

Role of fodder trees in Philippine smallholder farms

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INTRODUCTION

The majority of livestock in Asia are found on smallholder farms. In the Philippines, it is estimated that 80 percent of the cattle population is raised by smallholders while over 90 percent of buffalo and goats are also in the hands of small farmers. Dairy production remains underdeveloped but the small number of cattle and buffalo being milked are raised by smallholders, who individually sell their produce to milk buyers or through a government assisted milk-collection program. The sheep population is small (about 30,000) but interest in the animal is growing with a high level of acceptability on both small and large farms. The feeding of livestock on small farms depends primarily on forages which consist of weeds, crop by-products and tree fodder.

SMALLHOLDER FARMS

Table 1 and 2 show the limited resources available on smallholder cattle farms: farmers operate a small parcel of land and most of them cultivate less than 2 hectares. A very small proportion own more than 2 hectares. Animal holdings are few, with the majority of the farms keeping one head of cattle. Larger landholdings and animal holdings were observed in the village Pacifico, a sugarcane growing area, compared to other villages.

A survey by Alviar (1987) of 1,867 buffalo producers showed that 76% of them had farm areas of 3 hectares and below while only 24% had more than 3 hectares. In terms of animal holdings, 52, 29 and 19% own 1, 2 and 3 or more buffalo, respectively.

TABLE 1. Farm size distribution (%) in four Philippine villages

Area (hectare)	Village			
	Luyos	Galamay-Amo	Pacifico	Matipunso
Less than 1.0	42	22	33	40
1 - 1.9	42	48	48	14
2 - 2.9	6	20	15	15
3 or more	-	10	4	0
Sample farms (No.)	63	100	81	71

TABLE 2. Cattle holding distribution (%) in four Philippine villages

Village No. of Head	Village			
	Luyos	Galamay-Amo	Pacifico	Matipunso
1	42	92	48	74
2	54	8	26	23
3 or more	4	-	36	3

TABLE 3.
Trees and shrubs species used as fodder on smallholder farms.

Species		Parts Used as Fruit/Feed	Other Economic Uses
Common Name	Scientific Name		
1. Madre de Cacao (Kakawati)	<i>Gliricidia sepium</i> (Jacq.) Kunth ex Welp	Leaves	Shade, post, timber, hedge, fuelwood, driftwood for archide
2. Ipil-ipil	<i>Leucaena leucocephala</i> (Lmk) de Wit	Leaves	Shed, post, hedge, fuelwood
3. Katuray	<i>Sesbania grandiflora</i>	Leaves	Hedge, fuelwood, seed for handicrafts
4. Acacia (Rain tree)	<i>Samanea saman</i> (Jacq.) Merr.	Leaves and pods	Shade, timber for furniture and handicraft
5. Dapdap	<i>Erythrina</i> spp.	Leaves	Post, hedge
6. Malunggay	<i>Moringa oleifera</i>	Leaves	Vegetable
7. Nangka (Jackfruit)	<i>Artocarpus integr</i>	Unripe off-size/ small fruits; ripe fruit peelings	Fruit
8. Saging	<i>Musa paradisiaca</i> L.	Leaves/trunks and fruit peelings	Fruit (Banana)
9. Kadyos	<i>Cajanus cajan</i> (L.) Huth	Leaves, empty pods	Fuelwood, vegetable
10. Cowpea	<i>Desmanthus virgatus</i>	Leaves	Hedge
11. Bignay-pugo	<i>Antidesma</i> spp.	Leaves	Fruit for wine manufacture
12. Bignay-kalabaw	<i>Antidesma bunius</i> (L.) Spreng.	Leaves	Fruit for wine manufacture
13. Kalios	<i>Streblus asper</i> Lour.	Leaves	
14. Anunang	<i>Cordia dichotoma</i> Forst.	Leaves	Glue (fruit)
15. Niyog (Coconut)	<i>Cocos nucifera</i> L.	Froned stalks and leaflets	Juice (Young coconut), oil timber, broom, and fuelwood rum, vinegar
16. Palsahingin	<i>Cenarium asperum</i> var. <i>samentis</i> Bth.	Leaves	

