

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



COMMERCIALIZING BAMBOO, REEDS AND PALM IN BONGA

(Project profile)

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



AGRIBUSINESS

A PRIVATE RURAL DEVELOPMENT & AGRICULTURAL EXTENSION AGENCY

A Public-Private-Rural Community partnership

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COMMERCIALIZING BAMBOO, REEDS AND PALM IN BONGA

INTRODUCTION

In South East Asia, Bamboo is becoming a fast growing foreign exchange earner. Using improved and modern tools and equipment, carpenters are making a range of well designed and well finished furniture and household items from various types of Bamboo species. Because of its a) hardness, b) no major diseases, c) non-palatability to livestock and d) fast growing properties, Bamboo is spreading to other countries as a major commercial/plantation product. In Ethiopia, there are large pockets of land covered with Bamboo mostly grown as a natural forest. The Kaffa zone in SNNPR is one part of Ethiopia that has abundant Bamboo, grown wild. In areas close to Mizan Teferi and Bonga, there are blocks of land (10-20 ha) totally covered with Bamboo forest. In spite of its potential as a major income earner, Bamboo has not been exploited as a commercial product. Except for domestic use to make baskets, fences and storage facility, the large stock of Bamboo is left untouched waiting for its natural death and decay without making a dent to the economic well-being of the community living near and around the dense bamboo forest.

In recent years, FARM Africa has initiated a participatory forest management development approach that will involve the community and local government to exploit the forest resources for enhancing food security, income and employment while protecting and conserving the forest. This study has concluded that Bamboo holds the greatest potential in the region as a major income generating activity focused on processing and marketing of an array of well-finished furniture and household items.

Project Rationale

The central plan and strategy that **FARM Africa** and partners, led by the local and regional government, has been to empower the people themselves and put the forest and resources therein into their hands. The PFM (Participatory Forest Management) has been the tool developed and being used to achieve the twin objectives: **Conserve** and **Utilize** resources of the forest and forest byproducts effectively and sustainably. Bamboo forests in the **Dega** AEZ, palms and reeds in the **Woina dega** and **upper Qolla AEZs** are important **NTFPs** that are under utilized or unused except for some traditional and customary uses.

Bamboo (*Arundinaria alpina*) *shinato*, or *kerkeha* which covers more than 15,000 ha in the **Dega** zone of Bonga forest, especially in **Tilo woreda** and is found in altitude range between 2400 to 3050 m.a.s.l

is poorly used and does not come into the urban market for cottage/craft uses as in other parts of Ethiopia (i.e. Western Gojam whose furniture (chairs, tables, room dividers, etc. enter the Addis Ababa, Bahir Dar, and other markets). It is reported that density of bamboo with DBH range of 2.6 - 12.5 cm Class is 1,824 stems/ha (Mateos Ersado, 2001). This resource can be sustainably exploited by harvesting 40 % of the existing stand.



Picture 1: Natural bamboo forest in Bonga

Bamboo in the Dega zone and in the Bonga area does not enter into the economy outside the traditional uses such as house construction, grain storage, fencing, floor cover, and construction of cattle barn. The stem sheath (thin silvery) is extensively used in roofing and the construction of traditional beehive. The stem (culms) cut into small pieces makes cups for coffee drinking and as water jar as well as in irrigation. But its role in cottage and craft industry, and as building material is well known especially in Southeast Asia and Japan. Kenya has made big stride in making bamboo economically important crop both in the coastal region and the lower parts of the highlands by successfully introducing commercial varieties from Asia with the assistance of IDRC of Canada. There are about 1,000 known uses of bamboo. Bonga has a lot to gain from economically harnessing its bamboo resource and suitable ecology to bring improved technologies and invest in several products made of bamboo.

