farmers have also observed that legumes like *Centrosema pubescens* and S*tylosanthes guianensis* 184 were not as palatable to animals as grasses. These cases were noted when these species were planted side by side with grasses. Moreover, these legumes were found to have low persistence under heavy grazing. In addition, farmers observed that *Desmodium heterophyllum* CIAT 349 and *Arachis pintoi* did not persist when weeds dominated them.

Farmers favoured legumes like Stylo 184, Desmanthus *virgatus,* and *Desmodium cinerea* because of their good growth, palatability, and yield. These species have been tried and found suitable as hedgerows in some sites.

Farmer management of different species

As of this stage, most individual farmers are still planting the species in small plots (either in blocks or short hedgerow lines) either near their houses or in portions of their farms. The species are either grazed or cut and fed to animals from time to time.

A farmer in Carmen planted Napier near a spring that supports the community's water needs. He observed that since the forages were planted, the well did not dry up as quickly during dry season and it did not become flooded with muddy water in the wet season.

Other upright grasses (Napier grass) and shrub legumes (*D. virgatus*) were also planted as live fence. *Arachis pintoi* was established by a farmer in Cagayan de Oro in her yard and became a good lawn material. A farmer in Cebu also planted this species as a cover crop for his grapes. Both are now expanding their planted area.

Many farmers have started expanding the areas planted to forages. These are mostly cut-and-carry species.

Learning from participatory evaluation

Participatory evaluation (PE) has been done in most sites especially in the initial testing and multiplication area. Farmers observed the species and commented on their performance. In some sites where individual testing has been done, farmers'

observations of the forages that they established were also taken. An open-ended evaluation method was used.

Farmers' comments varied, depending on whether they have planted and used the species in their own farms. Most comments of farmers who have not used the species were just perceptions on how good and useful the species are. The perceptions are usually related to their previous experiences with native species and what they have heard during training. For instance, it is not unusual to hear comments about the usefulness of a species (*Leucaena diversifolia*) in providing firewood and improving soil fertility even at the seedling stage.

In evaluations at this stage, the most useful information is the farmers' criteria for choosing the species that they want to adopt. These are '*high herbage yield that gives plenty of feed even from a small area'* or '*the good adaptation of the species because of its good growth*'. Similarly, insights on how farmers could integrate forages in their farms are also obtained. Comments like '*this species can be used for hedgerow/fence*' provide ideas on how farmers may utilise different species.

On the other hand, evaluation of farmers who have established the species themselves can give information on the characteristics related to the utilization of a particular species. This includes information on regrowth ability, itchiness when cutting, persistence, reaction to utilization, as well as palatability and effect of forages when fed to animals.

There is still a need to gain more experience and skills in evaluation techniques such as probing and asking questions as well as getting farmers' criteria in selecting a certain species. In the process of evaluation, many things can happen and the person handling the evaluation must know how to deal with the situation. These skills can only be obtained by practice, reflection, and training. Every evaluation session is different from another.

Technical issues

In working with forages on-farm, a major issue is the production and handling of seeds. At this stage, most forage establishment is done using vegetative planting materials. The problem is exacerbated by the fact that there is no existing commercial market for forage seeds in the Philippines. Moreover, seed production attempts at the farmers' level have not been successful. Greater attention must be given to seed production research to induce rapid adoption of forages.

Appendices

Appendix 1. Detailed Description of FSP Sites in the Philippines.

Guba, Cebu:

General description of the area

- Guba is located in the uplands of Cebu, central Philippines (10°25' N).
- Average annual rainfall is about 1495 mm, with peak rainfall from June to December. Considerable rains (>50 mm) are experienced throughout the year.
- Soils are sandy clay and moderately fertile with pH varying from 4.8 to 6.5.
- It is an upland area consisting of slightly rolling to steep hills.
- About 50% of the area (slightly rolling to moderately steep) is used for cropping (maize, vegetables, and flowers) and agroforestry while steeper areas are either used as tree farms (mangoes, fruit trees, and forest species). There are few areas with native vegetation which are used as pasture land.

Description of the community

- Farmers in Guba have been cultivating their areas since 1945 when the area was forested. These farmers were traditional suppliers of vegetables and flowers for Cebu City.
- There are two dominant upland farming systems: purely cropping and agroforestry (contour hedgerows and trees inter-planted with crops). Livestock are also kept to support cropping as well as a source of income and food.
- They grow maize (basically for home consumption) as well as cash crops like flowers, vegetables, and fruits like mangoes. Forest tree species like Gmelina are likewise grown in small tree farms. Commercial and organic fertiliser application is a common practice.
- Almost all of the farmers (90%) keep livestock for draft (carabao), cash income, and food for special occasions. These animals are either owned or availed of from dispersal programs. The predominant production system is breeding or reproduction. Few farmers attempt to fatten cattle for slaughter. These animals are marketed through middlemen who purchase them on a per head basis.
- Ruminants are mainly stall-fed with cut-and-carry herbage from hedgerows and vegetation around the farm with some grazing within the farm area. Due to limitations in area, farmers do not allow other animals to graze in their own farm. Inputs like de-wormers and veterinary medicine are used. Commercial feed supplements are not used.
- Farmers in the area are either owners or tenants in the farms.
- Cropping system shifts from monocropping to intensive farming (agroforestry integrating livestock). Livestock management is gradually changing from purely grazing/tethering to stall-feeding.