COMMON FODDER TREES

Fodder trees are grown naturally on smallholder farms and are an integral part of the farming system. Most of the identified fodder tree species are not primarily grown for fodder but for other purposes. Table 3 lists the tree species commonly found and used (some of them occasionally) as fodder in the Philippines. Most of the species had economic values other than fodder but being grown for such purposes makes them readily available for livestock feeding. Utilization of these species is still very limited and is confined to areas of livestock concentration and intensive crop production systems. In most areas, they are hardly used as a source of fodder. Ipil-ipil (*Leucaena leucocephala*) has been the most popular of the fodder tree species but its extensive use as fodder is confined in Batangas province. *Gliricidia* is more versatile than Ipil-ipil in terms of actual farm use, particularly as shade for black pepper, coffee and cacao. It has a wider distribution than any of the other species. Its major drawback is that it is not highly acceptable to cattle but, for sheep and goats, such a limitation is not observed. *Sesbania grandiflora* is commonly found in rice growing areas of Central Luzon. It is grown on roadsides and the perimeter of gardens. It is more popular for its inflorescence, which is used as a vegetable, than for its value as source of fodder. *Sesbania* is one of the species identified as an alternative to Ipil-ipil and has been introduced into upland areas of Batangas where psyllids have caused serious damage. It cannot be compared to Ipil-ipil in terms of palatability to cattle, but farmers report that it is relished by goats. (Most farmers in Batangas prefer raising cattle to goats).

The rain tree (*Samanea saman*) is commonly grown for shade but it is also grown on rice farms where, every year during the dry season, it is cut for fuelwood but not fodder. In Batangas, its leaves and pods are used for cattle feeding during the dry season.

The use of *Erythrina* is almost confined to live fence-posts. It is highly palatable to goats.

Moringa oleifera is popular for its leaves as vegetables. The tree is pruned regularly (30-45 days) and the leaves are sold in the market. The

leaves are cooked for soap and highly recommended for nursing mothers because it is claimed to be very nutritious. One advantage of this species over the rest is that it is easily propagated from stem cuttings (as well as from seed) with a very high survival rate; it is relished by sheep and goats.

The rest of the species are seldom used but when feed shortages are encountered they have their own value. Except for coconuts, which are found on most farms, other species are just allowed to grow without consideration of due agronomic management practices.

UTILIZATION OF FODDER TREES

In general, the value of fodder trees in the villages are confined during the dry season. Table 4 shows the months when high and low utilization of fodder trees occur under different upland cropping systems.

TABLE 4. Periods of high and low utilization of fodder trees in different cropping systems and villages (Philippines).

Cropping system/Village	High utilization		Low utilization	
	Months	Component in feeds (% daily)	Months	Component in feeds (% daily)
<u>Batangas Province</u>				
Rice/Corn (Galamay-Amo, San Jose)	March to June	27.2	July to Feb.	4.6
Rice/corn/ Sugarcane (Luyos, Tanauan)	March to July	21.6	August to Feb.	15.6
Sugarcane (Pacifico, Sta. Teresita)	April to May	17.2	June to March	5.4
<u>Quezon Province</u>				
Coconut (Matipunso, San Antonio)	December to June	36.9	July to November	3.1

In rice/corn growing areas, fodder from trees is valuable from March to June, at the height of the dry season, during the planting season and the onset of the rainy season. Less fodder from trees is used in sugarcane cropping areas compared to the other 3 cropping systems. This is explained by the availability of sugarcane tops in the area where harvesting of cane occurs just before and during the dry season. Increased use of fodder trees occurs in April and May, at the end of the cane harvest period. With a combined cropping system, utilization of fodder trees is more uniform throughout the year and is less during the dry season compared to that of the rice/corn cropping system.

