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Agroforestry practices in Somalia

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ABSTRACT

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Traditional agroforestry methods in Somalia and attempts to introduce new practices are described. Physical, social and political constraints are discussed and recommendations for future developments are made.

Nomadic pastoralism with shifting cultivation is practised over most of the country. Settled communities in these areas plant live fencing. Most agroforestry is found near the two main rivers, the Jubba and the Shabeelle.

On rainfed land scattered trees, most frequently *Dobera glabra*, are retained. These provide limited dry season browse, fruit and poles but are mainly used as shade for the farmer and his livestock. A bush fallow is often used to maintain soil fertility.

On irrigated land, agricultural crops are commonly grown alongside young fruit trees until shade becomes too great. Other practices include growing crops in mature coconut plantations and with date palms. Large banana plantations are protected by shelterbelts, predominantly of *Casuarina equisetifolia*.

INTRODUCTION

This survey of agroforestry practices in Somalia was undertaken as part of the work of the research section of the British Forestry Project Somalia (BFPS). Unfortunately, parts of Somalia could not be visited owing to lack of time. The northwest was not visited because of civil unrest. For these areas, documentation and personal communications have had to suffice.

SOMALIA: BACKGROUND INFORMATION

Topography and climate

Central and southern parts of Somalia are mostly plain and plateau. In contrast, the north is mountainous with some peaks reaching over 2000 metres. There are two important rivers, the Jubba, which flows into the Indian Ocean and the Shabeelle which ends in swampland below Sablaale.

In climatic classifications most of Somalia is arid or semi-arid. The main

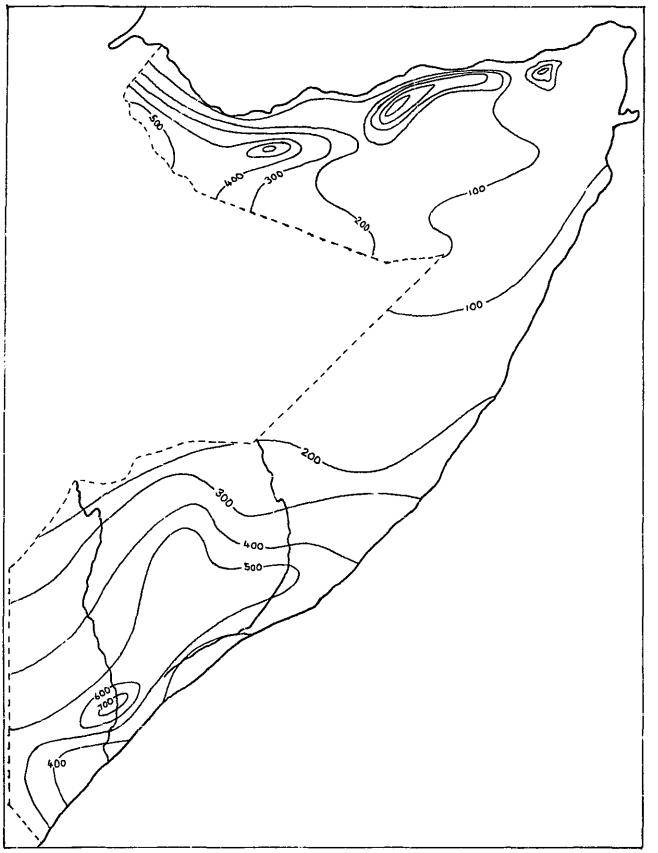

Fig. 1. Mean annual rainfall (mm), (Hutchinson and Polishchouk, 1989).

influence on the climate is the movement of the Intertropical Convergence Zone (ITCZ) and the associated Intertropical Front (ITF) (Hutchinson and Polishchouk, 1989).

The movement of the ITF results in two rainy seasons, the gu and the dayr. The gu lasts from April to June and the dayr from September to December. The movement of the rains is not simple, although generally in the gu and the dayr the rains start in the northwest and move in a southeasterly direction. The timing and amount of rainfall vary greatly within each season. Significant amounts of rain can fall as short, heavy showers during July and early August in the xagaa season. The importance of the xagaa showers is greatest in areas close to the coast. In September and early October there is a brief dry period called the jilaal dayrteed. The long dry season, the jilaal, follows the dayr. Most of the country receives less than 300 mm rainfall (see map shown in Fig. 1). Between years there can be large differences in rainfall. At Muqdisho annual rainfall has varied from 56.7 mm in 1915 to 997.2 mm in 1923 (Hutchinson and Polishchouk, 1989).