Matalom, Leyte

General description of the area

- Matalom is located on the southwest coast of Leyte island, Central Philippines (10o17' N).
- Average annual rainfall is about 1972 mm, with peak rainfall from June to December. Considerable rains (>50 mm) are experienced throughout the year. The area is prone to typhoons that occur between June and December.
- Soils are clay loam and moderately fertile. Two types of soil exist in the area: a) acid soils (pH 4.5-5.5, low P, and high Al saturation) and b) calcareous soils (pH >7).
- It is an upland area consisting of rolling to steep hills. Slightly rolling areas have acid soils and form the dominant landscape (47% of total area), covering the coastal portion and lower elevations (up to around 100 m asl) while calcareous soils are in the steeper and higher altitude areas (up to 300 m asl) inland.
- The flat areas near the coast are used mainly for rice production. Most of the sloping areas are used for upland cropping under a crop-fallow rotation system. The system involves cropping for a few seasons before the area is left fallow to regenerate soil fertility. During the fallow period, these areas become dominated by native vegetation and are used as common grazing areas for livestock. In the steeper slopes which are not suitable to grazing, fallow areas are often dominated by trees (predominantly *Leucaena leucocephala*) which are used for firewood. Sloping areas are planted to upland crops during the cropping period while valleys, where water catchment is possible, are planted to rainfed lowland rice. There is a recent increase in irrigated areas in the slightly sloping portions where irrigation is possible.

Description of the community

- Farmers in Matalom have been cultivating their areas since 1910 when the area was forested. Upland crops are planted.
- The dominant farming system in the sloping areas is upland cropping with livestock being kept to support cropping as well as a source of income and food. Valleys and water catchment areas are used for rainfed lowland rice.
- The slightly sloping and undulating acid soil areas are planted to upland rice, sweet potato and peanut. The higher calcareous areas are planted to maize and root crops such as sweet potato, yam, and gabi. Rainfed rice is planted in valleys both in the acid soil and calcareous areas. Most of the produce is used for home consumption with little surplus sold.
- Almost all farmers keep livestock for draft (carabao), cash income and food for special occasions. These animals are either owned or availed of under local sharing arrangement (alima). The predominant production system is breeding or reproduction; fattening for slaughter is not practiced except for swine. These animals are marketed through middlemen who purchase them on a per head basis. A farm household usually raises 1-2 heads of carabao or cattle. Commercial de-wormers and veterinary drugs are sometimes used.
- Ruminants are mainly tethered in vacant areas to graze on native vegetation. Supplementation is minimal (usually only done for draft animals during periods of peak use). No commercial feed supplements are used; only cut forage, corn stover and other available crop residues. During long dry periods when native vegetation for grazing becomes scarce, farmers use tree leaves and banana trunk as feed.
- Farmers in the area are either owners or tenants in the farms. Tenure arrangements are unclear.
- There is a recent move toward agroforestry in the upland areas. The area being irrigated is also increased with the initiative of the local government.
- Sale of products from bamboo, coconut toddy, small stores, abaca and remittances from household members working in Manila or abroad are primary sources of income. Sale of livestock, especially cattle, is the secondary source of income.

Pagalungan, Cagayan de Oro

General description of the area

- Pagalungan is located in Misamis Oriental Province in the Mindanao Region. Farms are generally hilly (up to 50% slope) with reasonable soil fertility. Upland management includes cultivation of coconut, abaca, and upland rice. The plain valley, on the other hand, is cultivated for coconut, rice, and banana.
- Soil pH ranges from 5.1 to 8.8; the lower limit of the range is more common while the upper limit occurs in eroded areas. Soil type is clay loam. Altitude is 185 m asl.
- The area has two types of climate: type 2 = no dry season with a pronounced maximum rainfall from Nov to Jan and type 3 = relatively dry from Nov to Apr and wet for the rest of the year. Average annual rainfall is 1500.87 mm.

Description of the community

- Pagalungan is 19 km from the capital of Misamis Oriental which is Cagayan de Oro. The area is hilly with vast expanses of uncultivated bushlands and grasslands (cogon). About 80% of the people belong to the Higaonon tribe, native to the place but assimilated to lowland culture.
- There are more than 850 ha of public timber and only 192 ha of alienable and disposable land.
- Maize constitutes the main product of 90% of the farm families. Only 7% rely on coconut as a major source of income. Root crops and bananas are regular crops. Patches of flat and lightly rolling country are suitable for a variety of crops such as pineapple with pasture intercropped. There are only a few work animals.
- Livestock ownership varies among species: carabao and horse are 100% owned; cattle is 75% owned, 15% on loan coming from the Cattle Breeding Program funded by PPAEP, and 10% from the Cattle Dispersal Program funded by the City Vet; and pigs and goats are 90% owned.
- Animals are tethered among native vegetation in vacant areas; some are left to graze along the road, river, or under coconut trees with minimal or no supplements at all (farmers use corn bran). Only a few farmers practice cut-and-carry.
- Farmers are now integrating forage into their farming system. Others increased the number of their livestock due to the good performance of their animals.

Malitbog, Bukidnon

General description of the area

- Malitbog is located in Bukidnon which is a landlocked province in the central part of northern Mindanao.
- It is predominantly an agricultural province with about 38% of the total land area devoted to agricultural crops, livestock/poultry, and vegetables. With rich fertile soil, big processing/manufacturing firms put up large-scale plantation-type farms in the area.
- Wet season occurs from June to October with an average annual rainfall of 1826.15 mm.
- Soil has a pH range of 5.6 – 6.5 and has three major soil types: clay loam, sandy loam, and loam.

Description of the community

- Brgy. San Luis ,Malitbog, Bukidnon, located at 700 m asl, was formerly inhabited by natives (Bukidnons). With an estimated land area of 38,867.75 ha., farming (90.2%) is the major source of income. This is followed by employment in government (2.5%), private firms, (2.2%), and self-employed (1.9%).
- Maize, rice, banana, coffee, coconut, a variety of root crops, and vegetables are the major crops planted by farmers while cows, carabao, chickens, pigs, horse, ducks, and goats are being raised in the municipality as draft animals (carabao), for market (cattle, chicken) and for home consumption (chicken).
- 95% of the farmers are keeping livestock. Ruminants are usually tethered. But now, it can be observed that cut-and-carry is being done specially in pilot areas. There are still farmers though with large areas who are still not concerned with forage cropping. Corn bran feeding is done during the bumper harvest of corn in the months of August-September and November-December.

