

# FARM Africa and SOS Sahel International/ UK Participatory Forest Management Programme (PFMP)



## AGROFORESTRY PROJECT FOR SOIL & WATER CONSERVATION, FODDER AND WOOD PRODUCTION IN BONGA (PROJECT PROFILE)

The Goal of PFMP is to ensure environmental sustainability through Community based natural resource management systems



**A PRIVATE RURAL DEVELOPMENT & AGRICULTURAL EXTENSION AGENCY**

**A Public-Private-Rural Community partnership  
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# 1. INTRODUCTION

## 1.1 The Bonga forest and adjacent *woredas*

The Omo-Gibe River Basin Master Plan Study (Vol. III, part I) identifies the Bonga Forest area as FMA2 (on the land use/cover map) and describes it as an irregular area of about 86,000 ha in the west of the basin. The forest is mostly broken up and encroached by cultivation. **Gimbo, Decha, Chena, Tello and Mewonjio** *woredas* encircle the Bonga forest which is the source of three major rivers. It is therefore an important watershed and center of biodiversity of tree species and woody perennials.

Slopes are variable but commonly range from 10 % to over 60 %. In addition to these local slopes conditions, the soils are extremely fragile. The soils are generally complex of very deep, well-drained, red and brown clays, with some shallow soils on steeper areas. Because of the high rainfall, most soils are highly leached and much of the soil fertility is tied up in the top 20 cm and maintained through nutrient recycling between the soil and the overlying forest vegetation. Removal of the forest cover and general vegetative cover breaches this cyclic process and leads to rapid decline in soil fertility.

## 1.2 Land use Conflict and Trends of Unsustainable Resource Use

There have been resettlements and rapid expansion of agriculture in the area through smallholder cereal crop farming and commercial farming (coffee, tea, pineapple), all at the expense of the forest cover, cleared for agricultural expansion. Initial harvests are usually good but soil fertility quickly declines as the organic matter is lost because of the clearing of the forest/vegetative cover. This is because **Soil Organic Matter (SOM)** is key to fertility and productivity of these soils. Indirectly, SOM is central to maintaining the structure of the soils. Soil structure in turn is central to rainfall infiltration, soil moisture storage, and erosion control. Thus, while these soils are maintained under forest, organic matter recycling continues and soil productivity is maintained. However, with forest clearing two things happen, namely: (a) organic matter is lost rapidly (aided by the high rainfall runoff), and (b) soil erosion sets in leading to the loss of the topsoil which contains most of the soil fertility. SCRP has shown that organic matter levels decline following forest clearing to about 30% of the original level within 4 to 15 years. The same study also showed that crop yields declined initially at the rate of 19% annually, stabilizing after 12 to 15 years at 35% of the original level. Erosion in these areas

particularly strong due to the high amount and intensities of the rainfall.

Unfortunately the positive elements of climate and seemingly good topography (undulating) and the luxuriant natural vegetation mask the major problems, i.e. rapid soil fertility decline and soil erosion. The Omo-Gibe Development Master Plan conclude that "**failure to manage these soils properly may lead to rapid and possibly irreversible soil degradation, leading in return, to much lower crop production and non-sustainability.**"



**Picture 1: Forest clearing on sloppy topography leads to sever soil erosion**

In observing the increasing trend in smallholder crop farming (i.e. maize, wheat, teff, and pulses in the highland) one observes that the continuous rains and high relative humidity makes crop harvesting and drying very problematic. Farmers are seen hanging bean harvest strung along fences or hanging down from trees to make them dry. Weed infestation in agriculture is also a major problem reducing crop yields and takes considerable labor and money to control weed. Farmers are also unable to do deep Plowing because of grass weeds after the commonly practice of field fallowing. *Digitaria scalarum* and *Cynodon dactylon* are common grass weeds that pose difficulty during land preparation and subsequent weeding. The dominant practice of cereal farming as regards weed control is the "**shilshela**" cultivation after the crop (maize) has emerged and such weeding is inadequate for the scale of weed infestation and growth due to the high rainfall and long growing season. Farmers of Gimbo worda and elsewhere complain that return to land and labor is poor especially for maize production. And yet, majority of farmers continue growing cereal crops including maize since they do not have alternative income to meet their food security.

