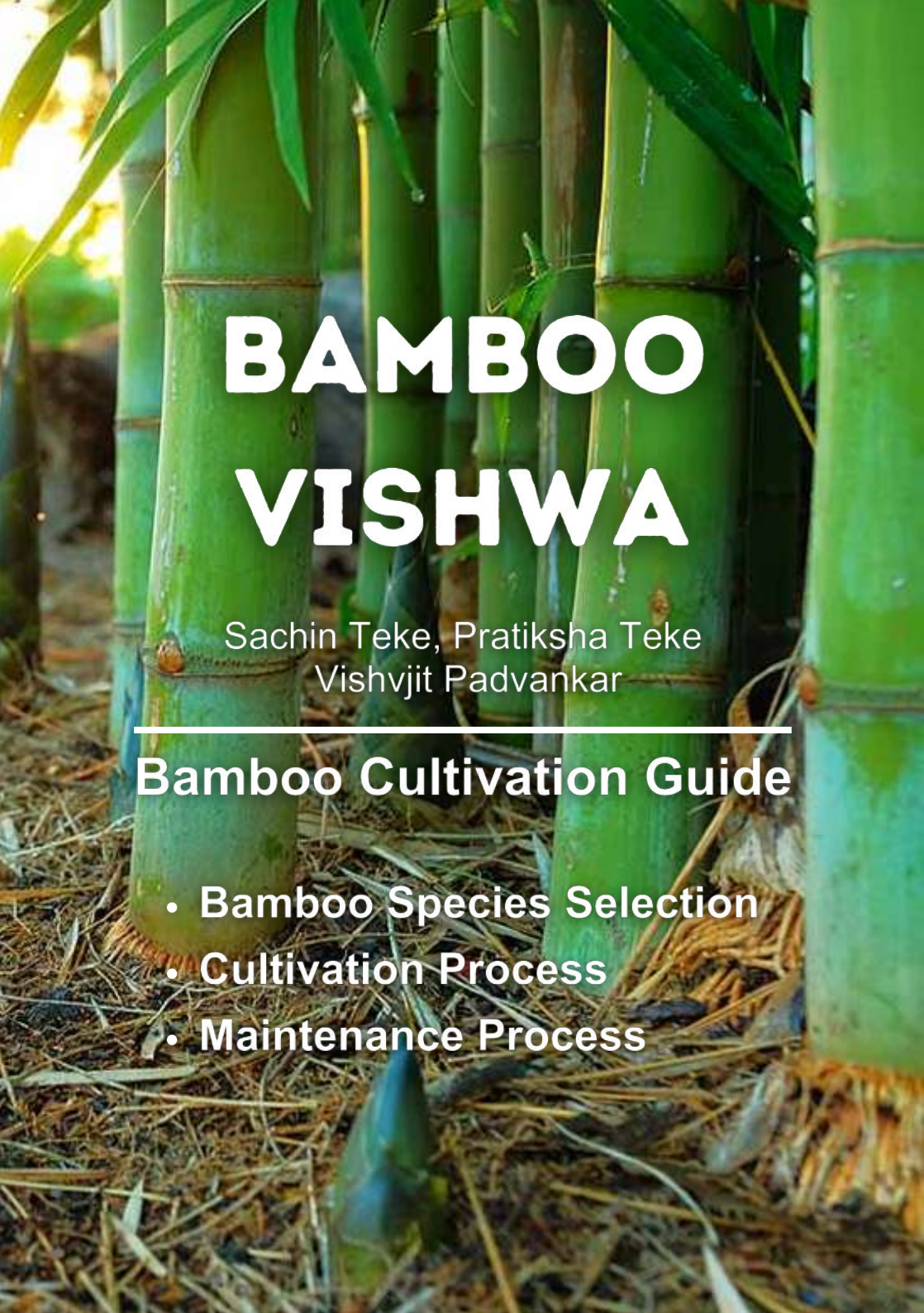

BAMBOO VISHWA

Sachin Teke, Pratiksha Teke
Vishvjit Padvankar

Bamboo Cultivation Guide

- Bamboo Species Selection
- Cultivation Process
- Maintenance Process

About Authors

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BAMBOO®

VISHWA

Bamboo Cultivation Guide

Dedicated to
Krishiratna Shri. Chandrashekhar Bhadsavle (Dada),
who inspired us to develop an interest in farming

Bamboo Vishwa

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Summary

Bamboo requires minimal maintenance and is not easily damaged by untimely rain or storms. Unlike fruit crops, bamboo is not perishable, so there is no exploitation by traders.

There is a long-standing high demand for the local **"Manga"** variety of bamboo from Konkan in the bamboo market near Mumbai.

The initial cost of planting bamboo on a large scale is Rs. 1,50,000/- per acre for 400 saplings. After 4 years, bamboo can be harvested and sold, yielding a maximum **profit of Rs. 3,50,000/- per acre every alternate year**.The best time to harvest bamboo is in November.

Bamboo should ideally be planted on **medium-sloped**, barren, and fallow land. It should not be planted in good agricultural land. Those who want to do **agri-tourism** in addition to bamboo cultivation should plant bamboo on a large scale. The main reason for this is that there is no other crop like bamboo that can quickly turn your land green.

Introduction

This book is the story of our bamboo plantation journey. We have used our own experience, the experience of other successful bamboo farmers, discussions with university professors, bamboo experts and bamboo nursery entrepreneurs, bamboo traders as well as national and international research papers, to write this book.

We have also noticed that when we do a large scale plantation, it is difficult to always follow the practices suggested by research. This is because research is done on a small scale and suggests measures for maximum production. Some of the things suggested in the research increase the labour cost tremendously. Therefore, such things are sometimes not feasible or profitable for large scale commercial plantations. Hence, we have tried to provide information in this book by balancing research and practical experience.