Riverside, Davao

General description of the area

- Riverside is located in Calinan District (7o05' N), Davao City in the island of Mindanao.
- Average annual rainfall is 2215 mm with peak rainfall from May to October. Considerable rains (>50 mm) are experienced throughout the year.
- Soils vary from silty loam in the flat areas to clay loam in the higher areas. In the upland areas, soil pH is around 5.1-5.6. Drainage and fertility are good.
- The barangay is located at an elevation around 175 m asl. Topography is generally rolling in the upper portions and flat in the valleys and lower portions.
- Most of the area is used for agricultural purposes (97%). Only a small portion (3%) is used for residential and other purposes.

Description of the community

- Farmers in Riverside settled in the area from as early as 1965. Majority were settlers from the Visayas while the rest were from Luzon. The area was originally forested. As early as 1940s, the natives and the Japanese were already practicing agriculture in the area. The Japanese introduced abaca cultivation while the natives were cultivating food crops. The abaca was later wiped out with a disease. This paved the way for cultivation of other crops. In 1965, the area was offered to settlers who then settled and cultivated the land.
- Upland farming with high-value cash crops is the dominant system. Small flat areas have irrigation and are planted to lowland rice. Vacant lands are used as common grazing areas.
- Most of the flat portions in the area are planted to rice or vegetables. Areas near the house are used for flower production. The sloping areas are often planted to coconut and other fruit trees. Maize is planted either as intercrop to coconut or in the open. Fertilisation and use of chemical inputs are widely practiced.
- Livestock raised include carabao, cattle (both beef and dairy), goats, swine, chickens and ducks. Almost all farmers keep livestock for draft (carabao to a little extent due to presence of tractors), cash income, and food for special occasions and domestic consumption. These animals are mostly owned except for dairy and Brahman beef cattle, which are obtained as loan from a government program. The predominant production system is breeding or reproduction fattening for slaughter is not practiced except for swine and broiler poultry. These animals are marketed through middlemen who purchase them on a per head basis. There are fewer carabao than cattle in the area because of availability of tractors for ploughing. Dairy cattle are intensively managed for milk production (complete with commercial and home-mixed concentrates, supplements, and biologics). Beef cattle and carabao are managed to a lesser extent, with minimal supplementation; however, veterinary medicines and de-wormers are also used.

- Ruminants except dairy cattle are mainly tethered in vacant areas to graze on native vegetation. Supplementation is seldom practiced. No commercial feed supplements are used; only cut forage and other available crop residues. On the other hand, dairy cattle are stall-fed with cut forages and provided with commercial supplements and concentrate (either home-mixed or purchased as premix).
- Almost all of the farms are owned by the farmers themselves.
- Tractors replaced carabao for draft. With the expansion of dairy production and the use of vacant areas for high-value crops, availability of grazing space has decreased. Commercial poultry and swine operations as well as conversion of some areas for commercial or industrial purposes are also evident.
- Sale of agricultural products (coconut, milk, and other farm products) is the primary source of income. Working in the city as well as in other farms is the next major source of income.

Malagos, Davao

General description of area

- Malagos is located in Bagio District (7o05' N), Davao City in the island of Mindanao.
- Average annual rainfall is 2215 mm with peak rainfall from May to October. Considerable rains (>50 mm) are experienced throughout the year.
- The soil is clay loam, generally fertile, and well drained with good texture. Soil pH is around 5.2-5.6.
- The barangay is located at an elevation around 354 m asl. Topography is generally rolling to steep in the upper portions and flat in the valleys and lower portions.
- Most of the area is used for agricultural purposes (82%). Only a small portion (18%) is used for residential, resort, and government reserve purposes (basically the highest part which is a forest and watershed of Davao City).

Description of the community

- The present farmers in Riverside settled in the area as early as 1970. Majority came from Visayas while the rest were from Luzon. The area was originally forested. Since the early 1940s, the natives and Japanese were already practicing agriculture in the area. The Japanese introduced abaca cultivation while the natives were cultivating food crops. Abaca was later wiped out with a disease (1950s). This paved the way for cultivation of other crops. In 1970, the area was offered to settlers who then settled and cultivated the land. From the late 1970s to the 1980s, most of the area was abandoned due to unstable peace and order situation. However, when the situation stabilized, a greater number of farmers came and settled in the area.
- Upland farming with high-value cash crops is the dominant system. Commercial poultry and swine production is likewise practiced. Small flat areas have irrigation and are planted to lowland rice. Vacant lands are used as common grazing areas.
- Most of the flat portions in the area are planted to rice or vegetables. Areas near residences are used for flower production. The sloping areas are often planted to coconut and other fruit trees. Maize is planted either as intercrop to coconut or in the open. Fertilisation and use of chemical inputs are widely practiced.
- Almost all of the farmers (96%) raise livestock -- these include carabao, cattle (both beef and dairy), goats, swine, chickens, and ducks. Almost all of the farmers keep livestock for draft (carabao to a little extent due to presence of tractors), cash income, and food for special occasions and domestic consumption. These animals are mostly owned except for dairy and Brahman beef cattle, which were loaned from a government program. The predominant production system is breeding or reproduction fattening for slaughter is not practiced except for swine and broiler poultry. These animals are marketed through middlemen who make purchases on a per head basis. There are fewer carabao than cattle in the area because availability of tractors for ploughing. Dairy cattle are intensively managed for milk production (complete with commercial and home-mixed concentrates, supplements, and biologics). Beef cattle and carabao are managed to a lesser extent, with minimal supplementation; however, veterinary medicines and de-wormers are also used.
- Ruminants except dairy cattle are mainly tethered in vacant areas to graze on native vegetation. Supplementation is seldom practiced. No commercial feed supplements are used; only cut forage and other available crop residues. On the other hand, dairy cattle are stall-fed with cut forages and provided with commercial supplements and concentrate (either home-mixed or purchased as premix).
- Majority of the farms (70%) are owned by the farmers. The rest are either tenanted or under lease.
- There is a recent change from carabao to tractors as source of draft power. With expansion of dairy production and use of vacant areas for high-value crops, grazing space availability has

decreased. Commercial poultry and swine operations as well as conversion of some areas for commercial or industrial purposes also occur.
- Sale of agricultural products (coconut, milk, and other farm products) is the primary source of income.