Fodder trees are even more valuable in coconut growing areas. A greater amount of tree fodder (36.9%) is fed for a longer period (seven months). Less biomass is available under coconuts for feeding livestock, compared to areas planted to cultivated annual crops.

Tree fodder as a supplement to crop by-products

For more than a decade, a lot of studies have been carried out on *Leucaena*. Marbella *et al.* (1979) reported that feeding cattle on rice straw with 50% Ipil-ipil gave an average gain of 520g/day, while supplementation of 40% Ipil-ipil and 10% concentrate produced 720g/day. However, considering the cost of the concentrates, the value of the extra 200g is not enough to pay for the cost of the concentrates and Ipil-Ipil supplementation alone is more economic.

Observations in Batangas showed that farmers feed their cattle with 5 to 20kg of Ipil-ipil. Estimates indicate that those feeding 15 to 20kg of Ipil-ipil, plus fresh grasses obtained an average daily gain of 800-900g.

A recent study by Medrano (1991) showed that the feed intake and live weight gain (LWG) of sheep increased with increasing levels of *Gliricidia*. Sheep fed 80% *Gliricidia* + 10% rice straw + 10% *Setaria* gave the highest adjusted LWG (49.7g) which was significantly better than those receiving lower levels of *Gliricidia* and 20% concentrate. The lowest LWG (20.4g) was obtained in sheep fed concentrate + 70% rice straw + 10% *Setaria* (Table 5). A ration containing 80% *Gliricidia* had the highest efficiency.

TABLE 5. Live weight gain and feed efficiency of sheep fed varying levels of *Gliricidia* in combination with rice straw and setaria.

PARAMETER	TREATMENT/RATION				
	A	B	C	D	E
	20% CON 70% RS 10% SS	20% GLI 70% RS 10% SS	40% GLI 50% RS 10% SS	60% GLI 30% RS 10% SS	80% GLI 10% RS 10% SS
Number of animals	4	4	4	4	4
Feeding duration, days	63	63	63	63	63
Initial weight, kg	12.2	11.6	11.5	12.9	13.1
Final weight, kg	13.5	12.7	13.2	15.3	16.6
Live weight gain					
Total gain kg	1.27 ^{cd}	1.10 ^d	1.76 ^c	2.41 ^b	3.43 ^a
LWG g/day	20.2 ^c	17.5 ^c	28 ^b	38.3 ^b	54.4 ^a
Adjusted LWG g/day	20.35 ^b	21.15 ^b	32.32 ^{ab}	34.82 ^a	49.70 ^a
Feed Efficiency (FE)	20.7 ^b	22.1 ^{ab}	16.2 ^{ab}	12.7 ^{ab}	10.7 ^a
Adjusted FE	20.67 ^b	20.31 ^{ab}	14.13 ^{ab}	14.27 ^{ab}	12.89 ^a

Means in the same row with different superscripts are significantly different ($P < 0.01$).

Legend: CON - Concentrate GLI - *Gliricidia* RS - Rice Straw SS - *Setaria splendida*

Source: Medrano (1991)

Recent study in the BAI (Navarro, unpublished) showed that sheep fed sugarcane tops (*ad lib.*), supplemented with 500g fresh Kakawati leaves + 100 grams copra meal had an average daily gain of 35g.

SUMMARY AND CONCLUSIONS

A range of fodder trees is available on smallholder farms but their value and utilization is limited to areas of high livestock concentration. Fodder from trees is very valuable in upland farming systems particularly during the dry season. The use of tree fodder is quite limited in sugarcane farming systems, except after the end of cane harvesting. A larger amount and longer period of fodder tree utilization is observed in coconut farming system.

Better animal performance is observed with increasing levels of tree fodder in animal ration. The use of other fodder trees may have limitations in terms of palatability for cattle but not for sheep and goats.

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