In June 2020, during the Corona period, we planted 1300 bamboos on 4.5 acres of land at Bamboo Vishwa, Dhokshet (Raigad). This place is 15 km away from Pali Ganpati Temple on Khopoli-Pali road before Pali.

We have planted 36 different types of bamboo and 1264 Manga bamboo variety in our bamboo forest.

The growth of our bamboo plantation has been excellent due to the cooperation of our farm workers, well-wishers, and guides. We thank them all.

We are trying to present here the bamboo plantation process that we have developed through in-depth study and with the help of experts.

- Sachin Teke
Pratiksha Teke
Vishvjit Padvankar

Special Note: *The information given in this book is based on our experience and research. It may not be completely accurate. It is necessary to do your own research on bamboo before planting.*

The Decision to Cultivate Bamboo

When it was time for us to decide which crop to grow on our land, we had many options, including Alphonso mangoes, cashews, jambul, and medicinal plants. After considering all the options, we decided to go for large-scale bamboo cultivation.

Why did we choose bamboo?

- It is a **non-perishable** product, so there is no need for expensive storage. This means we are not at the mercy of traders.
- After two years, it does **not require much wate**r.
- New bamboo shoots come up automatically every year, so there is **no annual planting cost**.
- It grows well even on fallow, rocky, sloping, and medium-sloping land.
- Since it does not bear fruit, there is **less chance of theft**.
- It is not damaged by storms.
- It is not damaged by unseasonal rains.
- The Panvel market is nearby.
- Bamboo cutting and transportation no longer require permission from the Forest Department, as bamboo has been classified as **a grass crop** since 2016.
- After the first four years, income from bamboo sales starts every alternate year. You don't have to wait a

longer time to get the income. If you plant teak or sandalwood you will require 25 years to get the income.

- It does not require pesticides or spraying.
- It may not give very high income, but it will not cause losses either.
- After three years, even if there is no arrangement for fertilizers and water, it survives on rainwater and grows vigorously in the next monsoon.
- A bamboo forest reduces the surrounding temperature and reduces the impact of storms by blocking the wind.
- Even if there is a **forest fire, the bamboo grows back automatically** in the next monsoon because the bamboo rhizomes inside the ground are still intact even after a fire. So there is no need to replant. You don't have to start from scratch like with mangoes or cashews.
- If you want to quickly turn your land green for agri-tourism, bamboo is an excellent option.

Conclusion:

In short, low maintenance, one time plantation, early production and non-perishability are the main reasons for cultivating bamboo on a large scale.

Is it true that it can be difficult to grow another crop after removing bamboo from the land where it was planted?

Yes, this is partially true. Here are some reasons why:

- **Aggressive root system:** Bamboo has a dense and extensive root system. It is very difficult to completely remove bamboo roots from the ground. The remaining roots can then compete with newly planted crops for water and nutrients.
- **Depletion of soil nutrients:** Bamboo, especially long-grown bamboo, can significantly deplete nutrients from the soil. This reduces the fertility of the soil for other crops that are planted later.
- **Allelopathic effects:** Some bamboo species release chemicals that can inhibit the growth of other plants. This makes it difficult to establish new crops.

Possibilities of growing crops after removing bamboo:

- Completely remove the roots using a JCB after using herbicides.
- Improve the soil by using manure.
- Plant nitrogen-fixing leguminous crops (e.g., green gram, black gram) in the soil. These crops are not affected by allelopathic effects.

About Bamboo

- **Bamboo** is a rapidly growing type of grass.
- Its **roots go max 2.5 feet deep** into the ground.
- It produces more oxygen and absorbs more carbon dioxide than other trees.
- Bamboo helps prevent soil erosion and reduce the force of strong winds.
- It also helps to lower the ambient temperature.
- Bamboo grows very quickly.
- It reaches its full height by October, after that it stops growing taller. The wall thickness of the bamboo then starts to increase.
- Bamboo culms (stems) are ready to be harvested for construction or other purposes 2-3 years after the shoots emerge.
- Bamboo is used for a variety of products, including Construction, Furniture, Handicrafts, Bamboo plywood, Flooring, Charcoal, Oil, Gas, Ethanol, Briquettes, Medicines, Textiles, Fences, Paper, Jewellery, House building & many more
- Many people plant bamboo near fences for privacy.
- With plenty of rain or good water availability, bamboo can grow vigorously. Bamboo can grow well in a variety of soils, but well-drained, fertile soil is best for bamboo.
- 2-year-old bamboo provides food for new shoots. 3-year-old bamboo does not do this as vigorously.
- Once a bamboo plant flowers, the entire clump dies.

Bamboo Species Selection Process

We got the guidance that the bamboo species we want to cultivate on a large scale should be currently sold well in the market.

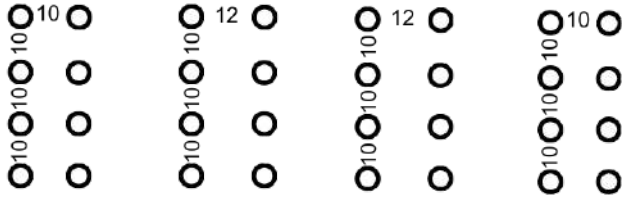
High demand and limited supply is the formula for getting a good price. Following points are very important for the selection of commercial bamboo species:

1. **Market Demand:** The bamboo should be sold in large quantities in the market near you. (This reduces transportation costs and provides a ready market.)
2. **Fewer Thorns and Branches:** The bamboo should have fewer thorns and branches. (This reduces labour costs for harvesting and cleaning the culms.)
3. **Sparse Clump Formation:** The bamboo species should form sparse clumps, not dense ones. (This allows the culms inside the clump to be harvested.)
4. **Straight Growth:** If the bamboo grows straight, it is useful in the construction sector. (Straight culms fetch a good price.)
5. **Solid Culms:** If the bamboo is solid, it is good for making furniture.
6. **Thick Bamboo Walls:** If the bamboo walls are thick, the bamboo does not split and is useful in the construction sector.
7. **Internodal Distance:** If the distance between two nodes is long, it fetches a good price.