Carmen, Cotabato

General description of area

- Carmen is located in the north-western part of Cotabato province (7o17' N) in the island of Mindanao.
- Average annual rainfall is 1593 mm with peak rainfall from May to November. Considerable rains (>50 mm) are experienced throughout the year.
- Soils are clay loam with pH around 6.5 and of good fertility.
- The southern portion is somewhat flat, and gradually becomes rolling, then steep, as one goes to the north.
- Most of the area is used for agriculture. There is still a small forest in the municipality. Only a small portion is used for residential and commercial purposes. The flat areas are planted to rice (especially irrigated) and maize. Rolling areas are planted to maize and upland rice. Steeper areas are used for rubber and other plantation crops.

Description of the community

- Farmers in Carmen settled in the area as early as 1940. Majority were settlers from Visayas while the rest were from Luzon. There are also some natives in the area. The area was originally forested. The settlers and loggers started clearing the area and paved the way for settled cultivation.
- Upland farming is the dominant system. Small flat areas have irrigation and are planted to lowland rice. Vacant lands are used as common grazing areas.
- Maize and upland rice are the dominant food crops in the upland area. Rubber, cotton, mungbean, peanut, coffee, banana, coconut, and mangoes are also cultivated. Rice is the sole crop in irrigated areas. Fertiliser and chemicals are applied to all these crops.
- Majority of the farmers (75%) raise livestock. These include carabao, cattle, goats, swine, chickens, and ducks. Almost all farmers keep livestock for draft (carabao), cash income, and food for special occasions and domestic consumption. These animals are either owned or availed of under a local sharing arrangement. The predominant production system is breeding or reproduction. Fattening for slaughter is not practiced except for swine. These animals are marketed through middlemen who purchase them on a per head basis. A farm household usually raises 1-2 heads of carabao or cattle and a few heads of goat. Commercial de-wormers and veterinary drugs are sometimes used.
- Ruminants are mainly tethered in vacant areas to graze on native vegetation during the day and then they are kept near the house at night. Supplementation is seldom practiced (usually only done for draft animals during periods of peak utilization). No commercial feed supplements are used, only cut forage and other available crop residues.
- Presently, some areas which were once vacant or planted to maize have been converted for planting of sugarcane and other high-valued crops (e.g. durian, mangoes, rambutan, and others). This change has also caused a decrease in grazing/tethering area for livestock.
- Sale of agricultural products (both crops and livestock) is the main source of income. Running small businesses like stores and acting as middlemen in the sale of agricultural products are secondary sources of income (15 % of households).

M'lang, Cotabato

General description of area

- M'lang is located in the south-eastern part of Cotabato province (7o10' N) in the island of Mindanao.
- Average annual rainfall is 1593 mm with peak rainfall from May to November. Considerable rains (>50 mm) are experienced throughout the year.
- Soils are clay loam pH ranging from 6.5 to 7.0 and of good fertility.
- The town has the widest flatlands in the Philippines (38,900 ha).
- Most of the area is used for agricultural purposes (77%). The rest are either used as fishponds (15.57%), institutional areas, residential, commercial, and road areas.

Description of the community

- Farmers in M'lang settled in the area in the early 1930s. Majority came from the Visayas (Panay Island) while the rest came from Northern and Central Luzon (Ilocos, Pampanga).

There are also some ethnic groups/natives in the area. The area was originally forested. The settlers themselves started clearing the area and paved the way for settled cultivation.

- Rainfed farming is the dominant system, representing two-thirds of the total agricultural area. The rest is irrigated rice area which is located near two major rivers. Freshwater fishponds are also common.
- Rice is the dominant crop in both irrigated and rainfed ecosystems. In the rainfed area, the other crops planted include rubber, sugarcane, coconut, banana, fruit trees, and coffee. All crops are fertilised and food crops are raised both for commercial and household consumption.
- Livestock raised include carabao, cattle, goats, swine, chickens, ducks and turkeys. Almost all farmers keep livestock for draft (carabao), cash income, and food for special occasions and domestic consumption. These animals are either owned or availed of under a local sharing arrangement. The predominant production system is breeding or reproduction fattening for slaughter is not practiced except for swine. These animals are marketed through middlemen who purchase them on a per head basis. A farm household usually raises 1-2 heads of carabao or cattle and a few heads of goat. Commercial de-wormers and veterinary drugs are sometimes used.
- Ruminants are mainly tethered in vacant areas to graze on native vegetation. Supplementation is minimal (usually only done for draft animals during periods of peak utilization). No commercial feed supplements are used; only cut forage and other available crop residues. During the dry season, when native vegetation for grazing becomes scarce, farmers cut and carry native grasses and tree leaves for feeding. A similar practice is done while the rice crop is growing due to limitations in grazing area.
- Sale of agricultural products (both crops and livestock, especially goats), working as hired labourers (both agricultural and non-agricultural) and remittances from household members working in Manila or abroad are primary sources of income.

Appendix 2. Results of Participatory Diagnoses at FSP sites in the Philippines.