It must be recalled that farmers pay annual tax on their agricultural land and none on the natural forestland under their management and use. Only when they register as traders of NTFP products and wood products will they pay market levy (revenue tax), which ranges from 5 to 15% of the market value of the product. So farmers must be seen using their agricultural land and live to ensure usufruct right. This condition promotes encroachment on forestland in an effort to put more land under individual household use and management resulting in **de facto** land ownership. The forest area at present is in free access to all including those residing in towns and far away villages and settlements.

Wealth is measured by and is a function of (a) size of agricultural land, (b) number of oxen and (c) access to natural forests. Farmers are tempted to increase the first two source of wealth indicators and do so at the expense of encroachment of the forests for agriculture and grazing. Using the above three ranking scales, a farmer with more than 2 ha of farmland, more than 2 pair of oxen and free access to forest resources is considered wealthy while a farmer with less than 2 ha and less than 2 pair of oxen and no access to forests is considered poor (Baah, etal, 2000). In Gimbo woreda, 83% of the farmers have land over 2 ha each while 17% have 2 ha or less. Farmers grow many types of food crops (maize, enset, teff, haricot bean, sorghum, faba beans, millet, peppers (chilies), coffee and barley). Maize, enset and teff are the most dominant crops with 100%, 72%, and 70% of the farmers growing them, respectively. Maize is given the largest area of the cropland (1.6 ha) of the agricultural land but the average yield is low (15 qt/ ha).

The current effort by FARM Africa and the local government through the PFM scheme is aimed at establishment of conservation and management Groups of forests that are adjacent to settlements, villages and farms. But will this stop the tide of expansion of agriculture and unplanned settlements? Indeed, landlessness is high estimated at 35% of the rural population and poverty is high (65% of the rural population is classified poor) and more poor people are coming to settle in the region, both planned and unplanned.

## **2. RATIONALE**

### ***2.1 Agroforestry for SWC and to enhance Fodder and Wood Supply***

The Development Master Plan for the Kaffa Zone (Kefficho) has identified Agroforestry as a sustainable land use technology, under the then **Gibe Development Authority**, over a decade ago. The need for soil conservation practices in the agricultural production is specifically described for reasons stated in preceding sections. FARM Africa has also identified Soil and Water Conservation (within Agroforestry system) as one area of intervention to make agriculture, especially cereal farming productive and sustainable.

In a recent study, "**Natural resources under threat**" (Baah et al. 2000), the forested area in the then Kafa-Sheka Zone to be only 29.2% while the cultivated and arable land is given as 55.9% of the land mass (total land is 1,328,923 ha). Thus, in the face of this unprecedented expansion of cereal agriculture (with maize in the lead), conservation-based farming is a must. This is offered by **agroforestry for soil and water conservation** technology whose implementation method is described in detail next.

## **2.2 SWC Measures and Felt Needs of Farmers**

It has been observed that smallholder farmers do not readily adopt SWC practices even in the face of obvious soil and water erosion problems on their croplands. While land tenure insecurity (real or perceived) contributes to this reduced interest to invest on land improvement, the technology must cost farmers minimally and must fall within the socio-economic realm of the farmers. Additionally, for SWC practices to be adopted widely it must be linked to other felt needs of the farmers. In the case of the Bonga farmers, they want a) feed for livestock, b) fuel wood, and c) timber for construction. The effort to establish and manage SWC physical and biological measures must also be designed to give the above needs on the farm. It must also be linked to other NTFPs such as bee foraging for honey production. AF-SWC participating farmers and households must have invested in farm enterprises such as sheep, oxen, dairying as these investments do require more quality feed and the SWC sites can be made to supply part of this feed need. Above all, for AF-SWC to succeed, a good technical and extension service is needed including assistance in seed and planting material supply and marketing of the increased farm output.