Comparative Study of Bamboo Species

	Manga (Stocksii)	Tulda	Green Vulgaris	Manvel (Strictus)
Location	Konkan	Konkan	Konkan / Plateau	Plateau
Climate	Humid	Humid	Humid / Dry	Mainly Dry
Market	Panvel	Panvel		
Diameter	2.5-4 cm 40 mm	5-10 cm 100 mm	4-10 cm 100 mm	2.5-7.5 cm 75 mm
Height	27 ft Straight	In Konkan 35 ft Straight	60 ft Slightly Spreaded	18-45 ft Slightly Spreaded
Internode Dist.	15-30 cm	36-60 cm	30-45 cm	30-45 cm

	Manga (Stocksii)	**Tulda**	**Green Vulgaris**	**Manvel (Strictus)**
Wall Thickness	40 mm nearly Solid	8-15 mm Hollow	7-15 mm Hollow	5-20 mm Thick Slight Hollow
Uses	Construction Furniture Baskets Poles	Construction Furniture Paper Edible Shoots	Construction Paper Baskets Poles	Construction Furniture Baskets Poles
Flowering	40-45 yrs	30-60 yrs	80-150 yrs	25-40 yrs
Planting Distance	10x10 ft	12x10 ft	12x10 ft	10x10 ft



Selection of Manga Bamboo

We visited the “Maharashtra Bamboo Bhandar” in Panvel to find a demanding bamboo variety. We spoke with the truck drivers who brought the bamboo and the store manager. They told us that the bamboo was from Konkan. Based on the thickness of the bamboo and the distance between the nodes, it was determined to be the **"Manga" (Stocksii)** variety.

They told us the following things about Manga bamboo:

- It is **solid** and flexible. It does not break easily even when bent.
- It grows mostly straight and is heavy.
- It sells quickly and the price of thick poles is also high. It is sold throughout the year.
- It is used to make **handles** for shovels, hammers, etc.
- Due to its flexibility, it is used to make baskets.
- Due to its density, it is used to make **furniture**.
- It is used in the **construction** sector to build scaffolding.
- It is also sent to Gujarat and Rajasthan.
- In the Mumbai market, Manga always outperforms other bamboo varieties from Konkan.

Why Manga Bamboo is Best for Our Needs:

- Manga bamboo thrives in **humid environments**, and Konkan has such an environment, which is why it grows very well there. This bamboo grows well in Western Ghat region such as Palghar, Thane, Raigad, Ratnagiri, Sindhudurga, regions of Pune-Satara-Kolhapur which are connected to Sahyadri.
- Its **clump is sparse**, meaning the bamboos do not grow too close together. This makes it easier to harvest and requires **less labour to clean** the bamboo. This reduces the cost of harvesting.
- Manga has been present in the Konkan environment for hundreds of years, so it is **less susceptible to pests**.
- If the Manga clumps flowers, we can perform "Dhagavani". This involves removing all the poles from the clump, putting dry dung on it and setting it on fire. The clump regenerates in the next monsoon. Therefore, there is no replanting cost.

Conclusion:

We chose the "Manga" (Stocksii) local variety due to the following reasons: The nearby Mumbai market is already available, high demand, good price, it is grown in Konkan itself hence lesser competition from bamboo from other states.

Tulda Bamboo

A Promising Alternative for Konkan

Market Demand:

- Tulda bamboo is highly demanded in the Mumbai market, mainly for scaffolding in the construction industry.
- The preferred dimension is:
    a. Length: 16 feet
    b. Diameter: 70 mm (2.75 inches)
    c. Wall thickness: 13 mm (0.51 inches)
    d. Internodal distance: 20 to 24 inches

Suitability for Konkan:

- Our experimental Tulda bamboo plantation in Konkan showed promising results, meeting the above market requirements.
- The bamboo can grow up to 35 feet tall in Konkan.
- It has a ready market and fetches a similar price to that of Manga bamboo.

Benefits of Tulda Bamboo:

- The culms (stems) are thin and smooth, making them ideal for manufacturing agarbatti (incense sticks).
- It minimises wastage in automatic agarbatti machines and increases production speed.

- Large-scale cultivation of Tulda bamboo and setting up own agarbatti manufacturing plant can be highly profitable.
- Currently, a large quantity of agarbatti sticks are imported from China and Vietnam. The government has imposed a high import duty to reduce imports and encourage domestic production.

Cultivation Considerations:

- Approximately 2600 Tulda bamboos can be transported in a single truckload.
- To achieve this production level, cultivation in Konkan requires at least one acre of land.
- Initially, local bamboo traders may be hesitant to purchase Tulda bamboo due to their unfamiliarity.
- Initially, farmers may need to harvest and transport the bamboo to the Mumbai market themselves.

Conclusion:

While Tulda bamboo cultivation is not yet prevalent in Konkan, it has the potential to be a profitable venture.

Species of Bamboo which can grow well in Konkan but do not have established market

Konkan Region:

1. Green Vulgaris
2. Manvel (Strictus)
3. Brandisii (Large Diameter)
4. Giganteus (Large Diameter)
5. Travancorica
6. Kalak - (Bamboosa Bambos) (Large Thorns, Dense): This species is strong and durable, but it is difficult to harvest and process due to its large thorns. It is not recommended for commercial cultivation.

Plateau Region (Dry Areas):

Manvel (Strictus): This species is well-suited to dry regions and has a relatively good market demand. This bamboo is found mostly solid. However, it can be challenging to harvest due to its twisted branches.