Matalom, Leyte

- Attendance : The 24 farmers participating in the PD were members of alayon groups coming from Barangay San Salvador, Matalom, Leyte.
- Problems identified by farmers :
  1) Lack of feed during dry season caused by the limited grazing area and insufficient knowledge of new technologies;
  2) poor animal nutrition and performance leading to low productivity (parasite/disease susceptibility especially in carabao; underweight and overworked animals)
  3) uncontrolled grazing.
- Coping mechanisms:
  1) Bringing animals to faraway places for grazing
  2) Using tree leaves and banana trunks for feed when all the native vegetation dries out
  3) Consulting livestock experts regarding animal diseases and giving supplementary inputs to animals;
  4) Getting exchange/hired labour to help in land preparation
- Decision: The farmer group agreed to work with FSP to evaluate forages for cut-and-carry and for grazing on their own land. First, they will try the species as a group. The results of the group activity will be used to decide which species the farmers will try individually. The species they plan to test will include those that can be used as hedgerows and fence lines.

Pagalungan, Cagayan de Oro

- Attendance: The 26 farmers participating in the PD were members of existing farmer associations (Tribal and Settlers Association, Women's Association) in the barangay. Some barangay officials likewise attended the meeting.
- Problems identified by farmers :
  1) Lack of feed especially during the dry season
  2) Increase in unpalatable weeds (especially Chromolaena odorata) in existing grazing areas
  3) Insufficient feed due to increase in number of animals and areas devoted to cropping
  4) Uncontrolled grazing
- Coping mechanisms:
  1) Use of cut-and-carry native forages existing near rivers and waterways as well as using banana trunks and rice bran for feeding during the dry season
  2) Grazing in vacant areas owned by other farmers

3) Establishing their own forage areas – only a few; problem of illegal grazing and decline of forage productivity

- Decision: The farmer groups agreed to test the species for cut-and-carry and for grazing. The plan was to try out as a group first. The results of the initial trial will be the basis for selecting species for individual farmer testing. The species for testing also include those which could be used as fence lines, cover crops/weed control, and contour hedgerows.

Malitbog, Bukidnon

- Attendance: Three participatory diagnoses were done involving members of farmer associations (rural improvement clubs [women's groups] and cooperatives) in sitios within Barangay San Luis, Malitbog, Bukidnon. These farmers were beneficiaries of the animal dispersal programs of the Department of Agriculture (either goat or cattle).
- Problems identified by farmers:
  1) Lack of food for the household due to low production and income
  2) Low crop production due to surface runoff
  3) Soil erosion
  4) Insufficient quality and quantity of feed due to limited area for grazing brought about by an increase in cropping area
  5) Increase in unpalatable weeds (especially Imperata cylindrica) in existing grazing areas
  6) Uncontrolled grazing
- Coping mechanisms:
  1) Establishment of contour hedgerows using forages and stones
  2) Adopting multi-cropping technology (banana-maize-vegetable)
  3) Planting of other food crops like banana, ubi, gabi, and sweet potato
  4) Tethering animals in faraway areas
  5) Establishing forages in marginal areas and small plots near houses
  6) Cut-and-carry system for native forages and trees existing near rivers and waterways as well as using banana trunk and rice bran as feed during the dry season
  7) Grazing in vacant areas owned by other farmers
- Decisions: The farmer groups agreed to test the species for cut-and-carry and for grazing. The plan was to establish forages both in individual and common farms with the help of the whole group (*alayon*).

Aroman, Carmen

- Attendance: The 26 farmers who participated in the PD were members of a cooperative coordinated by a non-government organization (Gagmayng Kristohanong Katilingban-Kidapawan Diocesan Federation of Cooperatives).
- Problems identified by farmers:
  1) Lack of feed due to increase in cropped area, number of animals, and number of unpalatable weeds
  2) Poor animal performance due to feed scarcity
  3) Lack of feed specially during the dry season
- Coping mechanisms:
  1) Planting of forages such as Napier grass, *Desmodium cinerea*, and *Flemingia macrophylla*;
  2) Using stunted maize plants to feed the animals.
- Decisions of the farmers will test different forage species for grazing and cut-and carry. They will at first establish and manage the evaluation in a common farm as a group. The results of the initial evaluation will be the basis for selecting the species that will be tested individually. The area shall therefore serve as initial multiplication and testing site. The species that they plan to test will include those which can be used as hedgerows and fence lines.

M'lang, Cotabato

- Attendance: The 24 farmers who participated in the PD came from different barangays around Pag-asa, M'lang, Cotabato. All were members of cooperatives coordinated by a non-government organization (Gagmayng Kristohanong Katilingban-Kidapawan Diocesan Federation of Cooperatives).
- Problems identified by farmers:
  1) Lack of feed due to increase in cropped area and in numbers of animals
  2) Lack of feed in the dry season and during the rice cropping period
  3) Occurrence of diseases in animals (diarrhoea, respiratory symptoms, liver fluke)
- Coping mechanisms:
  1) Cut-and-carry native forages whenever feed is scarce (especially during rice cropping season)

2) Grazing in vacant areas owned by other farmers
3) Uncontrolled grazing

- Decision: The farmer groups agreed to test species for cut-and-carry, grazing, as well as those that can be used as relay crops for rice (during dry season). Some of these species were useful as fence lines. The plan was to try out as a group first. The results of the initial trial will be the basis for selecting species for individual farmer testing. One of the cooperatives located in the common testing area was assigned to maintain the plots but all the other cooperatives were to help in the planting and in the evaluation. The initial evaluation area was also intended to serve as source of planting materials for individual testing.