Wind in Somalia is also determined by the movement of the ITF. Winds are usually light to moderate, although they can have a considerable effect on crop production through evapotranspiration (Hutchinson and Polishchouk, 1989).

Somalia is one of the hottest countries in the world. Mean annual temperatures range from over 30°C at Luuq to 18°C at Ceerigabo, which is at an altitude of 1800 m. Highest and lowest temperatures were also recorded from these two stations: Luuq was 50.2°C and Ceerigabo was −3.3°C. Over most of Somalia variation in temperature over the day is small; the phenomenon of hot days and cold nights is absent.

Land use

Of the 637 650 square km that make up Somalia, only 81 500 are suitable for cultivation, while grazing is possible on 288 500, the remaining 267 650 being unsuitable for either (Von Boguslawski, 1986). Livestock rearing, fruit production and collection of gums such as frankincense and myrrh are the most important exports.

Somalia can be divided into three land use zones (Conze and Labahn, 1986):

(1) The north, where pastoralism with camels, goats and sheep is the predominant form of land use. It is only in small areas that cultivation is possible.

(2) The central rangelands, where pastoralism is again the dominant land use although with a higher proportion of cattle in herds.

(3) The south, where the Jubba and Shabeelle rivers, a generally higher rainfall and more fertile soils allow large scale settled agriculture. Livestock husbandry, particularly cattle, remains an important activity.

Livestock husbandry is the most important export activity in Somalia. The predominant form of livestock management is transhumance, following good grazing and water supplies. Bananas are the second most important export.

Most are produced on prime irrigated land by joint Italian–Somali companies such as Somalfruit. Limited quantities of other fruit, mainly mangoes, are also exported.

Four main crops are grown in Somalia: sorghum, maize, sesame and cowpeas. Sorghum is grown in the drier areas during the gu and in wetter areas during the dayr. It is planted over the largest area. Maize is grown when there is sufficient rainfall. Usually other crops are grown with the maize, such as mung beans, cowpea and sesame, which is an important cash crop. Other grain crops with limited distribution are finger millet, grown near Muqdisho, Merka and Cadale and rice, mostly grown on the lower Jubba. Livestock often eat crop residues, which have significant monetary value and excess is sold. On irrigated land, vegetables and fruit are produced throughout the year if water is adequate.

The crop calendar (Fig. 2) shows the approximate times the food crops and cotton are grown. Because of the bimodal rainfall and different timing of the seasons across the country the cropping pattern is complex.

Tree planting is mostly for protection of agricultural land, stabilisation of sand dunes, fruit production and amenity. There is little tradition of tree planting.

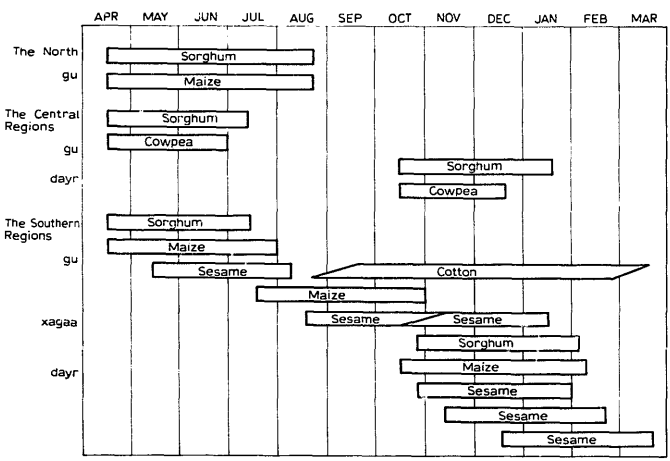

Fig. 2. Crop calendar (Hutchinson and Polishchouk, 1989).

