



4

BAMBOO PLANTATION

You are required to select a site suitable for the plantation and establish a nursery in or close to the plantation. Now once you have established a plantation, you need to maintain and manage it intensively for culm or shoot production. The focus of this lesson is on serious cultivation and management of bamboo as a plantation crop. Important issues like the size and scale of plantation, density of plantation etc. will be discussed. Although bamboo has been cultivated in India for thousands of years, plantations raised for commercial reasons are of relatively recent origin. You will also learn the profitability of a bamboo plantation.



OBJECTIVES

After reading this lesson, you will be able to:

- establish a commercial bamboo plantation;
- identify the size and scale, spacing used in the plantation;
- execute steps and consideration for a good bamboo plantation.

4.1 PLANTATIONS

Let us first understand what a plantation is and how it is different from any piece of land where a plant is growing. A plantation is a plot of land on which serious cultivation of any preferred species is done regularly over a period, using high-quality inputs and scientific methods of cultivation and management.

Plantations (Fig. 4.1) provide various opportunities as follows:



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1. They ensure optimal use of land.
2. They affect economies in the purchase of planting material and inputs such as fertilizers.
3. They enable planned irrigation systems.
4. They ensure best use of labor for planting, maintenance and harvesting operations.



Fig. 4.1: Bamboo plantation

The objective of a plantation is generally to maximize yield, and profit. There is thus a strong commercial orientation to plantations.

In some cases, however, plantations may be established without a primary commercial purpose like for other purposes of steadying soil and its renewal, and also reclamation of wasteland.

4.2 BAMBOO PLANTATIONS

Bamboo holds great potential to be a commercial crop (Fig. 4.1a). With increasing demand for bamboo-based products due to several reasons, bamboo is a good crop for commercial plantations, for many reasons:

1. Bamboo can be grown in a wide variety of soil and climatic conditions.
2. Once clump maturity has been attained, bamboo can be harvested every year and can provide regular returns.

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3. Harvesting of bamboo can be staggered – either brought forward or delayed – to cater to the fluctuations in market demand.
4. Bamboo plantations have comparatively few requirements of labor and maintenance. The demand for bamboo in the market is increasing due to its ecological acceptability, ease of growing, short rotations to harvest, and multifarious uses, from handicrafts to engineered products.



Fig. 4.1a: Commercial bamboo plantation

The bamboo-based industry would require a continuous supply of raw material. Thus, a bamboo plantation will be the source of raw material to the industry. Therefore, commercial bamboo plantations may need to be established:

- to maximize the yield of bamboo culms
- to produce a mix of bamboo culms and shoots
- to maximize biomass production

The basic principles of establishing a plantation will remain the same in all cases. However, there can be certain changes depending on its product focus. These changes include choice of species, spacing, input intensity and content, harvesting technique and, most importantly, clump management.



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4.2.1 Can raising Bamboo Plantations be a Profitable Activity?

A well-managed mature plantation can yield 25-30 tonnes of culms per hectare or we can say that 5–6 culms per clump of medium diameter bamboo can be obtained, i.e. 2500–3000 culms per hectare (Fig. 4.2). There is demand of bamboo in bulk to meet the needs of large-scale users. Pulping units and paper mills also have high demand for bamboo (air dried, i.e. moisture levels of 12–15% in large quantities at rates varying from Rs. 800–Rs. 1,300 per tonnes).



Fig. 4.2: A Commercial bamboo plant

Bamboo can also be sold by the piece (culm). The price it gets is generally higher than when sold in bulk. Culms sold by the piece must be of good quality and nature to attract a higher price. The price per culm varies across the country in retail markets, ranging from Rs. 25 to Rs. 80. It increases with distance from growing areas. There is a growing demand for high-quality and mature bamboo from architects and builders. For good-quality bamboo, such users are ready to pay between Rs. 40 to Rs. 80 and higher per culm. Manufacturers of bamboo boards and composite material also require large quantities of good-quality bamboo.

4.3 SIZE AND SCALE OF BAMBOO PLANTATION

A bamboo plantation can be established on lands ranging in area from half an acre to a couple of hundred acres. Most commercial plantations fall into one of these size-categories:

- Large (over 20 acres / 8 hectares) and
- Small (5 to 20 acres / 2-8 hectares).