Malagos, Davao City

- Attendance: The 16 farmers participating in the PD were members of either small coconut farmers' organization (SCFO) or a dairy cooperative or both. Barangay officials likewise attended the meeting.
- Problems identified by farmers:
  1) Diseases and low market price of crops and livestock
  2) Decreasing feed supply due to increase in cattle population and cropped areas
  3) Increase in cost of concentrate feeds for dairy animals
  4) Unavailability of adapted and productive forages
  5) Lack of capital for proper establishment of forages
  6) Increasing need of fertiliser for crops
  7) Uncontrolled grazing
- Coping mechanisms:
  1) Grazing in vacant areas owned by other farmers
  2) Maintaining a manageable number of animals by selling and sharing excess animals
  3) Establishing their own forage areas – only a few; problem of illegal grazing and decline of forage productivity
- Decision: A field day was conducted after the PD. The farmers made a list of species they would try in their area. The plan is to try out as a group first. The results of the initial trial will be the basis for selecting species for individual farmer testing. The species farmers wanted to test include those that were useful for grazing, cut-and-carry, and as cover crops under coconut. The initial testing area shall serve as source of planting materials for individual farmer testing.

Riverside, Davao City

- Attendance: The 10 farmers who participated in the PD were members of either a small coconut farmer organization (SCFO) or a dairy cooperative or both. Some barangay officials likewise attended the meeting.
- Problems identified by farmers:
  1) Lack of capital for farm inputs (e.g. fertiliser, fencing of forage area, feed supplements)
  2) Crops need more fertilisers and time to produce well
  3) Increasing cost of commercial supplements for dairy cattle
  4) Lack of feed due to increase in cropped areas and in animal number
  5) Diseases in crops
  6) Lack of adapted forages
  7) Uncontrolled grazing
  8) Occasional flooding in flat areas
  9) Increase in unpalatable weeds in grazing areas
  10) Erosion in sloping farms
- Coping mechanisms:
  1) Grazing in vacant areas owned by other farmers
  2) Establishing their own forage areas – only a few; problem of illegal grazing and decline of forage productivity
- Decision: A field day was conducted after the PD. The farmers made a list of species they would try in their area. The plan is to try out as a group first. The results of the initial trial will be the basis for selecting species for individual farmer testing. The species farmers wanted to test include those that were useful for grazing, cut-and-carry, and as cover crops under coconut. The initial testing area was to serve as source if planting materials for individual farmer testing.

Appendix 3. Description of activities conducted at each site in the Philippines

Matalom, Leyte

1995

- Participatory diagnosis and planning of activities conducted with alayons from San Salvador and Montealegre.
- Establishment of initial testing and multiplication areas in San Salvador and Montealegre. Alayon leaders from the barangay provided the areas. The plots were established and managed by the alayon members. In addition, FARMI established a backup area for multiplication of the same species.
- The species tested in San Salvador (acid soil) and Montealegre were as follows :

Species	San Salvador	Montealegre
Aeschynomene histrix CIAT 9690	✓	-
Arachis pintoi CIAT 22160	✓	✓
Centrosema acutifolium CIAT 5277	✓	✓
Centrosema pubescens CIAT 15160	✓	-
Desmanthus virgatus CPI 40071	✓	✓
Desmodium cinerea (ex) MBRLC	✓	✓
Flemingia macrophylla CIAT 17403	✓	-
Gliricidia sepium (Local)	✓	✓
Leucaena leucocephala K636	✓	-
Stylosanthes guianensis CIAT 184	✓	✓
Andropogon gayanus CIAT 621	✓	✓
Brachiaria brizantha CIAT 6780	✓	✓
Brachiaria decumbens CIAT 606 (cv. Basilisk)	✓	✓
Brachiaria humidicola CIAT 16886	✓	✓
Panicum maximum CIAT 6299	✓	✓
Paspalum atratum CIAT 9610	✓	-
Pennisetum purpureum cv. Capricorn	✓	✓
Florida Napier	✓	-
Setaria sphacelata var. *splendida* (ex) Indonesia	✓	✓

- Distribution of small amount of planting materials/seeds to interested alayon leaders. A total of 26 farmers were able to receive planting materials in small amounts (10 g of seeds or 10-20 pieces of vegetative planting materials).
- Open-ended evaluation of forages planted by *alayon* leaders. Only 16 *alayon* leaders were successful in establishing the forages. The species evaluated and their comments were as follows:

  Grasses

  A. gayanus CIAT 621 (vegetative) – moderate establishment; good vigour and palatability
  B. brizantha CIAT 6780 (vegetative) – moderate establishment; good vigour and palatability
  B. humidicola CIAT 6133 (vegetative) – poor establishment
  Florida Napier (vegetative) – good establishment, growth, and palatability
  P. purpureum cv. Capricorn (vegetative) – good establishment; palatable to carabao only
  S. splendida (vegetative)– good growth and palatability (3 farmers)

  Legumes

  A. pintoi (vegetative) – moderate establishment; slow growth
  C. acutifolium CIAT 5277 (seeds) – good germination poor vigour (yellow)
  C. pubescens CIAT 15160 – moderate germination; poor vigour (yellow)
  D. cinerea (seeds) – moderate establishment; poor vigour (yellow)
  D. virgatus CIAT 40071 (seeds) – moderate germination; good vigour
  P. maximum CIAT 6299 (vegetative) – poor establishment
  S. guianensis CIAT 184 – good germination; poor vigour in calcareous soil; good palatability

