

Bamboo Cultivation

SEEMA BIOTECH is a leading tissue culture company in India. Since 2002 we are successfully producing supplying tissue culture plant of Banana, Teak & Bamboo all over the India. Apart from tissue culture we have different projects, like SEEMA FOOD (sweet corn processing unit), SEEMA DRIP (Non ISI drip production & Installation), Hi-tech Biofertilizers production unit, well equipped soil & water analysis lab. Separate R & D unit & own field for mother plant, Plantation of different plants & for different agronomical trials.

SEEMA BIOTECH is trusted company due to world class technology, transparency, & strong technical support to customers. Considering importance of Bamboo in these days, SEEMA BIOTECH has started production of Bamboo plants since in 2020. With production of high quality bamboo plants, it is our duty to provide all technical information to our farmers regarding bamboo. Hence we are presenting this Booklet of Bamboo.

Bamboo is the fast growing durable, versatile natural source. Bamboo plant has capacity to produce maximum biomass. Bamboo is used since ancient times in many areas such as furniture, construction, food agriculture etc. As well as with traditional uses there are ever increasing, contemporary uses in industries like construction, textile, food, energy production, Bio ethanol, Bio CNG, charcoal etc.

Through bamboo can grow naturally all over the India, India is net importer of Bamboo. It means that there are greater opportunities to increase production of bamboo through commercial plantation of bamboo. Bamboo has potential to make revolution in agriculture, industrial, economical growth & ecological security of the nation.

Habitat of Bamboo -

Bamboo grows naturally on the earth from latitude 40 South to 47 North. Bamboo found in almost all states of the India from tropical to the temperate regions, the only exception where they do not occur naturally is Kashmir.

Why plantation of Bamboo ?

- The bamboo is light weight, flexible, tough, high tensile hence we are using bamboo since ancient times. Due to new Industrial uses demand for bamboo is increasing.
- Bamboo has calorific value more than 4000 k.cal/kg, which is higher than any other agriculture product (sugarcane Bagasse has calorific value about 2500 kg cal./kg) having low ash content i.e. only 1% and digestive cellulose of 65% hence bamboo is better source for fuel & energy than any traditional source.
- Bamboo has 50% carbon hence is the best source for making charcoal.
- Bamboo may be used for production of bio ethanol.
- Bamboo has high strength to weight ratio, high tensile strength & natural resistance against biological attack. Hence it is best natural source for structures, furniture's, for the construction of roofing, doors resorts etc.
- Paper is mainly produced from bamboo, India imports paper more than of 40 thousand Cr.

annually from other countries.

- High quality thread can be produced from bamboo.
- India spent more than 8 lakh cr. Annually for fuel import. Bamboo is eco-friendly option to reduce the import.
- Bamboo early shoot is nice source of food having low cholesterol & enough antioxidants, vitamins and minerals.
- Leaves of the bamboo are used as fodder
- Indian climate is very suitable for the optimum growth of bamboo.
- Bamboo may be cultivated on barren land also.
- Due to different uses demand of bamboo is increasing in our country. Annual bamboo requirement is 26 million tones & we can produce only 13 million tones bamboo per year. Trade India is net importer of bamboo. From total bamboo production of India 94% bamboo is from forest & only 6% bamboo is from commercial cultivation.
- Bamboo has great ecological importance. It is fast growing plant, it cleans the carbon dioxide in the air more than the other plants & helps to cool the climate. It grows on sewage water also fibers roots of the bamboo prevents soil erosion and increases water holding.

Verities of Bamboo -

In India there are 134 varieties of Bamboo. From which 15 varieties have selected for commercial cultivation by the government of the India. These includes balcooa (Bambusa balcooa), Managa (Dendrocalamus stocksii) Bangal Bamboo (Bambusa tulda), B.nutans, Bambusa brandisii. etc.

Balcooa (Bambusa balcooa) is the bamboo variety is of multipurpose use & more accepted variety all over the India.

Importance of tissue culture Balcooa Bamboo -

- Balcooa is naturally occurring bamboo variety of India & Indian continent.
- It is suitable for almost all soil type & climatic condition of India. It has nice growth in high temperature also.
- It grows vigorously & yields high in short period. (Height 23 m, Diameter 8-15 cm, & node length 20-40 cm.)
- Balcooa is sterile variety, there is not seed formation in Balcooa. After a plantation it may yield up to 60-100 years.
- Balcooa is thicker than the other variety (wall thickness 1.9 – 2.5 cm)
- Balcooa Bamboo has calorific value more than 4500 kg cal/kg & only 1% ash content hence very suitable for energy generation, for coal & pellet production.

- Due to this higher tensile strength it very useful for furniture, construction materials, scaffolding flooring etc.
- Its may be used for weaving to make different articles & traditional products, incense sticks, & other industrial products.
- It grows straight & thorn less hence it is easy to harvest.
- Tissue culture plants are genetically pure, identical homogeneous & free from disease & pest.
- Tissue culture plants are prepared in very hygienic conditions & well hardened in different stages. Hence these are more healthy than the plants derived from traditional methods.
- Tissue culture raised plants have low mortality & uniform growth. As compare to plants derived from traditional methods.
- Millions of genetically pure, uniform ,disease pest free plant production is only possible in tissue culture method. Tissue culture plants may be available throughout the year.

Plantation of Tissue culture bamboo –

Bamboo can be grown & cultivated in a wide variety of soils except from rock-strewn soils.

Bamboo prefers well drained sandy to clay soil with minimum 30 cm soil layer.

Usually bamboo plantation is done in rainy season. If there is proper irrigation arrangement then bamboo plantation may be down thought the year.

Well hardened tissue culture bamboo plants are the best option for the commercial cultivation of bamboo.

