



# Improved forages benefits Ethiopian farmers

**Cattle, sheep and goats are vital for Ethiopian agriculture. They feed mainly on crop residues and harvested fields but this forage cannot satisfy their needs. They do not produce as much milk and meat as they could, and the oxen are sometimes so poorly fed that they have little strength. In order to improve animal performance, high-quality forage is needed. The Ministry of Agriculture's Fourth Livestock Development Project (FLDP, 1987-94) focused on forage improvement strategies suitable for smallholders. The strategies reported here come from Bihar Dar District, in West Gojjam Zone, which lies close to Lake Tana. Lying at an altitude of 1700 to 2300 metre. It has an annual rainfall of 800-1200 mm most of which falls between June and September. Average farm size is 1.5-2 ha. About 95 % of farm households keep about 3 head of cattle as well as some sheep and goats. In terms of better animal nutrition, higher livestock yields, enhanced soil fertility and erosion control, results of forage strategies are promising. Multiplication of forage legume seed has played a large role in this success.**

## Abraha Lemlem

**T**housands of farmers in Bahir Dar District have established hedges of tall forage plants such as *Sesbania sesban*, *Leucaena leucocephala*, *Cajanus cajan* (pigeon pea) and *Pennisetum purpureum* (elephant grass) inside their farm compounds. These plants provide forage, shelter and fuelwood and are sown around the edges of the garden so they do not compete with garden crops.

A few farmers have also established mixed plots (50-100 m<sup>2</sup>) of perennial herbaceous legumes in their backyards. Where space is very limited, they sometimes plant climbing legumes. Measurements made in farmers' backyards throughout Ethiopia showed a forage yield of 195 kg of dry matter (DM) per year from 50 m of hedge and 100 m<sup>2</sup> of herbaceous legumes (Alemaheye et al 1987), with large variations between sites. In Bahir Dar, farmers' yields were

53-84 kg DM from a 50 m *sesbania* hedge and around 200 kg DM from a 50 m row of elephant grass, with one cut per year.

Change is gradual, but now 200 farmers in West Gojjam fatten their animals on improved legumes. They sell cull oxen at high prices using the cash, for example, to buy replacement stock. One farmer with dairy cattle fed on home-grown forage legumes gets up to 8 litres of milk per cow per day without supplementing the animals' diet with industrial by-products.

## **Undersowing**

Forage legumes are sown under another established crop. The legume is usually sown after the final weeding of the main crop, but may be sown earlier if weeding is light or weeds are cut. The legumes are grown in crops such as maize, sorghum, barley, wheat or plantation crops such as coffee, and are grazed with the crop residues or cut-and-carried away with crop remains. In our district, the main food crop

is maize, and the main undersown legume is vetch (*Vicia dasy carpal*). Under this programme, about 120 farmers now sow 60 ha.

Neither we nor the farmers have measured the effect of undersowing forage legumes on the yield of the main crop. According to researchers elsewhere in Ethiopia, yield is reduced by 5-15 %. At the Adet Agricultural Research Station, local *Trifolium* species were undersown in wheat. This gave slightly higher grain and straw yields than on the control plot, probably because of the increased soil fertility. In addition, these treatment plots also yielded legume forage.

Many farmers in the district say that undersowing helps to keep the soil *sibam* (fertile in Amharic) as well as boosting milk production. Ato Muluken Lakew, a farmer in Sebatamit Peasants Association, reported that his maize plants were yellow in previous years but had turned green because of undersowing. Some farmers make hay from the vetch.

## **Forage strips**

These are narrow lines of forage established between arable crops and provide cut-and-carry feed, fuelwood, help reduce soil erosion and improve soil fertility. Forage is planted in bunds or on contour strips without bunds. Tree and shrub legumes are used for alley farming and shelter belts.

Some 170 smallholders have planted about 17 km of *sesbania* tree legumes around food crops. These trees are cut back during the cropping season to provide feed and reduce shade. Initial measurements showed annual yields of 75-100 kg DM per

100 m of forage strip (Alemayehu et al 1987). My own farm-level studies in Bahir Dar suggest that 200 m of sesbania shelter-belt around a 0.25 ha plot provides 200 kg DM with one cut per year.

Farmers prefer to plant forage as shelter-belts (*imballelie*). Formerly they grew eucalyptus and the oil crop noug (*Guizitea abyssinnica*) around their food crops and to protect cash crops from livestock and wind. Shelter-belts provides forage, do not compete for land and, unlike other ways of planting strip forage, do not disturb normal cropping patterns.

