



## Bamboo Cultivation Methodology

### INTRODUCTION

Bamboo is a member of the grass family Graminae and the fastest growing woody plant on the earth. Bamboo is a versatile, strong, renewable and environment friendly material. Bamboo described as the “wood of the poor” in India, “friend of the people” in China and “brother” in Vietnam. Bamboo is a wonder plant that grows over wide areas of Asia, the Caribbean and Latin America. Millions of people depend on this plant for their livelihood. Its use in food and cooking goes far back in history. Apart from traditional uses, bamboo has many new applications as a substitute for fast depleting wood and as an alternative to more expensive materials.

Woody bamboos have vast economic and as yet substantially untapped potential. Historically woody bamboos have been used for different applications but rather recently interest from paper and wood industries has increased. Bamboo is often advocated as an ideal renewable resource for biomass, useful for wood and paper industry. Positive arguments thus also include ecological arguments, indeed in the future forests and agriculture, water conservation, soil stabilizer, an effective carbon sink and helping to counter the green house effect are very important criteria. However, the classical economic criteria (profit and added value) will remain very important.

### BAMBOO AS A CROP PLANT

Though bamboo is found in wild with low yield and economically low return on investment, bamboo can be cultivated as crop plant and harvestable every year. In nature most of the bamboos are thorny and hence harvesting is difficult. There are many species of bamboo which are thornless and also non flowering. The regular bamboo flowers at specific intervals of 30 to 40 years and the bamboo would totally perish after the flowering. The latest bamboo clones developed by us is non flowering and hence there is no death and replanting requirement.

Success in cultivation of bamboo depends on the climatic condition, water availability, choice of suitable species and adaptation of required agronomic practices. The good quality plant availability is one of the major constraint and the recent development in plant tissue culture offers superior plants in large quantities. The availability of tissue culture bamboo has opened up new avenue for energy plantation based on bamboo.

### MICROPROPAGATION

Bamboo can be propagated by seeds, rhizome, culm cuttings and clump division. But the efficiency of these propagation methods varies greatly. Bamboo propagation by these techniques is not sufficient to meet the demand for large scale requirement. Plants



developed through seeds are not uniform as one variety while plants propagated vegetative methods are uniform and not free from pest and diseases, Growmore Biotech has developed micropropagation method for mass scale propagation that are commercially viable. In micropropagation, mass scale production of high quality plants is available which are easy to transport & deliver, disease free and vigorous growth. Moreover micropropagation is very flexible and rapid up scaling is possible. New selection can be produced in large numbers from single plant in a short span of time which is not possible by conventional method of propagation.

## Bamboo cultivation

Soil	Most bamboos grow best in deep, well-drained, fertile soils and they generally prefer neutral to slightly acid soils. Red and red loamy soils are more preferable however bamboo can be grown in a range of soil from black cotton soil to degraded soil.
Plants / acre	1000 plants/ac
Spacing	10 feet between rows and 4 feet within row. The plants are planted at a distance of 4 feet.
Season & Planting	The best planting time is usually as soon as monsoon starts. This gives the plant, a longer growing season to get established and develop its roots to withstand the hot and dry season
Climate	Bamboo can be grown in a wide range of environments, requiring well distributed rainfall, with shortfalls being made up through irrigation. Although bamboos are hardy, adaptable and perennial, they are intolerant to waterlogged condition.
Land Preparation	The land should be ploughed as thoroughly and deeply as possible. Clearing and ploughing should be done at least three weeks ahead of the planting. Addition of organic materials to pits such as compost, green manures and neutralized saw dust helps retain moisture and also provide nutrition to the plants. Provide better drainage system. Bamboo likes water and requires similarly to sugarcane cultivation to do its best, but it does not like to be submerged in water or “wet feet” condition.
Pits	Pit sites should be identified before digging the pits, to ensure the desired spacing. Dig the pit 2 x 2 x 2 feet size or make continuous trench at 2 feet depth along the row. Pits should be dug much before the rainy season and the dug out pit exposed to



	weathering. A few days before planting fill the pit with thoroughly mixed soil and compost.
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## **PLANTING**

In the pit, mix the soil with 2 baskets (20 to 25 kgs) of FYM and 500gms of Neem cake. If the place is prone to termite increase the neem cake to 1 kg as basal application. In case of long trench apply the above mixture along the trench. Carefully cut open the Polybag having the bamboo plants using sharp blade, to ensure the root ball not disturbed. Place the plant vertically in the pit, ensuring that entire polybag soil is placed along with plants. Level the pit or trench with the mixed and enriched soil, be sure to eliminate all air pockets. Mulch the soil around the plants, it will help control weeds and keep the soil moist.

## **IRRIGATION**

Provide life irrigation immediately after planting with 10 to 15 lit of water. Drip irrigation along with fertigation tank is one of the good irrigation systems to get maximum yield. Irrigate after planting depending on the soil condition and prevailing climatic condition. Compact the loose soil around the plant. Repeat the irrigation at an interval of 2 to 3 days for the first one month. The water requirement for bamboo for the first month will be 2 to 3 lit per plant / day, at the end of first year it will increase to 8 to 10 lit a plant/day for non-rainy days. When the plants are fully grown the water requirement would be 20 lit per plant during peak summer. The frequency of watering depends on how soon the bamboo is showing the symptom of wilting. The typical wilting symptom of bamboo appears as folding of leaf blade followed by total curling.