In Kenya, where AF-SWC practices are well established, farmers use several types of SWC measures including: (a) contour Plowing, (b) residue (trash) line in windrows, (c) row of stones (stone terracing), (d) physical and biological terraces, (e) mulching (crop residues, GLM), (f) cut-off drains, and (g) Fanya Juu. Farmers were paid cash per meter of conservation terrace they made on their farm by the government with financial assistance from SIDA until the technology took root in the farming system. What is more, farmers in Kenya and other East African countries plant crops in rows that greatly facilitate adoption of Agroforestry practices including SWC using biological terraces (planting of woody perennials and perennial grasses in terrace intervals).

But in Bonga, none of the above is in use consciously in the croplands by farmers including row cropping of crops such as maize. Farmers apply FYM (Farm Yard Manure) in the home gardens but are unwilling to transport it to the crop fields. In a recent study, farmers of Gimbo *woreda* ranked the following practices as "bad" leading to land degradation and decline of crop yield (listed in the order of importance): (a) continuous cropping (without fallowing), (b) cutting of trees, (c) shifting cultivation, and (d) mono-cropping. Farmers listed and ranked the following "good" practices to

counter the bad practices (listed above): (a) keep soil fertility high, (b) plant and grow more coffee trees, (c) plant and grow more trees (i.e., *Grevillea robusta*), (d) control activity of new investors in agriculture, and (e) educate farmers on forestry.

These are good indications that farmers are aware of the problems and may be willing to adopt new ways of land husbandry, including Agroforestry for SWC. But the problem of soil erosion continues to grow unchecked and the felt-needs of enhanced supply of feed, fuel wood and construction timber go un-met. The truth is that soil erosion threats in Bonga are real and are with us already. The technology needs to be taught and demonstrated to farmers. But extension staff and woreda development agents need to be adequately trained themselves first.



**Picture 2: Initial stage of land degradation in settlement areas**

One must remember the AF-SWC program being proposed for Bonga area is a multipurpose one, where soil conservation is the primary objective and other needs are to be met at least in part through the biological terraces. The establishment and managing of two differing species (one grass and the other woody perennial or tree) is central to the science and practice of the AF-SWC program being proposed for Bonga for implementation by FARM Africa and partners, both within and outside Ethiopia, such as the new **EU-funded project based in Mizan Teferi - "NTFP R&D" Project** which includes sustainable management of forests and natural resources for the benefit of local communities. Because the slopes (even of the cultivated and arable lands) in Bonga are quite steep, the frequency of

the conservation hedges will be high (i.e. every 10 m or even less). Under this circumstance, the terrace hedges may be equivalent and similar to the Hedgerow Intercropping (also known as alley farming or alley cropping) in the literature. One is more certain that this technology will work, as both growing period and rainfall amounts are high in the Bonga highland zone.

Agroforestry for soil and water conservation will primarily serve as soil erosion prevention and the management of the grass and woody perennial harvests will go for feed and the woody component for fuel wood. The fodder system will be a cut-and-carry system or feed brought to a tethered animal if no animal shade is made available, which may be the case initially. This technology is equally applicable to relatively flat lands where the frequency of the terrace hedgerow will be a function of felt needs, that is between fertility enhancement and erosion control, fodder and fuel wood.