DESCRIPTION OF TRADITIONAL AGROFORESTRY SYSTEMS

Live fencing and hedges

Live fencing is used extensively in Somalia to restrict the movement of livestock. It occurs around huts, where browsing and grazing are restricted, and lining tracks through agricultural land. The two genera most commonly used are *Euphorbia* and *Commiphora*. Hedges not only exclude animals but provide shelter.

Commiphora and *Euphorbia* live fencing is established through cuttings taken in the dry season, which are planted directly into the ground. Establishment is very successful, even on hostile sites. A wide range of *Commiphora* species, is used. Most have spines. Of the euphorbias, *Euphorbia tirucalli* is most commonly used. Although without spines, it has a toxic latex and can produce a very effective live fence. In Homboy and in parts of the Bay region, the spiny *E. grandicornis*, has been planted to form a live fence. This live *Euphorbia* was supplemented with dead branches of *Acacias*.

The prickly pear, *Opuntia* sp., is commonly used as a live fence on the dunes around Muqdisho and Baraawe. A yellow berried, *Solanum* sp. is unpalatable to livestock and in Sablaale and the Qoryooley refugee camps (Huke and Plecan, 1986) is retained around huts as shelter and to exclude livestock. It regenerates freely in these areas and does not need to be planted. *Erythrina* sp. as a live fence is confined to an area between Muqdisho and Balcad. In many areas an informal type of live fencing is used, where naturally regenerated trees and shrubs are kept, forming a strip around the field. Any gaps are filled with cut branches of various thorn bushes or planted *Opuntia*.

The use of hedges is widespread on riverine land in Somalia. These exclude livestock, provide limited shelter for the crop and act as boundary markers between fields. Species used include *Parkinsonia aculeata, Leucaena leucocephala* and *Caesalpinia pulcherima*. No complex plantings of hedges, such as used in alley cropping, exist in Somalia. All are planted around field boundaries.

Shelterbelts

On the flat riverine plains there is extensive use of shelterbelts. These are of simple design, consisting of one or two lines of trees, usually of the same species. Many of the older shelterbelts were established by Italian farmers in the colonial period whilst recent shelterbelts were planted by large commercial concerns such as Somalfruit. These are to protect banana plantations. Banana leaves are prone to splitting even in weak winds (El Lakany, 1983).

The species most used on the riverine areas of the south of Somalia is *Casuarina equisetifolia*. Other species used are *Conocarpus lancifolius, Azadi-*

TABLE I

Types of shelterbelts observed in Somalia

Species	Age	Layout	Region
Casuarina equisetifolia	Recent	Varied, from single row to four rows	Lower Shabeelle; lower Jubba; middle Shabeelle
Casuarina equisetifolia/ Thevetia peruviana	Recent	One row *Thevetia* / up to four rows of *Casuarina*	Lower Jubba
Casuarina equisetifolia/ Eucalyptus camaldulensis	Recent	One row of each	Lower Shabeelle
Thevetia peruviana	Recent	Single row	Lower Jubba
Tamarix aphylla	Old	Single row	Lower Shabeelle
Delonix regia	Old	Single row	Lower Shabeelle
Conocarpus lancifolius	Old	Single row	Lower Shabeelle
Eucalyptus camaldulensis	Recent	Single row	Lower Shabeelle
Cassia sp.	Recent	Single row	Lower Shabeelle
Leucaena leucocephala	Recent	Single row	Lower Shabeelle; lower Jubba
Nerium oleander	Recent	Single row	Lower Shabeelle; lower Jubba

rachta indica and *Eucalyptus camaldulensis*. These are often planted along roadsides and are not orientated in the best direction for crop protection. Most are irrigated for the first years of establishment.

There appears to be little management of the older shelterbelts. Many have gaps, which increase the wind speed and can cause more damage to crops than no shelterbelt. In many the lower branches have died resulting in no cover close to ground level. This is sometimes compensated by the invasion of creepers and shrubs in the shelterbelt.

In the northwest *C. lancifolius* is planted as a shelterbelt, especially in coastal areas. The combinations of species encountered in southern Somalia are noted in Table 1.

Boundary planting

Boundary plantings allow demarcation of a farmer's land and can provide useful subsidiary products.

At Luuq *Leucaena leucocephala* is planted around small, irrigated fields of 0.1 to 0.25 ha. The spacing is too great to exclude livestock and the main aim is to produce poles. Leaf litter from the trees falls on the fields and would act as fertiliser. However, the farmers often clear this litter from their fields.