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The decision on the size of plantation will depend on the following factors:

- Land availability
- Investment capital
- Availability of labor and other inputs
- Management capacity
- Market demand for bamboo culms or shoots.



INTEXT QUESTIONS 4.1

1. Fill in the blanks
 - (a) The price per culm in the market ranges from
 - (b) Air dried bamboo has high demand in industry.
 - (c) Apart from profit, bamboo plantation can also be used for of wasteland.
2. State whether True or False
 - (a) The objective of a plantation is to increase yield and production but not profit.
 - (b) Bamboo plantation requires comparatively less labor.
 - (c) Bamboo can be grown as a useful agro-forestry species with certain precautions.
 - (d) On clump maturity, bamboo can be harvested every year regularly as individual culms without creating 'ugly' gaps in the canopy in contrast to tree felling.

4.4 PLANTING OF BAMBOO

Placing the planting material in previously prepared pits is an important activity. It signifies the initiation of a bamboo plantation.

Planting should be done in the early hours of the morning. The planting material should be stored in a convenient and shaded part of the plantation site. If natural shade is not available, arrangements should be made for temporary cover. Planting should be completed in a short period of time and, as far as possible, should be



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undertaken simultaneously. After the first year, further planting may be needed to cover gaps due to mortality (death) of plants (also called gap-filling in the plantation).

4.4.1 Spacing (Planting Density)

The spacing to be followed while planting bamboo will depend on many factors like the species to be planted, the primary objective of the plantation, local climate and soil conditions. The size and physical dimensions of the species to be planted are an important for planting density.

Higher densities (i.e. closer spacing) are appropriate for small-sized bamboos and lower densities (i.e. more spaced out) are appropriate for larger-sized bamboos.

If the plants are spaced too far apart, the plantation will suffer from canopy exposure, loss of soil moisture through evaporation, and competition from weeds and other vegetation. An unduly dense plantation will lead to bamboo plants competing amongst themselves for light, space, soil moisture and nutrients.

If your main objective of the plantation is to have steady supply of culm, the following guides to spacing may be followed:

- For medium-dia., thick-walled species, 5×5 meter² spacing. This requires 400 clumps per hectare, or 160 clumps per acre. This spacing is good for *Bambusa tulda*, *Bambusa nutans*, *Dendrocalamus asper* and *Dendrocalamus brandisii*. Under well-managed conditions it can go up to 6×6 or 7×7 meter² (Fig. 4.3).

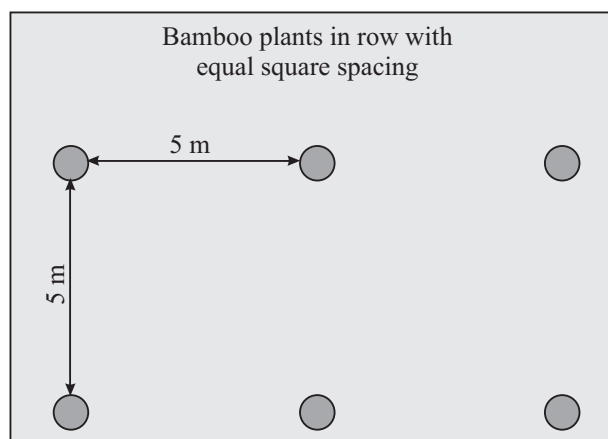


Fig. 4.3: Plant spacing for medium dia. thick walled species

- For smaller species, like *Ochlandra travancorica* 4×4 meter² spacing will be enough. This requires 625 plants per hectare.

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- For larger species like *Dendrocalamus hamiltonii*, the spacing can be 7×7 meter², or 204 plants per hectare. For *Dendrocalamus giganteus* this can go up to even 10×10 meter², or 100 plants per hectare.

If your primary objective is soil stabilization, smaller spacing of even 3×3 meter² (1111 plants per hectare) will suffice. However, if your objective is erosion control along river banks or landslide/avalanche protection, the spacing can be 3×3 meter² or even 2.5×2.5 meter². In such cases, bamboo (1111 to 1600 plants) can be interspersed with appropriate, fast-growing timber species.

4.4.2 Trench cum Bund Method of Spacing

The trench cum bund method (Fig. 4.4) of spacing involves planting bamboo on 1 meter wide and 50 cm high bunds (heap of soil). The bunds are prepared by digging trenches and heaping the dug-out soil. The distance from the centre of one bund to that of the next on a 5×5 -metre plantation should be 5 meters.