Palm (*Phoenix reclinata-Yebo or Zembaba*) is typically a **Woina dega zone** species and has a narrow altitudinal range and is commonly found between 1,600 and 1,850 m. It inhabits the near river and lower slopes in these altitudes. An estimated 3,128,000 total stand of palm is found in the Bonga Forest. The leaf (frond) is little used commercially except in ***floor mats, local handbags making and for roofing***. Other uses in and around the home and in tradition include: ***Enjera Mosob, Mosobework, Burial Wraps, Rope, Bridal Purse, Zimbil, Sieve, Honey Containers, and Barnetta (Kofiya)***. But the market value of all these items is insignificant. The leaves are often used as ceremony decor during public or private event. The fruit is the main diet of monkeys and children eat too. On the other hand

the wood (trunk), which is straight is extensively used in house construction and constructing local bridges over the many small rivers and streams. Other uses include *dry fence, lanterns construction* (the wood does not rot easily) and as *fuel-wood*. There is more room for commercially exploiting the Palm forest sustainably.



Picture 2: Palm trees in Bonga forest a potential plant for income generation

The Common Reed (*Phragmites communis*) commonly inhabits miscellaneous sites such as river edges and seasonally water-logged sites in urban, semi-urban and rural areas. It has no altitudinal restrictions as long as local moisture conditions are wet or water tables are high.

Project Objectives

- 1) Improve the livelihood of the local communities through sustainable utilization of Bamboo, reed and Palm
- 2) Improve harvesting techniques, handcraft skills, processing and marketing techniques of the local communities to produce and sell good quality bamboo/palm/reed products to attract domestic, regional and global market into the Bonga economy.

SPECIFIC ACTIVITIES

Supported by the introduction of improved processing technologies and attractive product designs, the enterprise and business development must necessarily begin with market study both within and outside the country for crafts, furniture, household items, etc made of Bamboo, Palm and the Common Reed. In Ethiopia, there is only one government agency that provides some training on Bamboo-made products. This agency not only lacks the resources to reach as many trainees as possible throughout the country, but also does not have the latest tools and equipment needed to produce well designed products to compete with imported ones. Although there are a number of entrepreneurs who make some products made of Bamboo and Palm, most of them do not have the skills and the tools to make good products. Hence, most of the activities of the project will focus on a) bringing improved technologies and design techniques, b) improving the skills of potential entrepreneurs to design and make quality products, c) assisting farmers and entrepreneurs in marketing of the products, and d) organizing farmers to utilize and conserve the Bamboo/Palm/Reed forest. Select interested individuals and train in sustainable management of Bamboo, reeds and palm.

1. Introduce and develop new and improved techniques of processing of Bamboo and Palm products using existing facility and resources of a) Bonga Skills Development Institute, b) ICRAF's outreach programme, and c) the Netherlands Voluntary Services for Development Programme.
2. Arrange tailor-made training on handicrafts of Bamboo, reeds and palm with the help of organizations such as the Bonga Skill Development Institute, Ministry of Trade and Development and UNIDO.
3. Conduct market study, and document product development strategies
4. Assist in organizing farmers and entrepreneurs into production and marketing cooperatives.
5. Establish marketing linkages within and outside the country.
6. Arrange & facilitate credit provisions
7. Provide other support services including networking and advocacy

EXPECTED OUTPUTS

- Selected members of the rural communities gained handcraft skills in Bamboo, reeds and palm
- Market situation improved for Bamboo, reeds and palm
- Supply of good quality products availed in the market
- Training program and skills development in place
- Sustainable management and utilization of bamboo, reeds and palm enhanced
- New and improved technologies, techniques and tools imported & adopted from other countries
- Farmers and entrepreneurs acquired alternative income generating activity.
- Bonga's economy improved due to production and trade of Bamboo products

STRATEGY

- FARM Africa should establish good networking and collaborative work with relevant institutions both in country and abroad for provision of a) of new and improved technologies, b) skills, c) micro credit and d) marketing services
- Establish a working group or network for NTFPs
- Establish a FARM Africa Unit within the Bonga Skills Development Institute to coordinate the development of NTFPs production-processing-marketing chain including the Bamboo enterprise.
- Focus on engaging farmers' cooperatives and small-scale private sector investors to successfully utilize Bamboo significantly improve livelihoods.
- Focus on supporting youth groups regarding skills development and employment opportunities in handcrafts, and making of furniture and household items.
- Negotiate and facilitate credit opportunities for local enterprises with existing Micro-finance institutions.

PROJECT SITE

Bonga town: the centre for skills development, processing and marketing.