Pre-planting Preparation

Land selection:

- The land for planting should not be agricultural land (because agricultural land is flat and waterlogging can occur).
- Land with a **medium slope** is ideal.
- It should not be in a very high altitude where there is a lot of wind, as the **wind can bend the bamboo**.
- Fallow or uncultivable land is ideal.

Fencing:

- Bamboo plantations should have a **wire fence to prevent animals** from eating the saplings which can cause significant financial losses.
- If there are wildfires in your area during the summer, create a road on all four sides of the area to prevent the fire from entering and plant the bamboo in the centre.

Water supply:

- Before the monsoon, in May, make arrangements for drip irrigation to provide water to the saplings after the rains in October.
- This will prevent the need for haste in October and the saplings from dying due to water scarcity.

Bamboo Plantation Methods

Propagation through saplings:

We had to plant 1300 bamboos, and propagation through rhizomes was not feasible because of the limited availability of rhizomes and their high cost. Although rhizome propagation leads to faster growth, we decided to use saplings considering availability and cost factors.

Advantages of sapling propagation:

- saplings do not need immediate planting after being brought from the nursery. It can be planted even after a few days.
- During plantation, it is often difficult to find a large number of labourers at a specific time. Hence, saplings are preferred for large-scale plantations.

Disadvantages of saplings Propagation:

- It needs water in October & summer for the first two years else sapling will die.

Propagation through Rhizomes:

Advantages of Rhizome Propagation:

- Rhizome propagation leads to bamboo shoots ready in 2 years less time.
- Bamboo culms are thicker right from the beginning. This is because the rhizome already has a sufficient amount of nutrients required for the growth of new culms.
- After the monsoon, a separate water system (drip) is usually not required. Bamboo can grow solely on rainwater.

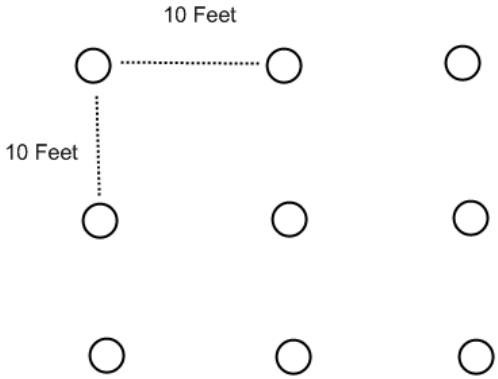
Disadvantages of Rhizome Propagation:

- For large-scale plantations (100 to 1000), it is difficult to obtain bamboo culms.
- Even if bamboo culms are available, they are 40% more expensive than saplings.
- Rhizome plantation must be done immediately after extraction. If labourers are not available for planting on time, there is a possibility of significant losses.

Conclusion:

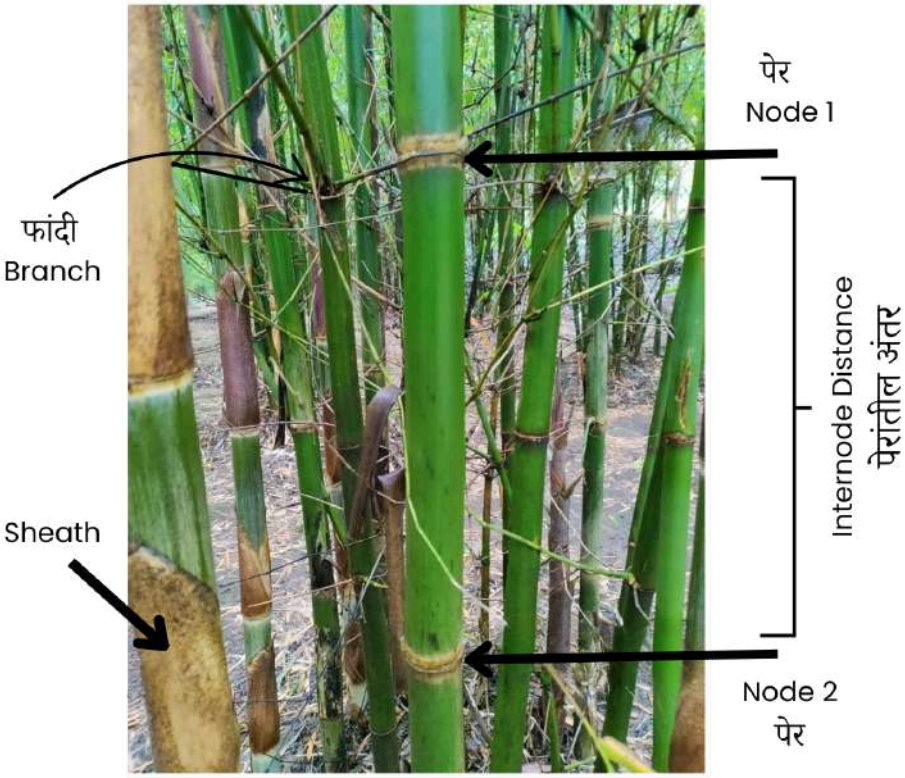
If water is not available, then rhizome propagation should be done. If there is a large-scale plantation and a water system is available, but a large number of labourers are not available for planting, then saplings should be preferred.

Spacing in Bamboo Plantation



According to the research paper of Dr. Ajay Rane, Professor of Dapoli College of Agriculture, we planted the Manga variety (Stocksii) at a spacing of **10 x 10 feet**. (The spacing varies for different bamboo varieties depending on their height at maturity.) This spacing provided good support to the bamboo from every side. Bamboos did not bend due to wind. They also grew straight in search of sunlight. If the spacing is too wide, the bamboo tends to bend and sway in the wind.

400 saplings were planted in one acre area. Planting in straight lines made it easy to irrigate with drip irrigation, and it also made it easy to harvest the bamboos. A 20 feet space is left after every 10 rows. This will help prevent fire and provide space for bamboo cutters.