### **3. OBJECTIVES**

- Increasing productivity and sustainable land management.
- Protecting the soil from erosion and to increase soil fertility by planting MPTs.
- Acquisition of additional products such as fuel wood and fodder

### **4. SPECIFIC ACTIVITIES**

- Selecting the grass and woody species for the terrace hedgerows
- Seed/Germplasm supply and nursery Development
- Training of farmers and experts in MPTs management and SWC
- Establish Farmers Field School
- Establish demonstration plots on different biological SWC methods
- Establish On-farm trials and collaborate with research institutions
- R & D networking with relevant institutions and individuals

## 5. EXPECTED OUTPUTS

- MPT nurseries established
- Soil Erosion reduced and/or prevented and soil fertility maintained
- Adequate wood and feed produced
- Production and Income per unit area increased
- Supply of MPTs seeds secured in the area
- Farmers Field Schools established
- Relevant Research results obtained on biological SWC
- Capacities of communities and local experts built in SWC
- Networking on R & D with relevant institutions established

## STRATEGY

- Start with problem of SWC and future environmental prospects
- Enable communities and local authorities participate in all process
- Focus MPTs species germplasm and nursery development on community level
- Adopt research results from similar agro-climatic areas
- Establish Farmers Field Schools through community participation
- Increase the Economic output of the farm by planting MPT species
- Focus on traditional SWC methods
- Focus on capacity building of local communities
- Establish networking on Research & Supporting Services on agroforestry for SWC

## 4. PROJECT SITE

All Kafa zone woredas but emphasis should be given to PFM sites of the five woredas adjoining the Bonga Forests. Priority should be given to Gimbo woreda where cereal (maize) farming is on the increase mainly due to new settlers (eg: Yabekecha).

## **5. BENEFICIARIES**

- PFM groups
- Local communities
- Local government staff
- Private sectors
- Local government

## **IMPLEMENTING PARTNERS**

- FARM Africa
- SuPAK
- EU-funded NTFP project based in Mizan Teferi
- Kaffa Zone and respective woreda Administrations.
- Jimma Agricultural Research Centre
- EARO
- MoA
- Agriculture & Natural Resources Office (Region, Zone, Woreda)
- Jimma University
- PFM Coops.
- ICRAF
- Private sector
- Other Relevant NGOs and GOs

## **DURATION (3-5 Years)**

- Seed/Germplasm supply and nursery Development
- Training of farmers and experts in MPTs management and SWC
- Establish Farmers Field School
- Establish demonstration plots on different biological SWC methods
- Establish On-farm trials and collaborate with research institutions
- R & D networking with relevant institutions and individuals
- Monitoring and evaluation
- Introduce and test R & D results of other countries

## **INDICATIVE BUDGET (750, 000 ETB)**

- Capacity Building of communities and local government staff (150, 000)
- Seed/Germplasm and nursery Development (150, 000)
- Networking with relevant institutions and individuals (50, 000)
- Consultative planning and strategizing meeting with stakeholders (100, 000)
- Establish Farmers Field Schools vis-à-vis seed and nursery services (100, 000)
- Establish demonstration plots on different biological SWC methods (50, 000)
- Establish On-farm trials and collaborate with research institutions (100,000)
- Monitoring and evaluation (50, 000)
- Source of funding (EU, SuPAK (Netherlands Govt.) World Bank, UNDP, & other NGOs/donors).

# ANNEX 1. IMPLEMENTATION OF AGROFORESTRY FOR SWC

## 1. Justification for Biological terraces (hedgerows)

One must remember the AF-SWC program being proposed for Bonga region is a multipurpose one, where soil conservation is the primary objective and other needs are to be met at least in part through the biological terraces. The establishment and managing of two differing species (one grass and the other woody perennial or tree) is central to the science and practice of the AF-SWC program being proposed for Bonga for implementation by FARM Africa and partners, both within and outside Ethiopia, such as the new **EU-funded project based in Mizan Teferi, "NTFP R&D" Project** which includes sustainable management of forest and land resources for the benefit of local communities. Because local slope even of the cultivated and arable lands in Bonga are quite steep, the frequency of the conservation hedges will be high (i.e. every 10 m or even less). Under this circumstance, the terrace hedges may be equivalent and similar to the Hedgerow Intercropping (also known as alley farming or alley cropping) in the literature. One is more certain that this technology will work, as both growing period and rainfall amounts are high in the Bonga highland zone, the focus of this program.