Field sites: Areas where availability of Bamboo, Palm and Reeds are abundant.

Addis Ababa: FARM Africa office for collection of market information and product Development.

BENEFICIARIES

- PFM GROUPS (Sale of products, food security through enhanced income)
- LOCAL COMMUNITIES
- YOUTH GROUPS
- PRIVATE SECTORS (Investment opportunities)
- LOCAL GOVERNMENT (Enhanced revenues)

IMPLEMENTING PARTNERS

- FARM Africa
- SuPAK
- Bonga Skill Development Institute
- Kaffa Zone Trade & Industry Dept.
- Investment Authority
- ICRAF
- Netherlands Embassy
- PFM Coops.
- Private sectors
- Relevant NGOs and GOs

DURATION (3-5 years)

- Identify improved technologies, tools and techniques
- Conduct Market studies of products
- Identify trainer and trainees
- Establish networking with relevant institutions and individuals
- Conduct skills development training
- Facilitate credit
- Organize and help youth and women groups to establish their own business

- Carry out monitoring and evaluation on the quality of products

INDICATIVE BUDGET (1, 700, 000 ETB)

- Training & provision of tools (Capacity building) = 500, 000
- Marketing study =100, 000
- Credit (revolving fund with nominal interest rate) = 1, 000, 000
- Networking = 10, 000
- Assist in business management = 30, 000
- Monitoring & Evaluations = 60, 000
- Source of funding (EU, SuPAK (Netherlands Govt.) World Bank, UNDP, **UNIDO**, **UNICEF**, **UNESCO**, **OXFAM**, **ILO (Jobs and skills Program for Africa, JASPA)**, & other NGOs/donors).

Annex 1: Tools used by local entrepreneurs

Hand Tools

1. Big knife (jakin) for splitting
2. Medium knife (jakin) for splitting
3. Sharp knife
4. Width arranger
5. Plane
6. Bark remover
7. Node remover
8. Kik memria
9. Chisel
10. Semi circle chisel
11. Glue
12. Varnish
13. Brush No. 2 ½ & 3

Servicing Tools

1. Saw
2. Scissors
3. Rough file
4. Smooth file
5. Players (Pinsa)
6. Measuring tape 30cm
7. Rough grinding stone
8. Smooth grinding stone
9. Hammer for Iron
10. Hammer for wood
11. Manual hand drill
12. Hand chisel 1-6cm
13. Vice (Morsa)30 cm

Annex 2: Additional Tools needed to improve Bamboo work.

1. Bench Drill
2. Grinder
3. Splitting machine
4. Threading machine
5. Machine for tooth pick
6. Bamboo saw
7. Bamboo carving machine
8. Bamboo smoothening and polishing machine

Annex 3: Training Programme Provided on Bamboo by Govt's Cottage Industry Enterprise

1. How to use hand & service tools for Bamboo work
2. How to use different types of raw materials for Bamboo product
3. Basic design of Bamboo products
4. Basic Bamboo frame work.
5. Methods of working different Bamboo products.
6. Different types of Bamboo production and its product.

Training Schedule

In one budget year there are two rounds of Training programme. Each programme covers 4 months.

- a. October – January
- b) March – June

Cost of Training

- Registration fee birr 5.00 for each trainee
- Birr 168.00 /person /month
- Birr 672.00 /person/for 4 months

One trainer can train 15 persons for 3 months

To Train 15 people on Bamboo work for three months the following tools are required

1. Price & quantity of hand tools

S.No	Type of tools	Qty	Estimated price/tool	Total Price	Remark
1	Big knife (Yakin) for splitting	15	45.00	675.00	Not available in the market by order of the black smith
2	Medium knife (kin)	5	40.00	200.00	

3	Sharp knife	15	40.00	600.00	
4	Width arranger	7	20.00	140.00	
5	Plane	5	40.00	200.00	
6	Bark remover	5	45.00	225.00	
7	Node remover	15	45.00	675.00	
8	Kik memria	5	35.00	175.00	
9	Chisel	20	45.00	900.00	
10	Semi circle chisel	15	30.00	450.00	
Total			<u>4,240.00</u>		