पेर
Node 1
फांदी
Branch
Internode Distance
पेरांतील अंतर
Sheath
Node 2
पेर


कंद
Rhizome
मुळे
Roots

Diameter of Manga Bamboo
43 mm = 4.3 cm = 1.70 inch

Distance between two nodes in Manga Bamboo
300 mm = 30 cm = 12 inch = 1 foot.

On April 1, 2020, marking was done at 10 feet using a rope.
(Coloured ribbons were tied to the rope every 10 feet to make marking easier.)

Using JCB make pits of 3 x 3 x 3 feet

Bamboo saplings were planted in the pit on 15th June

Bamboo shoots emerged after 10 days

3 years later - June 2023 - The growth of bamboo

Thickness of Bamboo

New Shoots

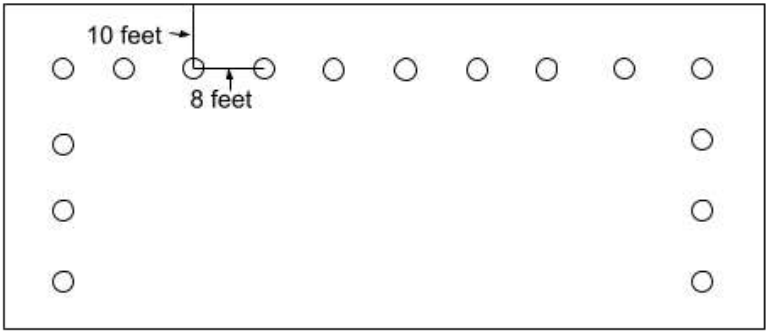
Bamboo shoots emerged after 7 days of forest fire

Since there are wildfires in our area during the summer, we did not plant anything near the fence. We built a road around the plantation, so if a fire comes from outside, it is less likely to spread inside. In the future, if the bamboo groves become dense, we plan to remove one row.

Bamboo plantation on the border

Many people want to plant bamboo on the border to create a dense border for privacy. Before planting bamboo, it is important to check if there are any wildfires in the surrounding area every year. If there are wildfires, bamboo should not be planted on the border.

For such plantations, it is necessary to leave at least 10 feet of space from the border and maintain a distance of 8 feet between two bamboos. This is because it is necessary to be able to walk around all four sides to cut the bamboo. **Bamboo clumps can grow up to 6 feet in diameter. If bamboo is planted too close to the border, there is a high probability of land boundary disputes with neighbours in the future.**



Bamboo Plantation Calendar

1 Nov	Booking of saplings or rhizomes (not available at the last moment)
1 Jan	Fencing the land (otherwise cattle will eat the saplings)
1 Apr	Marking with the help of rope at 10 x 10 feet and digging pits of 3 x 3 x 3 feet using JCB.
15 Apr	Bring and dry the farmyard manure (to avoid pest infestation)
15 May	Put a handful of Boric powder and granular phorate at the bottom of the pit. Leave the pit in the sun.
15 May	Mix 2 bags of farmyard manure + (1/2) half kg SSP (Single Super Phosphate) + 1 handful of Boric powder + 1 handful of phorate in the soil removed from the pit with the help of a spade and fill the pit. (Do not plant any saplings at this time)
7 Jun	Bring the saplings from the nursery and keep them in the shade for at least the next 5 days. (Bring 5% extra saplings for replanting in case of mortality)

15 Jun	Dig the pits filled with soil with a spade enough to plant the saplings and plant them. Take care that rain water will not accumulate near sapling. If rhizomes are used instead of saplings, plant them immediately on the same day or the next day.
15 Sep	Cut the grass that has grown around and put it near the bamboo (for mulching purpose). This helps the water to remain in the soil for a longer period of time. Also, spray weedicide (Glyphosate) around the fence to prevent fire.
1 Oct	If planted using saplings, it is necessary to arrange drip irrigation. If planted from rhizomes, you can avoid drip irrigation, but if you arrange water, the mortality of rhizomes will be reduced. Give 20 litres of water twice a week per plant. (Total 40 litres per week per plant)
15 May (2nd Yr)	Apply dried farmyard manure and soil to bamboo every year or every alternate year.
15 Jun- 2 Yr	Replant dead saplings.
After 3 yrs 1 Mar	Remove thin stems and prune branches.
After 4 yrs 1 Nov	Harvest 2-3 year old bamboos (every alternate year).

Bamboo Planting process

Large-scale bamboo planting should be done only after the rains start in June (June 15th).

- Warm soil and water availability are naturally available at this time for root emergence.
- There is no need to plan for water at this time.
- The humidity in the air creates a favourable environment for bamboo growth.
- Planting at other times will definitely result in damage.

Another important reason for planting in the monsoon season:

- Grass is grown all over during the monsoon season and is available for free-range animals.
- If we plant after the rains by arranging for water, our own plants will be green and there will be a barren situation elsewhere.
- Obviously, free-range animals will be attracted to our green plants and damage them.
- Therefore, bamboo should be planted only during the monsoon season.

Do not plant bamboo in places where water accumulates during the monsoon season.

- Bamboo does not grow there due to rotting.
- Sloping land is best.
- If there is no slope, make a slightly raised mound of soil and plant the sapling in it.

Pit preparation & fertilizers:

- In April **(April 1st)**, the land was marked with lime at 10 x 10 feet.
- A coloured thread was tied to the nylon rope every 10 feet for marking. This made marking easier.W
- Then, 3 (length) x 3 (width) x 3 (height) feet pits were dug with the help of JCB.
- This loosens the surrounding soil and provides space for the bamboo roots to grow.
- Digging the pits in April makes them heat up well in the sun and the fungi and other bacteria in the soil die automatically.
- In April **(April 15th)**, bring the farmyard manure and dry it well.
- This kills the fungi and other bacteria in the manure.
- On **May 15th**, a handful of ant powder (Boric Powder) and granular phorate were added to the bottom of the pit, which kills the harmful insects in the soil.
- Then, 2 baskets (Ghamela - 10 kg) of farmyard manure + (1/2) half a kilo of SSP (single super phosphate) + 1 handful of Boric powder + 1 handful of phorate were

added to the soil brought up by digging the pit and mixed well with the help of a spade.