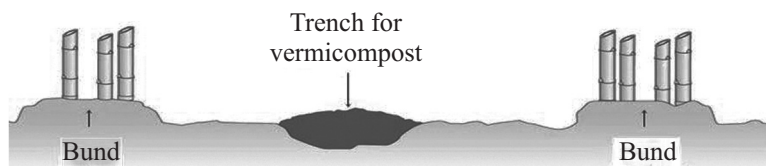


Fig. 4.4: Trench cum bund, trench method of spacing

Bunds and trenches should be prepared sufficiently in advance so as to stabilize them before planting is taken up. The trench cum bund method has several advantages. Bamboo planted on bunds with a base of well-worked soil, turned over from the trenches, will grow well. In subsequent years, more soil can be dug out of the trenches and heaped or mounded around the bamboo clumps.

The method facilitates mounding as the plants grow. The trenches can be used for irrigation, or for preparing vermicompost.

The initial cost of establishing a plantation using this method may be slightly high compared to conventional planting. This cost is however likely to be more than recovered in subsequent mounding and management operations, and through improved productivity.

4.4.3 Triangular Spacing Method

For commercial plantations, raised for culm, timber or for shoot, staggered planting in a triangular grid is recommended. This involves digging pits in alternating rows in the same line, with the row in the middle consisting of pits placed at the centre point of the preceding row (Fig. 4.5).



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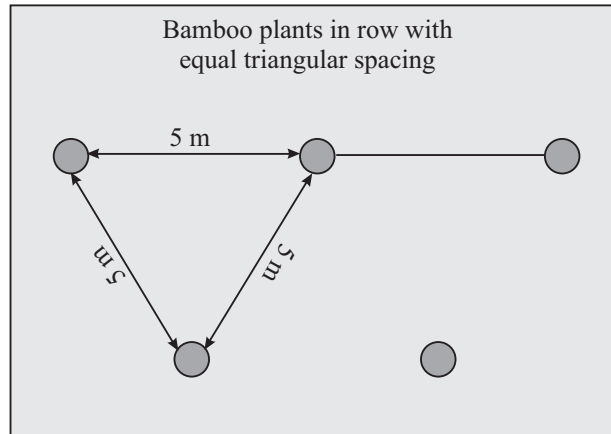


Fig. 4.5: Triangular spacing method

This allows for optimum utilization of land area and maximizes the space available to each clump. At the same time, it ensures a uniform distance between rows of plants, which can be used for intercropping and vermicomposting, and allows for easy passage.

4.5 PITS

After clearing the land and before digging the pits, you should identify the pit sites by using a measuring tape to ensure the desired spacing. It is then marked with wooden or bamboo sticks at the spot that will be the centre of the pit. The pit should be deep enough to ensure that the roots of the plants get enough space after the planting material is placed in it.