2. Price and Quantity of Service Tools

S.No	Type of tools	Qty	Estimated price/tool	Total Price	Remark
1	Saw	15	25.00	375.00	With its blade
2	Scissors	2	25.00	50.00	
3	Rough file	2	30.00	60.00	
4	Smooth file	2	30.00	60.00	
5	Pillar (Pinsa)	2	15.00	30.00	
6	Measuring tape 30 c.m.	15	15.00	225.00	
7	Rough grinding stone	2	30.00	60.00	
8	Smooth grinding stone	2	30.00	60.00	
9	Hammer (for iron)	2	30.00	60.00	
10	Wood hammer	5	30.00	150.00	
11	Manual hand drill	5	6.00	30.00	
12	Hand drill 1-6 c.m.	10	6.00	60.00	
13	Brush No. 2 ½&3	6	9.00	54.00	
14	Vice (morsa) 30 c.m.	20	30.00	600.00	
Total			<u>1,874</u>		

Annex 4: List of Products made from Bamboo in Ethiopia

- Sofa (single sit, 2 or 3 sits),
- Coffee table
- Stool
- Dinning tables with 6/8/12 chairs.
- Fruit tray
- Flower holder
- Lamp shade with stand
- Vegetable and Bread Basket
- Candle stand.
- Shelf
- Telephone table
- Room Separator (partition)
- Mirror Frame

Annex 5: Production capacity of one skilled person

<i>No</i>	<i>Item</i>	<i>Unit</i>	<i>Qty Produced</i>	<i>Days/ Weeks</i>	<i>Remarks</i>
1	Coffee table (50x50cm)	Pcs	2	3 days	Weaving takes 2 days
2	Fruit tray	Pcs	5	1 day	
3	Lamp shade with stand	Pcs	3	1 day	
4	Shelf	Pcs	1	1 week	It has more decoration & with 3-4 partitions
5	Room separator	Pcs	1	1 week	It has antique work
6	Mirror frame	Pcs	1	2 weeks	It has antique work
7	Dining table	Pcs	1	2 weeks	It has antique work & its size is 1 ½ mts radius
8	Flower seat	Pcs	5	1 day	
9	Dining chair	Pcs	1	2 weeks	It has antique work
10	Sofa chair (3 sit)	Pcs	1	2 weeks	It has antique work
11	Sofa chair (2 sit)	Pcs	1	2 weeks	It has antique work
12	Single sofa	Pcs	1	2 weeks	It has antique work
13	Stool	Pcs	2	1 week	It has antique work

Annex 6: Average price of Bamboo Products

<i>S.No</i>	<i>Item</i>	<i>Unit Price in Birr</i>	
		<i>Government</i>	<i>Private</i>
1	Single sofa chair	150	400
2	Sofa chair (2 Sets)	300	850
3	Sofa chair (3 Sets)	450	1250
4	Coffee table (50cm X 50cm)	50	200
5	Dinning table	350	900
6	Dinning chair	178	300
7	Shelf (3-4 layers)	230	500
8	Practitioner	531.85	1500
9	Mirror frame	315	600
10	Fruit tray	15	35
11	Lamp shade with stand	20	50
12	Telephone seat	95	160

ANNEX 7: Field Guide for growing and Managing Bamboo In Bonga

1. INTRODUCTION

Both highland bamboo (*Arundanaria alpina.*) and lowland bamboo (*Oxyantera abyssinica*) are important natural resources in Ethiopia but are little used. Highland bamboo in the Kafficho Zone, southwestern highlands covers considerable area as forest climax vegetation (15,000 ha in Tillo woreda alone) and as scattered stands in similar agro-ecological zone. Bamboo is neither cultivated by farmers nor harvested from existing natural stands for processing and marketing. Bamboo is however used by rural households in home and fence construction and for miscellaneous household items in the home. The level of craft products entering the market from bamboo in the region is negligible.

Historically, many foresters have pointed out the importance of bamboo in Ethiopia for pulp and paper as well as for local craft by pointing out the extent of the area under natural bamboo, particularly in the southern and southwestern highlands. But no effort has been made by the government and the private sector to harness this natural resource. Bamboo continued to fall out of forestry programs such as plantation establishment and its commercial utilization. On the other hand countries such as Kenya have made big strides in bamboo selection and introduction of plantation and general planting by farmers for own use and for the market.