The Agroforestry for soil and water conservation will primarily serve as soil erosion prevention and the management of the grass and woody perennial harvests will go for feed and the woody component for fuel wood. The fodder system will be a cut-and-carry system or feed brought to a tethered animal if no animal shade is made available, which may be the case initially. This technology is equally applicable to relatively flat lands where the frequency of the terrace hedgerow will be a function of felt needs, that is between fertility enhancement and erosion control, fodder and fuel wood.

## 2. Selecting the grass and woody species for the terrace hedgerows

At the out set, one can argue why have both trees (woody perennials) and perennial grasses together make conservation terraces? Either grass or trees planted in close spacing within the row can eventually develop into biological terrace capable of stopping soil and water erosion in the farm and croplands. But in the case of Bonga, where local slopes are too steep and where moisture (rainfall) is relatively high, the mixture is likely to ensure more control and provide more diverse products (food, feed, fuel, timber, etc).

But this technology is not tested and evaluated in the field in the Bonga area or elsewhere in the south and southwestern highlands of Ethiopia where the agro-ecology is similar. However, this technology has been tested in both humid/sub-humid tropical lowlands of West Africa and in Southeast Asia through the SALT and LANDCARE, as well as in sub-humid East African highlands (Northern Tanzania, Kenya, Uganda, etc.). In these climates and geographical regions in the tropics, the system is environmentally effective and yields higher economic benefits and diversified products for the household. The choice of two differing groups to form the conservation hedge is that each has different

soil depth of rooting for drawing nutrients and moisture, often below the rooting zone of agricultural crops. The grass row is planted and established after the woody perennial or tree row has been planted.

The ranges of perennial grasses to choose for the Bonga Region are wide and include the following:

- Lemon grass (not browsed or grazed, but for essential oil production)
- Elephant grass (highly palatable and requires protection from open grazing),
- Vetiver grass (less browsed)

The range of trees and woody perennials to choose from is even wider. It is therefore essential that a **Tree species Selection Criteria** be provided to assist the R & D phase. These are trees that provide desired **products** and **services** while competing as little as possible with the neighboring crops. The characteristics to look for are:

**Fast growing and high biomass production:** More leafy biomass and small branch production means more litter/mulch accumulation, more fodder, and or more fuel wood.

**Smaller, bushy form:** Smaller, multi-stemmed trees normally produce more biomass of a higher **leaf: stem ratio** than larger, single stemmed species.

**Deep rooting:** Take up nutrients and water out of reach of food crops such as cereals.

**Easy to establish:** Trees are easy to raise from seed either directly field-planted or in pots. Cuttings develop more rapidly but produce only lateral roots that compete more with neighboring crops.

**Repeated coppicing and/or re-sprouting ability:** Stems and leaves grow back again and again after pruning (after pollarding if large tree).

**Nitrogen fixing:** Nitrogen fixing trees are able to **fix** atmospheric nitrogen and contribute this to the soil system in the leaf litter fall/break-down.

**Free from pests and diseases:** Trees should not be hosts to crop-damaging insect or fungus pest.

**Easily controlled:** Trees that become weedy and will spread into the crop fields or neighboring fields are not desirable.

**Widely adaptable and stress tolerant:** Trees should be adapted to a range of soils and tolerant of environmental diversities such as high winds and periodic drought (if this happens in Bonga area).

**Multipurpose:** To provide an adequate return to land and labor inputs, trees must produce a number of useful products and services.