In the Shabeelle and Jubba river valleys boundaries are often planted with widely spaced coconut or banana.

Bush fallows and shifting cultivation

A fallow system is practised on rainfed agricultural land. The length of time the land is cropped and the time it is fallow depend on soil fertility, labour availability and land tenure. On fertile clays there are areas that have been under continuous cultivation for 50 years. On the less fertile sands of the central rangelands the land is cropped for two to ten years (usually six or seven) and then left fallow for a minimum of thirty years and up to fifty years. Before cultivation, the bush vegetation is often burned. Sometimes only troublesome stumps are burned, much of the woody vegetation being used for dead fencing. Where the vegetation is not burned there can be a depression in crop yields. Useful trees, such as evergreens, are retained for shade.

The farmer is able to use indicators, such as the age and presence of particular plant species, to determine whether the land is suitable again for cultivation. Other factors such as land tenure and labour also influence the length of fallow.

At Homboy on the black cotton soils, yields of maize and cotton decline after about 30 years. Despite this the land can be cultivated for much longer periods. When the land is left fallow a thicket composed mainly of *Acacia nilotica* establishes itself. Other species found on fallow land in this area include *Thespesia danis* and *Dichrostachys cinerea*. It is possible that the height and density of the *A. nilotica* thicket is used by the farmers to decide when to start cultivation again. Shifting cultivation is practised in most regions. This is a subsistence form of agriculture, the land being cleared immediately before the rains and cropped for one or two seasons.

Intercropping

Intercropping, the growing of agricultural crops with trees, is very common in Somalia. This usually consists of a mixed agricultural crop under widely scattered trees. More complex systems of intercropping are found in the riverine areas, where irrigation and relatively high rainfall provide plenty of water.

Naturally regenerated trees in intercropping

In most areas naturally regenerated trees are retained on agricultural land. These provide shade, fodder, fruit, building material, a site for hen-houses and a vantage point for watching over crops and livestock.

Farmers will tend young seedlings of useful tree species. Often a shelter of dead thorny branches is built around the seedlings to protect them from browsing. Occasionally a microcatchment will also be constructed.

The most common species retained on cultivated land in southern Somalia are *Dobera glabra, Balanites aegyptiaca* and *Salvadora persica.*

On the lower Jubba, *Cordia sinensis, Garcinia livingstonei, Tamarindus indica* and *Thespesia danis* are often left in farmers' fields (Madany, 1985) and *D. glabra* is also very common. Other species retained in this area include *Adenopodia rotundifolia, Albizia anthelmintica, Hyphaene thebaica, Adansonia digitata* and *Cordia ovalis.* Close to the Jubba River species from the riverine forest have been retained, especially *Ficus* spp., *G. livingstonei* and *T. indica*; these not only provide shade but also edible fruit. Where the riverine forest has been cleared more recently a wider range of species is retained. At Bu'aale, near to the riverine forest reserves, species including *Mimusops fruticosa, Newtonia erlangeri* and *Acacia, Hyphaene* and *Ficus* spp. are left in the fields.

On the Shabeelle, *D. glabra* is the most common tree found in fields of agricultural crops. Other trees commonly found in this area are *Balanites* spp., *Ziziphus spina-christi* and *S. persica.* The Henna tree, *Lawsonia inermis,* and occasionally *Euphorbia robechii* are also retained. All that remains of the riverine forest are large, old remnant trees of *G. livingstonei, T. indica, Mimusops* and *Ficus* spp.

Close to Muqdisho on the sand dunes settled pastoralists have small areas of grazing land often enclosed by live or dead fencing. Inside, trees, particularly *Acacia tortilis, D. glabra* and *Terminalia polycarpa* are left from the natural bushland.

In the Bay Region the natural vegetation is a type of *Acacia–Commiphora* woodland. Trees retained in farmers' fields include *D. glabra, Terminalia spinosa, T. prunioides, Balanites* spp., *Acacia senegal, A. tortilis, Delonix elata* and *Boscia* spp. In this region kites are used to scare seed-eating birds and the trees are used as tethering stations.