Therefore, not only should the existing natural bamboo forests and isolated stands be commercially utilized, but also farmers and the private sector need to be encouraged to grow, harvest, process and market bamboo products. Bamboo growing is certainly ecologically highly suitable for the slopping lands of Bonga and the Dega zone elsewhere in the country. Some bamboo growing is evident in urban areas and in rural homesteads. Bamboo should be given a place in Conservation Agriculture as its growing has the element of (a) minimum tillage or minimum soil disturbance both during establishment and harvesting and (b) permanent soil (land) cover. Field guide for sustainable management and utilization of existing bamboo forests and establishing and managing bamboo stands and even plantations for Ethiopian condition does not exist. Hence, this short field guide should fill this gap and will directly support the proposed bamboo project¹.

2. RAISING OF PLANTING MATERIALS

Bamboo growing is generally by cuttings or offsets from existing bamboos stand or material. Bamboo can also be grown from seed and wildlings from the forest. But if facilities are available, bamboo can be propagated from tissue-cultured plantlets.

2.1. Propagation by Seed

Bamboo normally flowers only once and dies. Seeds are available following these natural events. Such occurrences happen once in 40 or more years for the local highland bamboo (*Arundinaria alpina*). Large quantities of seeds may be produced during these rare events, although the seeds are short-lived. This makes propagation by seed not common. But should seeds be available, seedlings can be raised as follows:

- Sow fresh seed in nursery bed (in polyethylene containers). Cover seed with a thin layer of nursery soil and water daily using fine sprinkling can
- Prick out germinated seedlings from sowing nursery beds into polyethylene tubes when about 3 cm high. and;
- Transplant seedlings that should be ready after 8-12 months from the date of pricking. Good results are expected if seedlings are kept in the nursery for more than a year as these establish better in the field.

2.1.1. Use of Wildlings

The occurrence of wildlings in bamboo forests is not common. But when it does, the young clusters of bamboo wildlings can be scooped using a spade and taken to the nursery to plant into polyethylene tubes. These newly pricked wildlings should be kept under shade and water as described above. It is possible to directly transplant the scooped wildlings in the planting site. But survival rate is generally low.

2.2. Vegetative Propagation

Bamboo is commonly propagated vegetative using culms and offsets. Although this is a better source of planting material, collecting adequate material is difficult and transporting is also not easy due to the large bulk/weight.

2.2.1. Using Culms Cuttings

This is the most common method of bamboo propagation as related to the local species (*Arundinaria alpina*). The following procedure needs to be followed.

- Obtain cuttings from healthy culms of about 2 to 3 years old
- Prepare two-nodded cuttings leaving 5 to 7 cm on either side of the nodes. Use a sharp cutting knife or gejera (panga). The use of small handsaw is useful for smaller culms to avoid splintering.
- The use of 1-Nepathalene acetic acid (NAA) enhances rooting when applied as soon as possible.
- Place cuttings across the nursery bed, horizontally and with the opening facing upwards as shown in Fig.----- .The raised 1-m wide nursery bed should be filled with a mixture of soil and sand. It is recommended to

¹ This Field Guide is largely based on " Guidelines for Establishment and Managing Plantations of Bamboo in Kenya" by B.N. Kingdom (1995).

- drench the nursery bed with an effective insecticide and fungicide one week earlier to prevent termite and fungal attack respect

Using Offsets

At the beginning of the main rainy season in June, and just before the new shoot emerges, offsets can be obtained from existing bamboo stands as follows:

- Dig out 30-60 cm deep in the ground for a rhizome of 1 or 2 years old culms. This is recognized by the dark green color and smooth downy stems,
- Cut back the aerial culms to 60 cm in length and cut the rhizome off from the parent clump by avoiding the junction of the culms and rhizome and the underground dormant buds at the base of the culms,
- Transport the newly extracted offsets to the planting site with out delay and plant immediately or as soon as possible (same day or the next day)
- Please note and take precautions:
 - Offsets taken late in the rainy season after the new growth has started usually fail, thus making it necessary to take offsets as early as possible and timely
 - The younger the rhizome, the more vigor in the buds
 - Larger diameter materials are better in establishment and survival
 - Avoid damaging the junction of the culms and rhizome and the dormant buds
 - Do not delay in planting offsets after digging them out because early planted offsets root easily.