1996

- Group evaluation of forages in the initial testing and multiplication areas. Among the legumes tested, all farmers in San Salvador (acid soil area) favoured *Stylo* 184, and *C. pubescens* CIAT 15160. In Montealegre, all farmers favoured *D. cinerea* and *Stylo* 184. Their major criteria were vigour and herbage yield. Among the grasses tested, all farmers in San Salvador favoured *B. humidicola* CIAT 16886, *P. purpureum* cv. Capricorn, Florida Napier, and *S. sphacelata var. splendida*. In Montealegre (with less acidic and relatively fertile soil), all farmers favoured *B. brizantha* CIAT 6780 and *P. maximum* CIAT 6299. The farmers expressed the same criteria in selecting these grasses. The other species were favoured by some farmers but not by others.
- Conduct of quarterly *alayon* leaders' meeting. At the end of the year, an annual *alayon* leaders' meeting was done to report what has been accomplished by the groups and plan out their activities for the next year.
- Farmer-training in forage and livestock management. Three trainings were conducted: (a) San Salvador alayon, attended by 8 farmers, (b) Montealegre alayon, attended by 12 farmers, and (c) general training for alayon leaders, attended by 20 farmers. The topics covered were on the importance of good feeding to ruminants, the different types of forages and where forages can be integrated into their farms. The trainings were conducted, with farmers taken to existing forage plots and asking them to choose what species they were interested to plant. Arrangements were then made as to when those interested would establish the forages.
- Establishment of more or less structured experiments in their farmers' fields. These experiments involved comparison of forage species as used for different purposes: (a) cut-and-carry, (b) hedgerows, (c) grazing, and (d) fence lines. Two farmers were able to establish the experiments late in the year.
- Establishment of a larger range of forage species in a nursery in Matalom (managed by FARMI). This nursery aimed to produce planting materials for distribution to farmers. The species planted were as follows :

  Grasses
  - *Andropogon gayanus* CIAT 621
  - *Brachiaria brizantha* CIAT 6780
  - *Brachiaria brizantha* CIAT 16318
  - *Brachiaria brizantha* CIAT 26110
  - *Brachiaria decumbens* CIAT 606 (=cv. Basilisk)
  - *Brachiaria humidicola* CIAT 6133
  - *Brachiaria humidicola* CIAT 16886
  - *Brachiaria humidicola* cv. Tully
  - *Panicum maximum* CIAT 6299
  - *Paspalum atratum* BRA 9610
  - *Pennisetum purpureum* cv. Mott
  - *Pennisetum* hybrid (Florida grass)
  - *Pennisetum* hybrid (King grass)
  - *Setaria sphacelata* var. *splendida* (ex) Indonesia

  Legumes:
  - *Arachis pintoi* CIAT 22160
  - *Centrosema pubescens* CIAT 15160
  - *Desmodium cinerea* (ex) MBRLC
  - *Flemingia macrophylla* CIAT 17403
  - *Gliricidia sepium* cv. Monterrico
  - *Gliricidia sepium* cv. Retalhuleu
  - *Gliricidia sepium* (ex) Belen Rivas

1997

- Assisted farmers in establishing structured experiments. Eight more on-farm experiments were established. Details of the experiments were as follows:

Option	Calcareous Soil	Acid Soil	Total number of farmers
Hedgerows	1	1	2
Block	2	2	4
Grazing:			
Under shade	-	1	1
Open area	1	2	3
Fence line	Seedlings still in nursery		

- Conducted two field days for 18 farmers in Inopacan, Leyte (a nearby municipality)
- Conducted a field day for 20 farmers in Barangay Sta. Paz, Matalom. Farmers from San Salvador and Elevado who have planted the forages served as resource persons in the field day. A planning session was done as part of the field day.
- Establishment of initial multiplication and demonstration area at Sta. Paz, Matalom, Leyte.
- Conduct of quarterly alayon leaders' meeting. At the end of the year, an annual alayon leaders' meeting was done to report what has been accomplished by the groups and plan out their activities for the next year.

Guba, Cebu

1996

- Visit of four farmer-instructors to the FSP nursery and distribution of planting materials.
- Establishment of forages by farmer-instructors. The species established by the farmer instructors were as follows :

Grasses

A. *gayanus*
B. brizantha CIAT 26110
P. maximum CIAT 6299
P. atratum BRA 9610
S. sphacelata var. splendida (ex) Indonesia
P. purpureum cv. Mott

Legumes

A. pintoi CPI 12121
A. pintoi CIAT 17850
A. pintoi CIAT 26110
A. glabrata CPI 93483
C. macrocarpum CIAT 25522
D. cinerea (ex) MBRLC
F. macrophylla CIAT 17403
L. leucocephala K636
S. guianensis CIAT 184

1997

- Distribution of planting materials to other farmers trained by farmer-instructors (32 farmers).
- Meeting with farmers in Cambinocot and Tag-ubi on extension of forage trials.
- Seminar on forage production and management in Cambinocot and Tag-ubi.
- Distribution of planting materials to 30 farmers in Guba and Cambinocot.
- Cross-visit of farmers in Cambinocot and Tag-ubi to farm of Teo Llena in Balisong, Guba.

Cagayan de Oro

1995

- Participatory diagnosis and planning of activities with farmers in Pagalungan.
- Establishment of initial multiplication area at Cagayan Capitol College (CCC) and Pagalungan. The area for establishment of the different forages was provided by CCC and a farmer-leader in Pagalungan, respectively. Establishment and management were done by CCC students and farmer association members in Pagalungan, respectively. The different forages established were as follows:

Species	CCC	Pagalungan
Arachis pintoi CIAT 18744	✓	-
Arachis pintoi CIAT 22160	✓	✓
Calliandra calothyrsus (ex) Indonesia	✓	-
Centrosema acutifolium CIAT 5277	✓	✓
Centrosema macrocarpum CIAT 25522	✓	-
Centrosema pubescens CIAT 15160	✓	-
Desmanthus virgatus (ex) IRRI	✓	-
Desmodium heterophyllum CIAT 349	✓	-
Desmodium cinerea (ex) MBRLC	✓	✓
Gliricidia sepium (Local)	-	✓
Leucaena leucocephala K636	✓	✓
Leucaena leucocephala (Local)	✓	-
Pueraria phaseoloides CIAT 9900	✓	-

(continued next page)

Table (cont.)