- The pits were completely filled (no planting was done at this time).
- It is important to fill the pits before the rains start because fertilizers can be mixed well in dry soil and also, there is no formation of soil lumps while filling the pit and it requires less labour.

Bringing saplings from the nursery:

- The saplings were brought from the nursery in the first week of June **(June 7th)** after some rain had started. But the booking was done 6 months in advance (in November).It is necessary to bring 5% more saplings because if they die after planting, the extra saplings will be useful for replantion.
- One day before bringing the saplings from the nursery, no water should be given to the saplings in the nursery. This keeps the soil firm and prevents damage to the roots of the saplings during transportation.
- The saplings should be brought only after the rains start because in the nursery, there is a facility to provide water and shade to the saplings. If the saplings are brought before the rains, there is a possibility of them dying due to sun and lack of water.
- Transportation of saplings should be done at night. So that the saplings will not be exposed to the hot sun

during transportation. This is very important. Care should be taken that the saplings are not exposed to wind during transportation. The wind damages the saplings.

- After bringing the saplings to the planting site, they were kept in the shade (under a tree or in a shade net). Then water was given in the morning and evening (when there was no sun). Water should not be given when there is sun.
- After bringing the saplings to the planting site, it should not be planted immediately. The saplings should be kept at the site for 5 to 6 days. It takes time for the saplings to adjust to the environment of the new location. If this is not done, there is a high chance of the saplings' mortality.

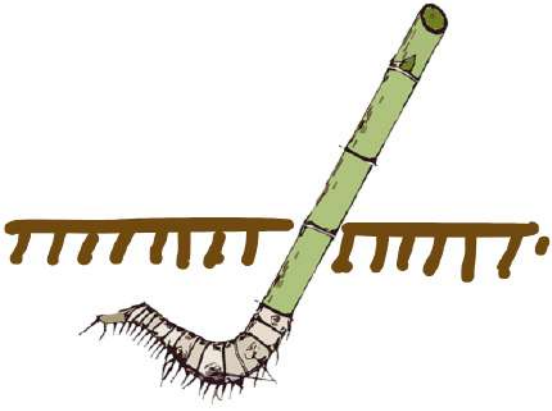
Actual Bamboo Planting Process

Planting bamboo using saplings

- On June 15th, after the rains started, the pits filled with soil were dug back slightly to accommodate the saplings.
- The location of the seedling in the pit was determined using a nylon rope with 10-foot markings.
- Since the pit is large, the person planting the saplings does not know exactly where to plant the seedling in the pit hence the above procedure is required.
- The bag was torn open using a blade and the sapling, held by the soil, was placed in the pit without disturbing the roots.
- The pit of the seedling was filled with soil from the side.
- The soil around the seedling was pressed down by hand.
- The plant was watered immediately.
- Care was taken to ensure that rain water did not accumulate near the plant.

Planting bamboo using rhizomes

- Only 1 to 2-year-old bamboo is suitable for planting from rhizomes. Bamboo younger or older than this will not survive when planted as a rhizome.
- The rhizome should be dug out of the ground without damaging it.
- When cutting such bamboo, cut it 4 to 5 feet high, 1 inch above the node.
- Cover the cut with a plastic bag to prevent rainwater from entering and spoiling the rhizome.
- In the method commonly practised in Konkan, the rhizome is planted in a pit with two nodes buried in the soil.
- Planting in this way prevents rainwater from entering the bamboo and it does not spoil.



Planting bamboo using rhizomes

Water Management

Since we planted the saplings during the monsoon season, we didn't have to worry about watering until September. Almost all of our saplings survived. Since our area is large, we set up a drip irrigation system after December. In Konkan, it is important to use **pressure compensated (PC) drippers** for drip irrigation.

- Even if the water pressure increases, pressure compensated drippers maintain a uniform flow of water.
- PC drippers are especially useful for farming in hilly areas. If ordinary drippers are used, the drippers at the end of the slope will receive the most water, and the drippers at the top may not even receive any water.

If we grow bamboo using rhizomes, there is no need to water after October, but there might be 15% rhizome mortality during that period. **Drip irrigation costs can be saved by planting rhizomes.** Those who cannot arrange for water should plant bamboo through rhizomes because bamboo grown through rhizomes grows 1 to 2 years faster. Therefore, they can withstand water stress.

For the first two years, watering is required from October to May. Each plant needs at least 20 litres of water twice a week (Total 40 litres of water a week). If sapling is not watered in the summer for the first two years, there is a pretty sure chance that the saplings will die.

Fertilizer Management

Our goal should be to develop strong, thick (diameter) culms rather than a lot of culms, as thick culms fetch a higher price in the market.

In the second year, after **May 15th**, the dried bamboo leaf litter was collected and deposited around the bamboo roots, and **two baskets (ghamela) (10 kg) of dried farmyard** manure were added. Two baskets (10 kg) of new soil were added on top. This increased the number of earthworms in the bamboo clump during the monsoon season and the leaves turned into earthworm manure. This manure was made available to the bamboo. Farmyard manure should be applied every year or every other year. **Farmyard manure should be well dried**, **otherwise there is a possibility of maggot infestation.**

New culms require more nitrogen for initial growth. Farmyard manure contains NPK (Nitrogen: Phosphorus: Potassium) in the ratio of 3:2:1. Farmyard manure retains moisture in the soil for a longer period of time and improves soil quality. It also provides nutrients to the plant slowly. It does not cause water pollution, hence farmyard manure is the best and safest option.