Using Tissue Cultured Plantlets

The use of tissue-cultured plantlets in bamboo is not as common practice as that enjoyed by sugarcane, banana, citrus, potato, cassava and in the flower industry. Countries such as Kenya are using this technology to mass-produce, high quality and genetically uniform planting material. This method is relatively common in Asia and is a promising alternative source of bamboo planting stock. This method is particularly useful in those species and cultivars that do not easily root from cutting. The use of tissue-cultured plantlets greatly facilitates large-scale plantation establishment and wide spread planting program.

2.3. Nursery Techniques and Management

Shading

Shade is needed initially whatever planting stock is used, i.e., seedlings, wildlings, offsets or culms cuttings. This shade is to protect the plants from direct sunlight. Normal material used in nursery operation is adequate. The shade can be removed after September as the climate gets cooler.

Watering

Water the nursery material regularly. Water twice a day in hot dry season and once a day in cold season.

Treatments

Spray sprouts from the cuttings after one month

Apply manure to improve/increase vigor of the sprouts

Mass Production of Seedlings

Development of rhizome system starts early in seedlings and buried cuttings during the nursery stage. The long buried (laid down horizontally in the nursery bed can be cut to make several rooted individual shoots (plants). Good rhizome development at this early stage is thus important. The individual rooted cuttings are then transferred into individual polyethylene tubes which will give them new vigor of growth. Multiplication of nursery seedlings can be carried out at six-month interval or more, which is a period sufficiently long for a critical mass of rhizome system in the plastic tubes (containers). Water these twice daily (in the morning and in the afternoon)

Hardening

Seedlings raised under shade as detailed above, and with frequent watering need to be hardened by gradually reducing the frequency of watering and decreasing and eventually removing the nursery shade. This process is called **hardening**. This will condition the seedlings to withstand conditions in the field after planting

3. FIELD PLANTING AND ESTABLISHMENT

3.1. Selection of Planting Site

- Select and demarcate planting site during the dry season, i.e., January/February
- Select sites with good drainage and sandy loam soils. Sloping land is most suited, and most sites in the Kafficho Zone make good sites

3.2. Planting Site Preparation

- Prepare the planting site by clearing the bush, grass and other unwanted native vegetation or cultivate the land as for other food crops
- Measure and mark planting holes at spacing of 4.5 x4.5 m or 5 x 5 m. This will result in a planting density of 400 to 500/ha.
- Dig 60 cm square and 60 cm deep planting holes. Refill the holes with top soil up to 10 cm below the ground level (surface). Application of chemical fertilizer and manure is highly recommended before or during planting in late February or early March.

3.3. Field Planting

- Transport seedlings with the onset of the rainy season to ensure good survival rate
- Plant as early as possible in the growing season
- For offsets collected from the forest, planting must be done same day id possible. The rhizome portion of the offsets should be placed 10-20 cm below the ground level and covered with soil
- After panting the plant (seedling or offsets) in the hole, cover with the soil and lightly press the soil around the plant

4. FIELD MAINTAINANCE AND HARVESTING

4.1. Weeding and Mulching

- Spot weed at a radius of 60 cm around the plant
- Mulch the weeded area
- Cultivate and loosen the mulched and weeded area every three months during the first year

4.2. Replanting

There will always be some percent of seedling mortality in the field. It is therefore necessary to carry out gap filing (replacing dead seedlings) from a stock left behind for this purpose. Replanting should be done during the first weeding schedule in the rainy season of the second year from first planting.