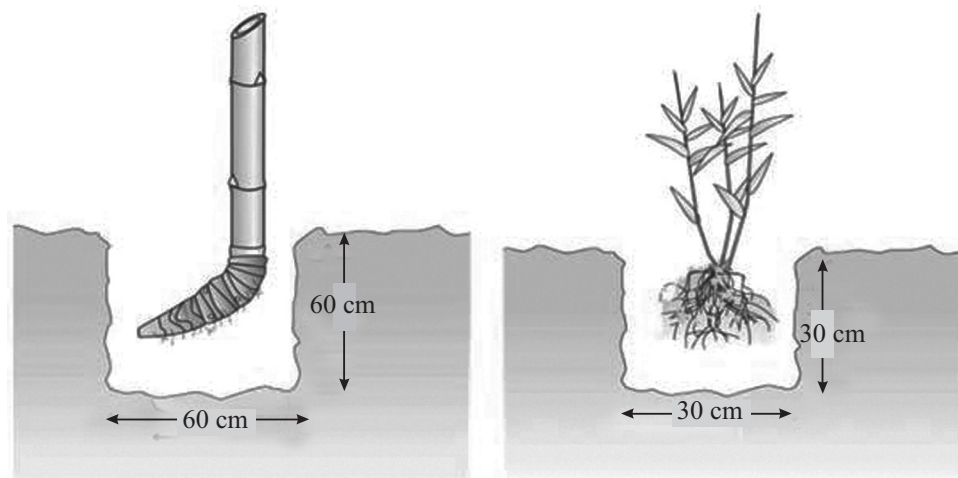


Fig. 4.6: Pits used for bamboo plantation/planting

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A thumb rule is, 'the larger the pit, the better the growth of rhizomes'. But this must be done seeing the cost-effectiveness. Offsets and rhizomes should be planted in pits measuring $60 \times 60 \times 60$ to $100 \times 100 \times 100$ centimeter³ (Fig. 4.6). Pits should be dug much before the rainy season. Pits should be spaced according to the requirement of the bamboo species or the management objective of the plantation.

You should take care of certain points while planting the bamboo to minimize the risks of failure. They are as follows:

- Thoroughly turn the soil in the pits a few days before planting.
- Remove weeds and competing vegetation within a radius of 3–4 feet from the pit.
- For a pit size of $60 \times 60 \times 60$ centimeters³, mix the soil with one basket (5 kg) of farmyard manure (FYM), 100 grams urea, 100 grams super phosphate and 50 grams muriate of potash (MoP). Nitrogen in the ammonium form increases water uptake, resulting in faster growth.
- Place the plant vertically in the pit, ensuring that the roots do not get cramped but remain free flowing.
- Level the pit with the soil mixed with manure.
- After planting, irrigate with 12–20 liters of water, depending on the prevailing climatic conditions. This will provide the needed moisture to the rhizome and roots and compact the loose soil around the plant.
- Repeat the watering the next day, moderating the quantity of water. For the next 10 weeks, provide water if there is no rain or little rain, at daily intervals initially. Later it can be extended to once in three days.



INTEXT QUESTIONS 4.2

1. Fill in the blanks
 - (a) Digging a can prevent spreading of bamboo to other adjacent area.
 - (b) density in planting bamboo is appropriate for large sized bamboos.
 - (c) For commercial plantation for culm timber method of spacing is recommended.
 - (d) Pits for planting should be dug much before season.



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**WHAT YOU HAVE LEARNT**

Let us recapitulate and list the salient points we have learnt through this lesson:

- Plantation is a plot of land where intensive cultivation of one species is done for commercial purposes.
- The objective of plantation is to maximize yield and profit.
- Bamboo is a good option for commercial plantation.
- Bamboo has high demand in market both in bulk as well as loose.
- A bamboo plantation can yield upto 23-30 MT of culm per hectare (Internationally, yields even as high as 50 MT/Ha are obtained).
- In bulk, bamboo is sold from Rs. 800-1300 per tonne.
- Loose bamboo culm can fetch Rs. 25 to 80 per culm.
- Size of the plantation can range from large scale (over 20 acres) to small scale (5-20 acres).
- The scale depends on many factors like availability of land, capital, labor and other inputs.
- Planting of material is initiation of a bamboo plantation. It should be done in early morning and the planting material should be stored in shade.
- Spacing between individual plants is very important. The spacing depends on type of bamboo species, other climatic and soil conditions.
- For proper spacing Trench-cum-Bund, Trench Method or Triangular spacing methods can be used.
- For planting the bamboo, pits are dug at desired spacing.
- The pit should be deep enough to provide proper space for the roots. The larger the pits, the better growth of the rhizomes and better will be the yield.
- After planting, they should be irrigated completely, and water should not be scarce at least for 10 weeks.

**TERMINAL EXERCISE**

1. What do you understand by the term plantation? Write 3 important goals achieved by plantation.
2. List the factors on which the size of bamboo plantation depends.

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3. Do you think bamboo plantation is a profitable activity? Discuss.
4. What factors determine the size and scale of the bamboo plantation?
5. Why spacing is important in plantation? Describe the various methods for determining the proper spacing?
6. Discuss the role of pits in bamboo plantation?
7. What important considerations should be taken in establishing a plantation to minimize the risk of failure?



ANSWERS TO INTEXT QUESTIONS

4.1

1. (a) Rs. 25 to 80 (b) Paper (c) Reclamation
2. (a) False (b) True (c) False (d) True

4.2

1. (a) Trench (b) Lesser (c) Triangular (d) Rainy

Key Learning Outcomes

- Establish and manage a commercial bamboo plantation efficiently.



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