Weed (Grass) & Fire Control

In the beginning of September, the weeds in the bamboo plantation should be cut with a sickle.

- Herbicides should not be used in bamboo plantations because there is a high chance of damaging the bamboo saplings if herbicides are not handled properly.
- The cut grass should be placed near the roots of the bamboo so that the water does not evaporate quickly due to the sun.
- **After 2 years, such weeds stop coming automatically**, because due to the shade and leaves of the bamboo, the seeds of the weeds that come with the wind do not fall on the ground and hence they do not germinate. After 2 years, the cost of weeding becomes zero.

Measures to prevent forest fires

Forest fires enter from the side of the fence. The grass that grows in the monsoon season starts drying up after October. Over time, forest fires occur in February and March. Fires are caused by hunting, land clearing, electric sparks, intentionally or carelessly.

Every year, without fail, Glyphosate weedicide should be sprayed on the side of the fence during Ganesh Chaturthi (in September) using a spray pump.

- Mix 150 ml of Glyphosate in 5 litres of clean water. (This chemical does not work in muddy water).
- Add a small sachet of hair shampoo to it (this helps the sprayed chemical stick to the leaves).
- There should be no rain while spraying. Also, there should not be much wind.
- Spraying should be done in the morning. (The wind is calm).
- Sunlight is necessary while spraying because the leaves absorb this chemical through photosynthesis.
- The grass should be green and moist. This chemical is absorbed through the leaves and reaches the roots, killing the grass along with the roots and it does not grow back. When we remove weeds with a sickle, it grows back, but this does not happen if we use weedicide.
- While spraying, spray in the opposite direction of the wind. (Otherwise the chemical will fly on your body and if you spray in straight steps, your feet will fall on the sprayed area and the effect of the spray will be reduced.)
- To prevent forest fires from entering through the fence, we are forced to use herbicides due to the lack of labourers for large areas.
- As mentioned above, the **weedicide should be used only near the fence and not in the bamboo plantation.** If Glyphosate is accidentally sprayed on bamboo, the bamboo will also die.

Bamboo Harvesting

The first harvest should be done **4 years after planting**. Thereafter, bamboo should be harvested every alternate year. Only **2-3 year old bamboos should be harvested**. For example, shoots that sprouted in June 2024 will be 2-3 years old in November 2026 and can be harvested without any problem.

2-year-old bamboos provide food for the newly emerged shoots. By October, when the growth of the new shoots is complete, the two-year-old bamboos from June will be two and a half years old in November. Therefore, it is expected to harvest only bamboos that are 2-3 years old.

As the bamboo ages, the amount of water, starch, and sugar in it decreases. Therefore, **3-4 year old bamboo lasts better than 2-3 year old bamboo**. Bamboos over 5 years old in the clump start to weaken.

The reason for harvesting every alternate year is that if 1-2 year old bamboos are accidentally damaged during harvesting, the gap helps in nourishing the new shoots that will come up next year.

Bamboo shoots with sheaths are new 1 year old bamboo and should not be harvested. New bamboos are at the edge of the clump while old bamboos are in the middle. So the middle bamboos should be harvested.

Regular bamboo harvesting is essential. This increases the number of new shoots and produces strong shoots. Also, the clump does not become dense, making it easier to harvest bamboo in the later years.

Bamboo should be harvested in October (good), **November (best),** and December (good) months. This is because the amount of sugar and starch in the bamboo stems is low at this time. Bamboo harvested at this time is less prone to termite attack. **In Konkan, bamboo harvesting is done from Dussehra (October) to March.** Bamboo should not be harvested after March because after March, the hormones related to reproduction are activated in the bamboo. If bamboo is harvested at that time, it has an adverse effect on the new shoots.

Bamboo should preferably be harvested early in the morning when the moisture content in the bamboo is low. Bamboo should not be harvested during the monsoon season as it damages the new shoots.

The amount of starch in bamboo decreases due to the gravitational pull of the moon. Therefore, **bamboo harvested between the 6th and 8th day after the full moon is considered to be the best.**

It is good to have bamboo harvesting done by your own labourers under supervision. This ensures that the cutting is done carefully. If contractors are hired to harvest bamboo, they damage the newly emerged bamboo shoots and also harvest younger bamboos that are 1 to 2 years old. This is because they are paid for the number of stems they cut. But this reduces the production for the next year.

If you mark the bamboo that you want to harvest with oil paint, the workers will not cut the tender bamboo and the clump will not be damaged. This will ensure good income from the next bamboo harvest.

Planting Expenses

If a spacing of 10x10 feet is maintained in an acre then 400 saplings will be fitted. Farmers who get the work done through labourers will have an approximate cost of **Rs 1,50,000 per acre** in the year of planting. From the third year onwards, there will only be expenses for fertilizers.

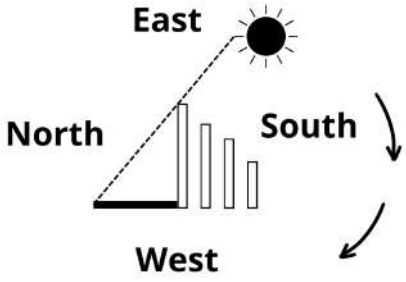
Planting cost for 400 plants in an acre:

	First Year From Saplings	**First Year From Rhizomes**	**2nd Year**	**3rd Year**
Plant/ Rhizome Cost	150*400 = **60,000**	225*400= **90,000**	-	-
Transport	8000	8000	-	-
JCB Pit Digging Cost	16,000 (16 hours)	16,000	-	-
FYM Cost	8,000 (4 tractor trolleys)	8,000	8,000	-
SSP Fertilizer	2,240 (200 kg)	2,240	-	

	First Year From saplings	**First Year From Rhizomes**	**2nd Year**	**3rd Year**
Pit filling and Fertilising Labour	10,500 (30 Labourers)	10,500	10,500	-
Seedling Planting Labour	3,500 (10 Labourers)	3,500	-	-
Weeding Labour	3,500 (10 Labourers)	3,500	3,500	-
PC Drip Cost	25,000	-	-	-
Electricity Bill	1600 (8 Months)	-	1,600	1,600
Other Expenses	3000	3,000	3,000	3,000
Re-planting Cost in case of Mortality	3687 (5% Mortality)	15,561 (15% Mortality)	-	-
Total Cost (For 1 Acre)	**1,45,027 From saplings**	**1,60,301 From Rhizomes**	**26,600 2nd Year**	**4,600 3rd Year**

How to plant bamboo with lower investment?