4.3. Plant Protection

- **Protection from Grazing damage:** Bamboo is palatable to livestock especially small ruminants. It is therefore necessary to provide protection against browsers and grazers, including wildlife by constructing physical barriers for each planted bamboo. Small sticks of bamboo or sesbania, etc., are placed at the edge of the cultivated radius and tied at the top. If the planted area is not too large, putting up perimeter fence and patrolling is useful, especially during the establishment year.
- **Protection from (wild) fire:** Fire is a major hazard to bamboo farming especially if the area is large and the dry season is long and severe. The establishment and use of firebreaks is necessary. Normally, a 10 m wide firebreak line is adequate to stop the fire from spreading into the bamboo farm or plantation. Some of the dry bamboo litter during the dry season can be removed and made into compost to minimize the fire damage, if fire should enter the farm.

4.4. General Tending

- Weeding and hoeing may be needed in the second and third year from planting
- Soil should be heaped around the developing clump to allow and ease shoot production which takes place mainly in the periphery of the clump
- Remove very small and thin culms, broken and over-hanging culms to leave only clean culms standing within a clump

4.5. Harvesting and Cutting Rules

4.5.1. Harvesting (see fig. 3 for harvesting details)

- As the native bamboo is the clumping type, this clumping habit enables the newly established (planted) plant to regenerate naturally after each harvest. Harvesting of bamboo is therefore through selection rather than clear felling. As much as 40% of the standing bamboo can be harvested.
- First harvesting is normally at the age of 6 to 10 years. There after, cutting can be done at intervals of 4 or more years.
- Cutting cycle, tools and methods of cutting (extraction of the mature stems from a bamboo clump) is important in bamboo management

4.5.2. Cutting Rules

- Cutting should be restricted to the center of the clump only

- All dead and dry culms should be cut and removed
- All broken, live stems (culms) less than 2.5 m in length, except in culms containing less than 10 culms
- Heavily congested clumps by be salvaged to productive state and should be clear-felled
- Current year's and one-year old culms should never be cut unless in cases where they are curved and swinging around other culms or are infested by disease or attached by insects
- The number of older culms retained should not be less than the number of current year's culms
- Rhizomes should not be dug out
- Culms should be cut between 15 and 45 cm from the ground, but not below the first prominent node above the ground
- All cutting debris should be collected and removed away from the clump
- Lopping of bamboos should be prohibited
 - Cutting should be done only during the dry season

5. POST-HARVEST TREATMENT AND USES

5.1. *Methods for Protecting Bamboo*

Harvested bamboo poles are susceptible to decay and attack by fungi and insects. Such attacks give bamboo low natural durability. Thus, treating bamboo poles will minimize these attacks and will extend the life of the bamboo under use. Processing and construction methods may also minimize attack by fungi and insects.

There are two methods used to increase the durability of bamboo. These are: (a) **non-chemical** and (b) **chemical**. The most useful and economical methods are listed below.

5.1.1. *Non-Chemical Methods*

Clump curing; Culms are cut at the bottom but are left standing for some time with their small branches and leave still on. This practice reduces the starch content of the culms, and as a result, the durability against infestation by (stem) borers is increased. However, this treatment does not influence attack by termites and fungi.

Smoking: where culms are stored above fireplaces in the house for some time. Due to the heating and smoke, the starch within the stem cells may be destroyed. This treatment is effective against insect attacks.

White wash:- where bamboo culms and bamboo mats for housing are often painted with lime (white wash). This delays water (moisture) absorption, resulting in higher resistance against fungi.

Plastering:- where cow dung is mixed with lime or with mortar

Soaking in Water:- where freshly cut, green, culms are put into stagnant or running water or mud for several weeks. The bamboo is then dried under shade condition. This treatment will increase the resistance to insect and fungal attack.

5.1.2. Chemical Preservation Methods

Chemical preservation methods provide more effective protection than do non-chemical methods described above. But these are not always economical, especially for the small holder farmers. The following treatments are used, namely:

1. Fumigation
2. Steeping or sap displacement
3. The open tank treatment (in water soluble preservative)
4. But treatment (bottom part in preservative as 4 above)

5.2. Major Uses of Bamboo

It is said that there are over 1,000 uses of bamboo especially in Asia, ranging from food to construction material in high- rise buildings replacing steel. The uses of bamboo by farmers and urban dwellers in the Region are also wide ranging. The following are the main areas of uses, namely:

- Fencing
- House construction
- Handcraft
- Furniture
- Pulp and paper (potential for Ethiopia, but common elsewhere in the world)