In the oasis gardens of the northeast indigenous fruit trees including *Z. spina-christi* and *Grewia tenax* are left when the natural vegetation is cleared (Godet, personal communication).

Planted trees in intercropping

There is little planting of trees in Somalia by farmers. Those that are planted are selected for their valuable products such as fruit, rather than for any environmental benefits. Most trees are planted by farmers in the riverine areas, where irrigation allows good growth and fruit yields. There are two types of intercropping of trees and agricultural crops:

(1) Permanent, where the agricultural crop is grown during the whole life of the tree crop.

(2) Temporary, where the agricultural crop is grown for part of the life of the tree crop.

(1) Permanent intercropping

Most trees planted in land under agricultural crops bear fruit. These include *Terminalia catappa, Mangifera indica, Phoenix dactylifera, Annona* spp., *Carica papaya, Musa* spp. These are planted at wide spacings or as single trees. They are usually planted on irrigated land as most commercial fruit trees require much water for good yields. However, water harvesting techniques such as microcatchments, with a furrow to channel water into them, allow some cultivation of fruit trees on rainfed land. This is often confined to wet depressions and usually no crop is grown beneath the trees.

Other trees planted in agricultural fields include *Cassia siamea, Tamarix aphylla* and *Terminalia* spp. Old individual kapok trees, *Ceiba pentandra*, are common near the Jubba and Shabeelle.

Farmers near Muqdisho plant scattered *Terminalia spinosa* in their fields primarily to provide themselves with poles for constructing their houses. This species, *Terminalia polycarpa* and *T. prunioides* are favoured, having termite resistant wood and a reasonably straight stem with light branching. These are established by direct seeding. Other benefits to the farmer include fodder and shade. Cassava is often planted with the trees.

In the northeast of Somalia farmers establish oasis gardens with date palm, *P. dactylifera*, as an overstorey, or more commonly adjacent to their agricultural crops. The gardens are small, the average in Seyn Weyn being only 200 m^2. Both the palms and the agricultural crops are irrigated, the agricultural crops only between October and May. The available water is shared communally and is allocated by a committee or village chief. Timing of irrigation of the date palms depends on this allocation of water (Chazee, 1988). Intercropping is rare compared with date plantations. Old plantations are usually densely stocked, the average being 400 stems/ha which precludes intercropping. The crops are planted in small irrigated squares called xeero. Formerly the date palms were intercropped with cotton, peanut, sorghum and maize. Recently, however, tomatoes, onions, sweet potato and watermelon have become the most common crops. Banana and papaya are often planted, while in Galgalo citrus trees and *Annona* are also common and mango, pomegranites and coconut are also used. The produce is usually consumed by the farmer and his family (Chazee, 1988).

(2) Temporary intercropping

There are many examples of temporary intercropping, mainly of fruit trees and crops. These usually involve planting a crop under a widely spaced stand of fruit trees until the shade cast by the trees is too great. Examples include:

(a) Papaya, grapefruit and vegetable intercropping. At a small farm at Sagaalad, near Afgooye, a farmer has planted alternating rows of widely spaced grapefruit and papaya in irrigation channels. The channels supply water to

TABLE 2

Agricultural crops and trees grown in rubac

Trees	Crop	Layout
Lime	Sesame, maize	Trees at 8 m spacing, maize grown for 5 years until shaded out
Grapefruit	Onion, lettuce	Trees grown at 8 m spacing, lettuce and onion grown for 3 to 4 years until shade too great
Banana	Maize	One tree at corner of 5×5 m quadrats
Papaya, grapefruit	Carrot, beetroot, pepper, cabbage, lettuce, coriander, spinach, coriander and beans, maize and beans	Grapefruit at 8 m spacing, lines of papaya in between, when shade too great remove papaya and stop growing crops
Coconut, lime, mango	Sesame, maize, tomatoes	Trees at corners of 9×8 m quadrats
Grapefruit, banana, papaya	Beans, maize, sesame	Grapefruit at 8 m spacing, banana, papaya and crops grown until shaded out

irrigated plots, about 4 m by 4 m, locally known as rubac. Usually only one type of vegetable is grown in these plots, but as many as three different crops have been seen (Table 2). The vegetables are grown under the trees for up to six years. The farmer also plants under the trees a mixture of maize and beans in the gu and sorghum in the dayr. This is a common system on the Lower Shabeelle.