Based on work done elsewhere and considering the agro-ecology of Bonga and using the above criteria, the following trees and woody perennials can and should be considered, namely:

*Calliandra calothyrsus* (Nitrogen fixing, fuel wood, fodder, and honey flora)

*Flemingia macrophylla* ( Nitrogen fixing and fuel wood sticks and fodder)

*Cajanus cajan* Nitrogen fixing, food, feed and fuel wood)

*Tree lucerne* (Nitrogen fixing, fodder and honey flora))

*Sesbania sesban* (choose from a wide range short term perennials to tree forms)

*Morus alba* (non- Nitrogen fixing, edible fruit, silk farming, fodder)

*Grevillea robusta* (big tree pollarded for fuel wood and timber as windbreak)

*Tephrosia spp.* (Nitrogen fixing, fodder)

*Prunus africana* (high value medicinal tree to be planted as windbreak on the hedgerows)

### 3. Field Establishment of the Terrace hedgerows

Assuming that one has made decision on the selection of both the grass and tree species to be planted and has adequate planting material (seed, cuttings, slips, seedlings, etc) and

planting design and subsequent management is equally important. One also needs to make planting material ready in time through seed procurement and/or seedling production and transport to the farm.

#### 3.1 Spatial Arrangement

**Orientation:** The ideal tree/grass row should be an East-West, perpendicular to prevailing wind, and parallel to slope contour. This terrace line orientation provides maximum sun exposure to crops growing between the two rows of terrace hedgerows, also resulting in maximum erosion control. Slope direction may not always be this way anywhere. But at any rate, tree rows should be oriented to provide the most benefit and the least competition given the particular environment. It is always necessary to plant along contours.

**Width between tree (hedge) rows:** This is dictated and determined by the slope frequency. The steeper the slope, the more terrace hedgerows. In the prevalent slope of Bonga area where the average slope is more than 15%, the hedgerows may be as narrow as 5 to 6m wide. Under this circumstance, it is necessary to design the most economic yield hedgerows by making the grass and tree combination yield the most desired needs (cash, food, feed, wood, etc.). For instance if there is a good market (nearby there is an essential oil processing plant) for lemon grass, a lemon grass with a Nitrogen fixing tree such as *Calliandra* may be a good mixture to establish. *Calliandra* is also an excellent livestock feed, bee forage, and yields considerable fuel wood that even burns when still green.

**Within row spacing:** Under the prevailing steep slope, it may be necessary to establish a hedgerow consisting of two rows (50 cm apart, planted in zig-zag pattern). The trees such as Calliandra, should be at least 30 to 50 cm spacing. Close spacing encourages more leaf and smaller branch production (as does more frequent cutting).

**Food crop Spacing:** This should be done according to the Ministry of Agriculture/woreda package. But a row planting of crops is expected to be enforced. Over all desire is to move away and out of cereal agriculture in the region as it is not giving a reasonable crop yield, but at the same time it is detrimental to the natural resources/forest of the region. In view of the special problem of weed problem in cereal agriculture, the growing of sweet potato and close spacing of castor may need to be considered as the initial crop in the arable lands, or grow them in the crop rotation calendar.

### **3.2. SWC Terrace hedge Management and Product harvest/handling**

**Terrace Hedge Pruning (management):** Periodic pruning is necessary to prevent trees from shading-out the agricultural crop. A good rule of thumb is to maintain a hedge height equal to the distance between the hedge and nearest row, (usually 50 cm to 1m). Pruning frequency will also depend on the product mix desired. More frequent pruning gives more feed or green manure for the soil. Less frequent pruning will give more fuel wood and construction pole.

In wetter areas (higher rainfall and warm climates such as Bonga), it is often desirable to allow the hedge to grow uncut for 18 to 24 months to control weed and build up soil fertility. At the end of this fallow period, the farmer will harvest considerable wood and seed harvest (the latter also of commercial value and needed for on farm supply). Then the high frequency cutting regime can be started again or replanting of new hedge may be required depending on the species. *Sesbania sesban* often needs to be replanted which can be done by sowing seeds in a row.