Bamboo plants may be cultivation by traditional method or dense method as per below.

Sr.No.	Plantation Method	Distance in rows	Distance in Plant	No. of Plants in Acre
1)	Traditional Method	3 m	3 m	445
2)	Traditional Method	4 m	3 m	333
3)	Dense Method	3 m	1.21 m	1078

- The pit size of 45 cm * 45 cm* 45 cm. must be digged. Same size tranche suitable for bamboo plantation.

- Dogged pit tranche should allow to sundry in summer for the prevention of the disease & pests.
- Do not use any chemical fertilizer for pit filling before plantation. Only well decomposed organic manure may be used before the plantation.
- Before plantation remove plastic bag around the root boll of the plant & not allow to disturb the root ball.
- Maintain proper moisture in pit/ tranche before the plantation of the bamboo plant.
- Drenching of chloropyriphos – 20 E.C. (2 ml of chloropyriphos – 20 E.C. in 1 lit of water) up to 6"-8" dept is necessary for the pest management.

Irrigation Management –

- 2000 mm annual rainfall necessary for optimum growth of bamboo.
- Proper irrigation management is important in commercial cultivation of bamboo. Water stress in light soil & in low rainfall area decrees yield of bamboo. Especially water stress in first two years from plantation leads to consideration loss in yield.
- As bamboo prefers well drain soil condition for normal growth. Hence water logging condition should be avoided.
- Drip irrigation is the best method of irrigation for commercial cultivation of bamboo.
- In drip irrigation 25000 lit / acre /day or 55-60 lit / day / clump water is necessary for the optimum growth.

Nutrient Management -

- Bamboo is the forest plant. But for the commercial yield of bamboo fertilizer application is necessary.
- Application of well-decomposed organic manure increases soil fertility & nutrient uptake.
- Chemical fertilizer should be apply as per below-

Sr.No.	Time of Application	Dose of fertilizer for one plant
1)	1st Year -15 days after plantation -Every month after first dose	- 50 gm urea + single super phosphate – 40 gm + M.O.P.- 50 gm. - 50 gm urea + single super phosphate – 40 gm + M.O.P.-

		50 gm.
2)	2nd year Dose for every month	Urea -75 gm, super phosphate- 60 gm, M.O.P.- 75 gm

- Above dose should be applied about 1-2 feet away from main stem of plant.
- Above chemical fertilizer doses should be applied by mixing with well-decomposed
- 0.5 – 1 kg compost or organic manure (Biogrow)
- Chemical fertilizers may be applied through drip fertigation as per below.

Drip fertigation dose per acre per year as per below.

Sr.No.	Year after plantation	Urea	12:61:0	M.O.P. (white only)
1)	First year	150 kg	20 kg	150 kg
2)	Second year	200 kg	30 kg	200 kg

Above dose should be applied for a year in split of 15 days or a month.

Important care of bamboo plant after plantation –

- New plantation bamboo should be protected from wild & pet animals.
- New emerging bamboo shoot should be protected from monkeys.
- In first year of plantation weed management in bamboo is important.
- In second year due to shade of plants & mulching of dry leaves, weed growth is prevented
- Dry leaves between two rows should be mixed with soil through rotavator & intercultivation. It prevents fire spread & decomposed leaves which is nice organic manure for the bamboo.
- For better decomposing of dry leaves use of compost culture, organic manure (Biogrow) is necessary.
- Pruning & thinning of bamboo is essential. Unwanted branches, twisted turned & dead culms should be removed. pruning of these branches reduces clump congesting & provides healthy airy environment in clump. Pruning should be carried out in the month of December & January, well before shoot emerge.
- Stunted and diseased shoots should be removed from the clump.

- There pruning & cleaning helps healthy growth & easy harvesting of bamboo.

Pest & disease management

- There is very negligible pest & disease attach in bamboo.
- Bamboo rarely attached by pests like defoliators, leaf roller, sap suckers, shoot & clump borer etc.
- Pesticides spraying like Quinalphos 25 E.C, profenphos – 50 E.C., chlorpyrifos 50% + cypermethrinn 5% etc. 2 ml per water may control the pest attach.
- In bamboo fungus attaches the rhizome, roots. Culms & foliage.
- Drenching & spraying of fungicides like SHAF (carbandazim 12% + mancozeb 63%), copper oxychloride 50% WP, Mancozeb 75% WP can control the fungal diseases.
- Water logging condition should be avoided to prevent fungal attach on rhizome & root.

Harvesting of bamboo

- First harvesting should be after 3 years of plantation
- At the time of harvesting the culms should be more than 3 year old.
- The culms should be harvested at least one to two nodes above the ground. This reduces the risk of injuring the rhizome.
- The culms should be cut obliquely to avoid collection of rain water, debris to prevent fungal diseases
- Bamboo clump should be maintained in horseshoe shape, due to which harvesting of inner side culms becomes easy.
- Harvesting of bamboo should be in December to May.

Government schemes for bamboo plantation –

As bamboo has great potential of development in agricultural, Industrial, economical & ecological sector of the Nation. The government of India has launched scheme '**National Bamboo Scheme.**' This scheme has launched to encourage the plantation of tissue culture bamboo seedling in non forest land keeping in view of doubling farmer's income, through this scheme. Government gives financial assistance of Rs 120/- per tissue culture bamboo plant plantation.

Maharashtra government also launched a scheme for the plantation of tissue bamboo is **Atul Bamboo Samrudhi Yojana**. Through this scheme the state government provides 50 – 80 percent subsidy in purchase rate of tissue culture bamboo plants. For any details please visit – <https://nbnm.nic.in>,

mahaforest.gov.in

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