(b) Coconut intercropping. During the development of the coconut the light regime under the canopy changes. There is sufficient light for growing crops under coconut early in its development and later on in its life. Coconut is a particularly good species for intercropping with agricultural crops because of its root architecture, as most of the roots are found close to the bole (Nair, 1984).

In Somalia coconut palms are planted at a wide variety of spacings in very different conditions. Coconut palms can be seen on sites as different as the heavy clays of the riverine areas and the coastal sand dunes.

Crops planted beneath coconut are usually a mixture of cowpeas and maize in the gu with sorghum in the dayr. Under most coconut plantations no crops are grown.

Soil stabilisation measures

The root systems of trees can effectively stabilise soil on sites prone to erosion. This has been recognised in parts of Somalia and in riverine areas useful trees, such as figs, are often left when the gallery forest is cleared.

The most important use of trees in soil stabilisation is dune fixation. Large moving sand dunes are a major problem along the eastern Somali coastline and central rangelands, encroaching on farmland and habitations. It is only now, however, that proposals are being made for ways of using the fixed dunes.

In Sablaale the sides of irrigation canals are being planted with *Eucalyptus camaldulensis* and mango to stabilise the bunds. Nine *Eucalyptus* and one mango are planted every 50 metres. Initial results are promising, the *Eucalyptus* growing an average of 3 to 4 metres in the first year.

In the northeast of the country *Conocarpus lancifolius* is planted along irrigation canals to improve water quality and reduce erosion. Grass often develops underneath and is harvested as fodder. In the same area *Prosopis chilensis* is grown on the edges of terraces to stabilise them. The pods, when mixed with other vegetable matter, are fed to livestock.

Plantation grazing

On the Shabeelle, livestock, mainly cattle, is often allowed to graze under fruit trees, such as mango and coconut. This keeps down the luxuriant grass and herb growth on these irrigated areas and gives the cattle dry season grazing. Farmers do not usually allow cattle into citrus orchards because they believe the trees harbour tsetse fly.

RESEARCH AND RECENTLY INTRODUCED AGROFORESTRY SYSTEMS

Most recent agroforestry practices have been introduced through the activities of aid organisations owing to lack of funding for the government bodies involved, the National Range Agency (NRA) and the Ministry of Agriculture.

Research

The Central Rangelands Development Project (CRDP), BFPS and World Concern have done most research work on agroforestry.

CRDP's work includes growing crops such as cowpea and sorghum under *Terminalia spinosa* and *T. polycarpa* at different spacings. Hedgerow and live fencing trials have been established using 10 different species. Intercropping trials with hedgerows have also been planted using 10 tree species. Unfortunately none of the results of these trials has been published.

As part of the research programme of BFPS, species elimination trials have been established at six sites; five rainfed and one irrigated, all in southern Somalia. Of particular interest are the 1988 and 1989 provenance trials for *Acacia albida*, a potentially useful species in agroforestry. Trials in 1989 concentrated on native multipurpose and fodder trees. Most are suitable for agroforestry. In 1988 an agroforestry demonstration was planted on irrigated land

at Sablaale. This comprised three and five row shelterbelts and a hedging demonstration. Comparisons will be made between crops grown with and without trees. A hedging trial using *Leucaena leucocephala* has been established this year.

Recently introduced systems

A successful example of an agroforestry practice introduced by a farmer is at Carab Ciise, a large farm of 228 ha about 5 km from Jenaale. A 3 ha block of *Leucaena leucocephala* at about 1 m spacing was established. This was planted to provide poles for the workers' houses, fodder for the farm's livestock and smallwood for staves for fruit trees. In areas where the poles have been harvested cattle graze the understorey. *L. leucocephala* was not planted mixed with crops or other trees because of its invasive nature under irrigation.

World Concern have been active in promoting agroforestry on the Jubba and lower Shabeelle. Their first project, between 1983 and 1988, was at Labadaad Island, a leper colony near Jilib. Their second began in 1988 and is at Homboy, on the lower Shabeelle.