## Oversowing

A mixture of legume seed is broadcast on grazing areas without cultivation or fertilizer. This is a simple, low-cost strategy to increase natural pasture quality and productivity. Sowing roadsides from a moving vehicle is one way of covering a large area. In Bahir Dar, 200 farmers have oversown 25 ha and good results have been reported from degraded grazing lands. Farmers prefer *Desmodium intortum*, *Macroptilium atropurpureum* (Siratro), *Desmodium uncinatum*, *Stylosanthes scabra* (Seca), *Stylosanthes bamata* (Verano) and *Macrotyloma axillare* (Axillaris) for oversowing.

Farmers see little point in oversowing communal grazing land. They prefer to oversow the degraded natural pastures under their own control. Real benefits take two years to appear and some farmers do not have the patience to wait. They prefer

Seedlings transplanted from the farmers' own backyard nurseries have a higher chance of survival than those obtained from MoA. The farmers can choose when they transplant their own seedlings and take greater care with preparing the site and watering.

## Farmers' preferences and practices

Some farmers complained their animals did not like the new forages. However, MoA held farmer field-days and farmers experienced in the cut-and-carry feeding of stall-kept animals showed how this was done. As a result of these field days, many farmers began to get their animals used to eating these forages.

Farmers prefer the fast growing sesbania for hedging. It can survive in a wide range of soils and climates and provides a better shelter-belt in forage strips. It is particularly popular as a dual-purpose plant in coffee cultivation.

Another dual-purpose legume is pigeon pea. It is harvested as a family food and what remains after the harvest becomes animal forage. Elephant grass is also popular for hedges and, in fertile soils, it is ready for forage use at the same time as sesbania. However, it is more palatable and animals get used to it more quickly. Once elephant grass has been established, farmers can readily propagate it from cuttings.

Farmers prefer tree legumes to herbaceous legumes because trees provide more feed in times of drought. Farmers who

up local capacity to supply seed. FLDP introduced a seed contract system to encourage farmers to produce high-quality forage seed at low cost and in large quantities. Growers are paid contract rates for clean seed.

In one year (1992/93) when the MoA provided herbicide (Triflan) free of charge, farmers produced stylo seed during the first rainy season. But now no herbicide is provided, they produce stylo seed in the second season. Some seed producers have started to sow stylo between rows of maize, so that they can harvest maize in the first rainy season and stylo in the second. The African bollworm, aphids and thrips were problems for farmers producing vetch. MoA offered them the opportunity to try insecticides (Malatione, Seven, Basodinek), initially free of charge. Farmers now pay for these inputs.

## Toward local seed marketing

Farmer-to-farmer exchange of forage seed, seedlings and cuttings is developing. Farmers who have started to collect seed from their own forage trees or legume plots no longer ask the MoA for seed. There are signs of self-sustainable seed production. Development agents encourage this by telling farmers that MoA will only provide free seed once. We hope that this strategy will gradually lead to the creation of a local market for seed and planting material.

## Women grasp the opportunities

Many women heads of household have also started to grow sesbania for shelter and fuelwood. The Ministry of Social Affairs recently started a programme in our area to provide women with local, female goats. The programme also encourages women to grow tree legumes to feed them. In Bahir Dar this approach is just beginning but it has been very successful in other parts of Ethiopia.

Both women and men are finding seed production provides an interesting income. In our district 22 women produce stylo (Verano) which gives them an income of between 300 to 1000 birr. Women appear to be especially skilled in collecting and multiplying forage seed, and their earnings contribute significantly to the total cash income of their households. We now have three women development agents in our forage programme: one in forage husbandry and two in seed production. It is recognised that forage production and seed multiplication offer particular opportunities for women.

## Farmers' preferences among forage plants

Criteria	Preferred species in order of ranking
Early feed	Elephant grass, sesbania
Survival rate	Elephant grass, sesbania, leucaena
Fuelwood	Sesbania
Palatability (acceptability to animals)	Elephant grass, leucaena, sesbania, vetch
Ease to expand	Elephant grass, sesbania
Forage strips	Sesbania
Food + forage	Pigeon pea
Shade for coffee	Sesbania
Long lifetime	Leucaena, sesbania, elephant grass
Seed production	Stylo (Verano, Seca), vetch
Oversowing on severely degraded areas	Stylo species, Siratro, Desmodium
Resistance to grazing	Stylo species, Desmodium

oversowing herbaceous legumes rather than grasses, possibly because they see this improves soil fertility.

## Seedling survival

Free-ranging livestock and drought are the biggest threats to seedlings. Fences and thorny branches are used as protection until plants are well established. By the end of the rainy season, they are strong enough to survive browsing and the long, dry season until they are harvested during the second rainy season.

produce seed for sale prefer stylo to vetch because it is more productive, disease resistant and fetches higher prices.

Some of the farmers are now experimenting with mixing cereal straws and green forages such as vetch, Desmodium and Rhodes grass (*Chloris gayana*), to get better forage use out of the straw.

## Seed production

It is not feasible to meet the seed requirements of these various forage-improvement strategies by importing seed. The success of the forage programme depends on building

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