- Farmers who do not have much capital should plant bamboo every year in June with the help of two people from their own household.
- For this plantation, bamboo rhizomes should be requested from other farmers in the same village.
- At least 20 bamboos should be planted every year.
- After 3 years, the rhizomes from the existing bamboo clumps should be used for new plantations.
- The area should be increased gradually every year. Less fertilizer will be required for a smaller plantation, which can be met from local sources.
- In this way, 100 bamboos can be planted in 10 gunthas (1/4 acre) in 5 years without spending any extra money.
- If such bamboo plantation is to be done in a continuous area, it should be started from the north side and planted towards the south. The reason behind this is that the sun moves from east-south-west. The sun's rays come from the south. Starting the plantation from the north will ensure that the shade of the old bamboos does not fall on the new plantation, allowing the new bamboos to grow properly



Income from Bamboo

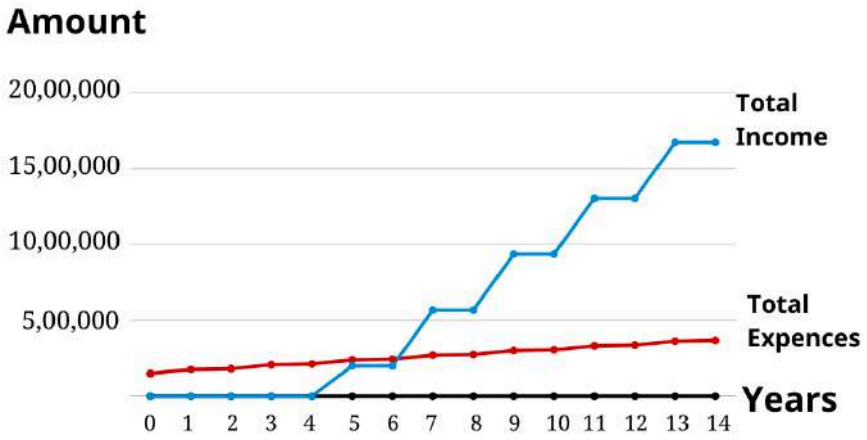
Bamboo can be harvested every alternate year after four years of planting. The culms obtained in the first harvest will be of less thickness, while those obtained from the second harvest will be of more thickness. Thicker culms fetch a good price. Bamboo prices vary depending on the height and thickness of the culm.There are different rates for 12 feet, 18 feet height sticks. Bamboo worth Rs. 3,68,000 can be sold from one acre of land. After deducting the fertilizer cost incurred every alternate year, a profit of Rs. 3,68,000 - Rs. 26,600 = **Rs. 3,41,400 can be obtained every alternate year.** If fertilizers are applied every year, the profit will increase as the bamboo culms will be of good thickness.

- **There are 400 clumps of bamboo in one acre.**
- On average, 20 culms will be obtained from one clump every other year.
- Let's assume that 6 culms will be 12 feet high and 14 culms will be 18 feet high.
- 12 feet rate = Rs. 25
- 18 feet rate = Rs. 55
- Income from one clump = 6x25 + 14x55 = Rs. 920
- Income from 400 clumps = 400 x 920 = Rs. 3,68,000
- Fertilizer cost per acre every other year = Rs. 26,600
- **Profit = Rs. 3,68,000 - Rs. 26,600 = Rs. 3,41,400**

We should keep in mind that, in the future, if the supply of bamboo increases, the prices may go down.

Returns Chart

Income from 400 bamboo saplings in one acre area



From the above table of expenses and income, it appears that the total expenditure and income for bamboo cultivation in the 5th year will be the same, and after that the real profit will start. A profit of Rs 3,41,400 per acre can be made every alternate year.

Closing Lines

Various bamboo species grow well in Konkan, but not all species have a market available at present. New bamboo industries are emerging such as bamboo houses for tourism, bamboo flooring, bamboo panels, incense sticks, handicrafts, charcoal and ethanol. Currently, transportation is a major cost factor, so it is also expected to consider whether these industries are located nearby or will be created nearby in the next 5 years. When our bamboo is sold in the market for a long period for a good price then only can we say that we have successfully cultivated bamboo.

We should focus more on selecting the right variety of bamboo. Our fair advice is, **“Not to rely solely on consultants”**. Go to the nearby bamboo market & identify the varieties that are actually selling well. If you follow this then you can avoid regretting later.

Best wishes for bamboo cultivation

from Bamboo Vishwa!

Sachin Teke, Pratiksha Teke & Vishvjit Padvankar

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- **Tulda**
- **Golden Bamboo**
- **Black Bamboo**
- **Buddha Belly**
- **Green Vulgaris**
- **White Multiplex**
- **Green Multiplex**
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There is no other crop like bamboo that needs to be planted only once, does not require much water, can grow on slopes and rocky land, and can quickly green the land.

This book provides information about why to plant bamboo, how to plant bamboo, and the income potential.

In writing this book, we have used our own experience, the experience of other successful bamboo farmers, discussions with university professors, bamboo experts, traders and bamboo nursery entrepreneurs & national and international research papers.

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