## **FERTILIZER APPLICATION**

Bamboo plants are heavy feeders and respond very well to fertilizers. Growth of bamboo is vigorous under fertilized condition than without. Fertilizers are important to ensure high yield and overall profitability of plantations. Bamboo needs complete range of fertilization including nitrogen, phosphorous and potassium and often a higher amount of potash. It is better to carry out soil analysis to fix and confirm the dosages. A general dosage norm that may be followed is 160:40:200 of NPK per acre per year. For the first year 50%, second year 80% and third year onwards-full dose should be given in 10 split doses. Care should be taken to see that chemical fertilizers are not applied close to the plant and should be applied 12 inches away from the plant during first year and 2 feet away from plant during second year onwards.

## **CLUMP MANAGEMENT**



## **SOIL LOOSENING**

Soil should be loosened to a depth of 10 – 15 centimeters, and 30 –45 centimeters away from the bamboo clump at least twice a year, improves the growth of shoot and the root system. Preferably ploughing with tractor in between the rows of bamboo before the rains would absorb the rainwater better. Intercultivation operations between rows also removal of weeds. It is possible to do the Intercultivation by tractor for the first 1 or 2 years between all rows of bamboo.

## **WEEDING**

Regular weeding is necessary 2 feet surrounding the plant to prevent weeds and other vegetation from competing with the young bamboo plants for sustenance. Weeding should be done at least for the first two years after the rains and end of the wet season. Once the clump gets established there is considerable leaf coverage and shedding and this act as a barrier to the emerging weeds. Weeding should be done very carefully at the time of new shoot emergence, which mostly coincides with pre monsoon time.

## **MULCHING**

Mulching reduces loss of moisture due to evaporation from the soil surrounding plant and checks weed growth. In grownup bamboo field, fallen bamboo leaves serve as good on-site mulching material.

## **MOUNDING**

Rhizomes grow laterally under the soil surface and when ready to produce new shoots, begin to grow upward. In this period of growth, exposure to sunlight retards and may even stop the growth of rhizomes. Mounding or heaping fresh, loose soil around and over the base of the plant is recommended.

## **PRUNING**

There will be heavy branching at the lower nodes of the plant. In the first two years Pruning of these branches reduces clump congestion and helps provide a healthy, airy environment within the clump. Mild pruning should be done in the second year. It should be completed before the end of the dormancy period, well before shoots emerge.

## **CLEANING**

Generally clump formation starts in second year, the management of clump are very important. Rhizomes grow centrifugal (outwards) throwing up new shoots in enlarging circular formation. Bamboos can throw up many branches, which if left unattended can get deeply entangled. This not only curbs access to older culms towards the center of culm, but also obstructs free vertical growth of new culms. The new culms may get



twisted and turned, which further congest the clump. Such malformed culms make harvesting of the better culms difficult. Therefore, it is important to clean clumps early and to remove all dead and malformed culms.

A well aired clump results in the emergence and growth of healthy culms. Dead stems are vulnerable to pathogens. A good time to carry out clump cleaning operations is throughout the year other than new shoot formation period.

## **THINNING**

In the energy plantation with high density population, the clump formation should be along the row or. The shoot formation towards the 12 feet row should be discouraged. The clump structure would become oval shape from the planting point. Two nearby clumps would meet in 4 to 5 years time making a continuous row of bamboo culms. Weak and deformed culms should not be retained in the clump.

## **HARVESTING**

One year old culms are harvested from second year onwards. Harvesting is done on an annual basis with an interval of 12 months. Harvesting of bamboo culms every year will induce the emergence of new shoots and ensures regular and healthy culm production. Harvesting of bamboo for commercial purpose can begin from the second year of establishment of plantation. The yield of bamboo increases every year by 10 to 20 % and stabilizes after 5 years. The best time of the year to harvest culm is the post monsoon season extending through the summer. Culms should not be harvested in the growing season, which is normally during the monsoon months. Harvesting in this period can damage young and emerging shoots and retard the growth of the clump.

## **HARVESTING TIPS**

- The number of harvested mature culms should not normally exceed the number of healthy shoots that sprouted and grew into young culms in the preceding year.
- Stunted and diseased shoots should be removed from the clump as soon as they are identified.
- The clump should be visually examined and the culms to be harvested are selected, before beginning the cutting operations.
- Branches extending from the lower nodes of the selected culms should be removed. This makes cutting and extraction easier.
- The culm should be harvested at least one, preferably two nodes, above the ground. This reduces the risk of injuring the rhizome.
- The culm should be cut obliquely, that is, with a slated cut. This ensures that rain water, debris and twigs do not collect in the uncut portion above the last remaining node, and become a breeding ground for fungus, parasites and insects.