At Labadaad farmers have been encouraged to adopt agroforestry practices such as hedges and alley cropping; many of the farmers have very small areas of land and there is a local firewood shortage.

The demonstrations include alley cropping and hedges, using a wide variety of species. Spacing between the rows of trees in the alley cropping was initially 4 m. This was found to be too narrow, the agricultural crops being suppressed by the trees. Species used for the alley cropping demonstrations were *Leucaena diversifolia, L. leucocephala, Cassia siamea, Gliricidia sepium, Casuarina equisetifolia, Moringa oleifera* and *Samanea saman. Sesbania sesban* was used as a windbreak. Species used in hedges included *Parkinsonia aculeata, Caesalpinia pulcherima* and *Prosopis chilensis.* Although alley cropping has not been adopted by the local farmers about one third of the farmers have established hedges, mainly of *P. aculeata.*

At Homboy the main aim of the project was to provide fodder banks for farmers. This involved planting fodder trees at wide spacings in the fields of participant farmers. Species used include *L. leucocephala, G. sepium* and *Acacia albida.* These have been established by direct seeding and using nursery stock. It is too early to assess the success of this project.

Little documentation exists on the agroforestry activities of CRDP. Live fencing has been established around dry season grazing reserves, dwellings and small block plantings of trees and shrubs. *Commiphora* spp. were used.

As part of the activities of Cooperation for Development in Africa four forestry projects were started, as follows.

(1) Qoriooley forestry project

The main aim of the project was to establish irrigated and rainfed plantations and promote tree planting. Trees were distributed free, the most popular being lime and mango.

Although the plantations have not been a success, because of irregular and insufficient irrigation, amenity plantings in nearby refugee camps and agroforestry on neighbouring farms have met with success (Bowen, 1988). More recent small plantations for poles and fuelwood are growing well.

Small scale farmers were encouraged to plant the boundaries of their fields with trees and larger scale farmers to plant trees in blocks. The aim was to alleviate local shortages of firewood and poles. One farmer established a small irrigated woodlot of about 1 ha using *Leucaena leucocephala*, planted at 1 m spacing. During the first rainy season maize was grown with the small seedlings. The *Leucaena* provided fodder during the dry season and also a supply of poles, most of which were sold locally. The same farmer has now established another block of 1 ha.

(2) Gedo community forestry project

Implemented by the NRA in cooperation with Interchurch Response, this project involved establishing nurseries, block plantings, amenity plantings and agroforestry. The agroforestry component promoted the establishment of windbreaks around fields and has encouraged a limited amount of intercropping. The most successful plantings were on the narrow, irrigated strip by the Jubba River. This project ended in 1987 but has taught farmers simple methods of tree propagation and, it is hoped, tree planting will continue (Bowen, 1988). The most successful components of this project were adopted by Church World Service in the Luuq Agroforestry Project.

(3) Northwest community forestry project

This project, implemented by OEF International, established nurseries, block plantings, amenity plantings and agroforestry. Agroforestry was initiated through the establishment of windbreaks and live fencing. Those windbreaks that were described are of *Leucaena leucocephala* and appeared to be fairly successful (Bowen, 1988).

(4) Jalalaqsi reforestation and fuelwood production project

Africare established nurseries, windbreaks, block plantings, natural regeneration reserves, amenity plantings and sand dune fixation sites. Two successful windbreaks were noted by Bowen (1988); a 250 m single row belt of fast growing *Eucalyptus camaldulensis* on an irrigated fruit farm and a single row of mixed species on another farm.

THE POTENTIAL FOR AGROFORESTRY IN SOMALIA

It is in the higher rainfall and irrigated areas that there is most potential for agroforestry. In the lower rainfall areas, where nomadic livestock husbandry predominates, poor growth rates do not favour widespread tree planting.

Agroforestry can benefit both small and large farmers. Small farmers require a large number of products from their land; food. fodder, and wood for fuel, construction and making implements. They are also likely to adopt a diverse farming system to minimise risk. Large farmers have capital that they can invest in expensive systems such as shelterbelts.