Species	CCC	Pagalungan
Sesbania sesban	✓	-
Stylosanthes guianensis CIAT 184	✓	✓
Andropogon gayanus CIAT 621	✓	-
Brachiaria brizantha CIAT 6780	✓	-
Brachiaria brizantha CIAT 26110	✓	✓
Brachiaria decumbens CIAT 606 (cv. Basilisk)	✓	✓
Brachiaria humidicola CIAT 6133	✓	✓
Brachiaria humidicola CIAT cv. Tully	✓	-
Panicum maximum CIAT 6299	✓	-
Panicum maximum cv. Tanzania	✓	-
Paspalum atratum BRA 9610	✓	✓
Paspalum guenoarum BRA 3824	✓	-
Pennisetum purpureum cv. Mott	✓	-
Pennisetum purpureum cv. Capricorn	✓	-
Pennisetum purpureum (Local)	✓	✓
Florida Napier	✓	✓
Pennisetum hybrid (King grass)	✓	-
Setaria sphacelata var. splendida (ex) Indonesia	✓	✓

1996

- Conduct of farmer training on livestock and forage management at CCC to interested farmer groups. A field day was always a part of the training. It consists of bringing the farmers to forage plots and discussing the forage trials. Four training courses involving 135 farmers from six barangays were conducted.
- Distribution of forage planting materials to members of farmer groups attending the farmer trainings. Farmers who received planting materials from CCC plots came from Pagalungan (33), Bayanga (39), Canituan (14), San Simon (16), Indahag (19), and Mambuaya (14).
- Conduct of field days/cross-visits to farms/areas where forages are established and used. This was done with 24 farmers from Pagalungan.
- Monthly regular meeting and cooperative work (pahina) to maintain the initial multiplication area with farmers in Pagalungan.
- Open-ended evaluation of forages in the demonstration area done with Pagalungan farmers.

1997

- Establishment of initial multiplication areas at Bayanga, Indahag, and San Simon.
- Monthly regular meeting and cooperative work (pahina) to maintain the initial multiplication area with farmers in Pagalungan, Bayanga, Indahag, and San Simon.
- Monitoring and feedback from farmers on their experiences with forages.
- Conduct of two field days attended by 20 farmers in Pagalungan. The topics discussed were feed requirement of animals and importance of fertilisation in fast-growing cut-and-carry forages.
- Distribution of planting materials to interested farmers. A total of 215 farmers coming from 10 upland barangays in Cagayan de Oro received forage planting materials for the year.
- Conduct of farmer training courses for 16 farmers from Lumbia. The training covered topics on forage and pasture.
- Conduct of cross-visits to successful agroforestry farmers in Cebu. A total of 9 farmers and 3 technicians from Cagayan de Oro were involved.

Malitbog, Bukidnon

1996

- Conduct of participatory diagnosis and planning at Kaluluwayan, San Luis. The activity was attended by 16 farmers.
- Cross-visits to Cagayan de Oro and Bukidnon. Thirty farmers participated in the activity as part of the visit, the farmers were shown the forages and were able to get planting materials for their communal initial establishment area.
- Establishment of forages in a common area and in individual farmers' fields. Farmers organized themselves into *alayons* (cooperative groups) to facilitate establishment. Three individual farmers were able to plant.

1997

- Conduct of participatory diagnosis and planning in two more barangays at Malitbog. The farmers involved also decided to test forages in their farms, starting with common area and using the alayon method in establishing the forages.

- Establishment of forages in common areas and individual farmers' fields. Fourteen farms were able to establish forages. The alayon method was adopted to facilitate the work. Aside from forage establishment, the farmers were also able to establish contour hedgerows.
- Distribution of legume tree seeds to seven farmers. The agreement was that farmers will establish the seeds in plastic bags for later transplanting of seedlings.
- Cross-visits to other areas and farms in Bukidnon where forages were planted and used. Twenty farmers participated in the activity.
- Conduct of farmer training on developing forage technologies with 21 farmers attending.
- Regular meetings and visits to exchange experiences and feedback on forage performance.

Carmen, Cotabato

1996

- Participatory diagnosis at Aroman. The activity was attended by 26 farmers coming from barangays around Aroman. The farmers decided that they would test forages, first in a common area and later to individual farms.
- Establishment of forages managed by farmer groups. The farmers provided the area and labour for establishment and management.
- Regular meetings and visits to share experiences and get feedback on forages trials.

1997

- Farmer training and field day on forages. The topics included use and integration of forages on-farm. An evaluation and planning session was done as part of the training.
- Distribution of planting materials to interested farmers. Two farmers were able to receive planting materials and establish forages in their farms.
- Regular meetings and visits to exchange experiences and feedback on forages.

M'lang, Cotabato

1996

- Participatory diagnosis at Aroman. The activity was attended by 26 farmers coming from barangays around Aroman. The farmers decided that they would test forages, first in a common area and later to individual farms.
- Establishment of forages managed by farmer groups. The farmers provided the area and labour for establishment and management.
- Regular meetings and visits to compare experiences with forages.

1997

- Farmer training and field day on forages. The topics included use and integration of forages on-farm. An evaluation and planning session was done as part of the training.
- Regular meetings and visits to get feedback on forages performance.

Riverside, Davao

1997

- Participatory diagnosis with farmers. Ten farmers participated in the activity. The farmers decided to evaluate forages, first in a common area, then to individual farms.
- Conduct of a field day at the PCA research centre. The farmers were shown different forages and options for integration of forages. From these, the farmers planned and decided what species they would try.
- Distribution of planting materials and establishment of initial evaluation and multiplication area. The area was provided by one farmer who established and managed the area himself. He plans to expand his area and to distribute planting materials to other interested farmers.

Malagos, Davao

1997

- Participatory diagnosis with farmers. The activity was participated in by 10 farmers. The farmers decided to evaluate forages, first in a common area, then to individual farms.
- Conduct of a field day at the PCA research centre. The farmers were shown different forages and options for integration of forages. From these, the farmers planned and decided what species they would try.
- Distribution of planting materials for establishment of initial testing and multiplication area.