### **PRODUCTS AND SERVICES BY TREE HEDGROWS**

- Nutrient recycling from deeper soil layer
- Green manure to benefit crop production
- SOM buildup from beneficial soil organisms
- Control soil erosion
- Pruning for animal feed
- Pruning for fuel wood and poles
- Supply biologically fixed Nitrogen to system

### 3.3. The 10 STEPS; Agroforestry for SWC/FODDER/FUELWOOD

To implement the technology described above, there are 10 steps that need to be done in sequence. They are:

1. Initiate germplasm and nursery establishment
2. Prepare high quality seedling, seed or planting material
3. Establish the contour hedgerows (using the A-frame), prepare for planting the Nitrogen fixing MPT
4. Plant the food crop(s) in the lower 1/3 portion of the farm
5. Plant fruit trees at the upper 2/3 portion of the farm (use 9-10 month old seedlings grafted or budded)
6. Inter-crop the fruit orchard with arable crops
7. Practice crop rotation and cover cropping (i.e. Sweet potato)
8. Trim hedgerows as suggested above
9. Harvest fruit on time
10. Maintain the agroforestry farm through regular weeding and hedgerow pruning

#### 4. Research for Development: On-Farm Research and Demonstration

As stated above, this technology and agroforestry practices in general are not field-tested nor adequately demonstrated to farmers. Nearly all of the existing demonstrations and field trials may have been well designed. But in terms of implementation, they are poorly executed and managed. The limited field data has not been processed and very little is published. To fill this need, a brief field guide is given below. The number of farmers or PFMs participating in the on-farm research will be taken as **replications**. The treatments will be as follows:

- Treatment 1. Control (farm with no AF-SWC hedge)
- Treatment 2. 2 rows of grass hedge (i.e., elephant grass or lemon grass)
- Treatment 3. MPT (i.e. Calliandra) 2 rows as described above)
- Treatment 4. MPT (CAL) + grass (planted as described above)

The terrace interval (distance from one terrace to the next will be dictated by slope % using A-frame or similar field tool. The terraces should be as far apart as possible to encourage farmers to adopt it as farmers may feel that the terrace hedges have taken too much land, forgetting that these sites are designed to bring more income and diversified product will controlling soil erosion. Considering the good moisture level of the soils (rainfall) and the steep slope aspect of the land, MPTs such as Calliandra should be planted 50 cm between plants in the terrace hedgerows while the grass (elephant grass) can be planted 25 cm from plant to plant with in the single row.

The management of the MPT should begin when the tree has reached some 2 m and can be cut at least two times within the year at 50 cm height while the grass should be cut at 5 cm above ground as often as needed.

**Results:** Keep record of harvests and any other events by date. Data recording books and guidelines are available from research centers. The results will be entered by the treatments listed above and entered in the on-farm trial and demonstration unit.

## 5. THE NEXT STEP AND THE WAY FORWARD

Adequate technical details have been given in this strategic plan to allow FARM Africa initiate the program in the field. As stated already, soil and water conservation practices, the production of fodder and tree planting (farming for timber and fuel wood) is not a common practice nor is there the tradition and knowledge. This applies to FARM Africa field staff, zonal and woreda agricultural staff and more so the farmers and rural communities.

The first step is for FARM Africa and government staff to agree on the need for a concerted effort to start an action program. The common practice of getting development workers and farmers representative to a training workshop sounds good, but in practice, this has not had impact of change. More training workshop will only make the practice more common and a workshop report (proceeding) may be the only output. Instead, we see the need to break from this tradition by directly initiating the field program.

There are already two resources that can be used, namely the community and government nursery sites and the on-farm participatory research and some of the existing demonstration sites. It has been suggested already (see other strategy plan documents in this series) that some of these field facilities and programs be developed and operated as **Farmers Field Schools**. The design and management of these field programs will determine the success of the program and must not be done poorly. Those centers have to be well planned and run can certainly handle, research, training and technical services (including extension). Like what has been suggested for the Fruit Farming sub-sector, it is important to

start with very few locations (2 to 5) which will need to be strategically located not by distribution on woreda basis.

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