An often cited example of a successful system is that of scattered *Acacia albida* in fields of maize or millet. This tree is unusual in that it sheds its leaves during the rainy season. Competition for light with the agricultural crop grown in the rainy season, underneath the trees, is minimal. The leaves and pods are good dry season browse. In addition the soil under and near the tree is enriched by leaf, root and wood decay and from the dung of animals browsing on the leaves and pods.

Although *A. albida* occurs naturally in the northwest of Somalia, it is only in the last few years, with the encouragement of aid organisations that intercropping with this tree has been attempted. The use of this tree in other conditions offers much, but there are serious constraints. *A. albida* grows very slowly in the semi arid and arid conditions that exist over most of Somalia. In the rainfed BFPS trials near Afgooye no provenance grew more than 80 mm in the first year. It would be difficult to persuade farmers, most of whom have no tradition of tree planting, to adopt such a practice.

A system that has much potential is that of alley cropping, or establishing hedges using nitrogen fixing tree species such as *Leucaena leucocephala. L. leucocephala* grows rapidly on irrigated land and grows well in some rainfed areas. Alley cropping with permanent hedges has not been tried in Somalia. However, at Qoriooley a farmer establishing *L. leucocephala* at narrow spacings to form a woodlot planted maize between the rows of trees for the first two seasons. He noted an increase in the maize yields. Alley cropping can also be advantageous to the farmer by maintaining soil fertility, obviating the need for fallow. The economics of alley cropping of *L. leucocephala*, beans and maize has been modelled for Machakos District, a semiarid area of Kenya. Although there are many assumptions in the model it indicates that land, labour and draught animals were all used more efficiently in alley cropping than in the traditional maize and beans cropping system.

In many riverine areas planting hedges of fast growing species around irrigated fields would be beneficial. Poles and fuelwood are usually expensive and the trees could be irrigated with the crop, requiring little extra work. This practice has been successfully adopted at Luuq and would be appropriate for

most irrigated areas. On good and irrigated sites care must be taken when using *Leucaena leucocephala* because of its invasive nature.

Planting of trees on the banks and by irrigation canals to stabilise them should be encouraged. Growth rates would be good because of the high, perennial water table. This has been tried recently at Sablaale. The growth of the *Eucalyptus camaldulensis* and mango trees planted there is excellent, the *Eucalyptus* growing in height by 3 to 4 m per year. The trees would yield important benefits other than bank stabilisation. They could provide fuel and poles in areas of intensive cropping, where such products are in high demand and command high prices. By shading irrigation canals, water quality could be maintained by lowering water temperature and loss through evaporation so that more, better quality water could be available to the farmer. In Somalia there are serious problems with water quality and salinity of irrigated crop land (Ministry of Agriculture, 1988).

A programme of establishing shelterbelts would be of benefit by increasing yields of certain crops, through soil protection and by providing useful products.

On irrigated land large farmers could plant complex, multiple row shelterbelts. Commercial companies like Somalfruit already have many such shelterbelts. However, the small farmer is only likely to adopt single row, simple shelterbelts as multiple row shelterbelts would occupy too much valuable land. Species for irrigated land would include *Casuarina equisetifolia, Conocarpus lancifolius, E. camaldulensis, L. leucocephala* and *Thevetia peruviana.*

Establishing shelterbelts on rainfed agricultural land would be difficult. The trees would require watering during their early years to ensure good survival and establishment and would need protection from livestock. Despite widespread wind erosion, farmers are unlikely to plant shelterbelts in these conditions without incentives. Species for rainfed land include *Albizia lebek, Cassia siamea* and *Euphorbia tirucalli.* These would require watering during the early years of establishment.

There is some potential for introducing improved bush fallows in much of the rainfed agricultural areas. This involves ground preparation and direct sowing the area with useful tree and grass species, such as those with high fodder or fuelwood value. The main constraint would be incursion of livestock as land under bush fallow in communal grazing. A farmer would be unlikely to adopt a practice where his work benefits his neighbours and himself equally. More realistically, small numbers of valuable species like *Terminalia spinosa* or *T. polycarpa* could be planted and individually protected. The value of the fallowed land could be improved further through the introduction of beekeeping. This would exploit the high nectar value of some of the local *Acacias* (Crane et al., 1984). Some improvement of land under bush fallow is already practised in the central rangelands. This involves sowing a palatable grass, *Cenchrus ciliaris.*

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