

Cinnamon: A Commercially Valuable Tree Spice Suitable for Agro-Forestry

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Introduction

Cinnamon is one of the oldest known spices that have been traded since time immemorial and popular spice in ancient Arab world. Cinnamon, *Cinnamomum zeylanicum/verum* belongs to family Lauraceae and mainly cultivated for the dried inner bark of the tree which is the spice of commerce, leaves and immature fruits. The term *Cinnamomum* is derived from the Greek root *Kinnamon* or *Kinnamomon*, meaning sweet wood/spice. Cinnamon is the second most important spice (next to black pepper) sold in U.S. and European markets (Ravindran *et al.*, 2004). The three major parts of the plant: leaf, stem-bark and root-bark yield three different types of essential oils. Now a day, immature fruits were gaining more importance due to its high spice value and high returns (Hanumantha, 2020). It is precious not only as a flavoring agent for food, but as a medicine and perfume. Cinnamon is used in the food industry as a spice for flavoring various foods such as pickles, cakes, biscuits, sweets, liquor, in food preservation and in the soap industry (Wijesekara *et al.*, 1975). The bark, exported as *quills*, is used as a spice or condiment, for flavouring cakes, sweets incense, dentrifices and manufacturing perfumes. Bark oil is used in flavouring confectionery, liquors, leaf oil for manufacture of cheaper types of perfumes used in soap, tooth pastes hair oil, *etc.* The bark of cinnamon is carminative, astringent, stimulant, antiseptic in action (Ravindran *et al.*, 2004). The essential oil of this herb acts as potent antibacterial, anti-fungal, and uterine stimulant. Cinnamon bark oil is employed in dental and pharmaceutical preparations.

Cinnamon is native of Sri Lanka and Malabar Coast of India. It is grown in the Naga Hills of Assam, Coastal hills of Karnataka and Western Ghats and Tamil Nadu. Cinnamon is also cultivated in other countries such as Indonesia, Philippines, Burma, Korea, Vietnam, China, Seychelles, Madagascar, Mauritius, Jamaica and Brazil. Sri Lanka is the largest cinnamon producer in the world, which contributed 60- 70 per cent of the total world production; Seychelles is the second largest producer of the bark,

but the best quality cinnamon is produced in Sri Lanka.

Cinnamon is a moderately sized, bushy, evergreen tree; grows up to a height of 6-15 m on full growth. Bark smooth, light pinkish brown, thin; up to 10 mm thick with a strong pleasant cinnamon smell and a spicy, burning taste. The leaves are dark green on top and light green at the bottom; young leaves of the flush are reddish/purplish. Leaves are opposite, with elliptic or ovate in shape and flowers very small, pale yellow in colour with foetid smell. Fruit is small, fleshy berry/ovoid drupe, black, 1-seeded, ovoid.

Cinnamon is a hardy plant, which tolerates a wide range of climatic conditions. A hot, humid and moist climate is highly suited for cultivation of cinnamon. The crop performs well from 300 to 350 m above MSL and thrives up to 1000-1800 m above MSL with an annual rainfall of 1500-2500 mm and average temperature of 27°C. Well drained sandy loam soil rich in organic matter is the best for cinnamon. In the west coast of India cinnamon is cultivated in lateritic and sandy soils which are poor in nutrient status. Red dark brown soils free from rocky gravel or quartz are also good for cinnamon cultivation (Ravindran *et al.*, 2004). Cinnamon tree starts flowering from October/November to February/March and the fruit ripens in May to June. Under the, West Coast conditions, cinnamon flowers in January and fruits ripen during June-August.

Propagation

Cinnamon is commonly propagated through seed, though it can be propagated by cuttings and air layers. The propagules are collected from the mother trees which are good in bark, leaf and immature fruit yield. Trees with smooth bark, easiness of peeling the stem bark, with good sweetness, pungency and flavor of the bark and good oil quality were preferred (Wijesekara *et al.*, 1975). For immature fruit production, crown spread, no. of inflorescences/tree, no. of fruits/inflorescence, dry immature fruit/yield per tree are essential characteristics (Niharika and Hanumantha, 2023). Cinnamon is commonly propagated through seeds. Seeds are extracted from



Cinnamon Plantation



Cinnamon Tree



Fresh Immature Fruit



Dried Immature Fruit



Bark (Quill)



Leaf and Bark Oil

ripe fruits from superior mother trees. Seeds are sown immediately after collection, otherwise viability gets reduced. Viability is reduced to 80 per cent after 7 days; and complete loss in viability after 40 days storage (Kannan and Balakrishnan, 1967). Seeds are sown in nursery beds or in pots filled with a mixture of sand, cattle manure and soil in the ratio 2: 2:1. About 70 to 90 per cent germination is obtained. Under normal conditions, seeds germinate within 20 days. From beds, seedlings are transplanted to polythene bags when they attain a height of 15 cm to polythene bags of 30 cm x 15 cm.

Cinnamon can also be propagated by cuttings of young one-leaved shoots or by layering. Semi-hard wood cuttings with single node shoots/cuttings (10 cm length) are prepared and put into water immediately until planted in polythene bags. Before planting, cuttings are dipped in IBA 2000 ppm/2500 ppm or in a rooting hormone (Keradix-B) or IAA 100 ppm or NAA 2500 ppm. Planting is done either in polythene bags filled with sand or a mixture of sand and coir dust (1:1) or in sand beds raised in a shaded place. Percentage of rooting varied from 40-80% (Chaitra Kotrabasappa Muddi and Hanumantha, 2024). In order to prevent water losses through evapo-transpiration, the bags must be covered with

polythene and it is important to protect from direct sunlight. After 2 months, the shade has to be removed gradually for hardening of plantlets. The rooted plantlets are ready for planting in 6-8 months.

Air layering of cinnamon is done on semi hardwood shoots. A ring of bark is removed from the semi hardwood portion of the shoot and a rooting hormone (IBA 2000 ppm or IBA 4000 ppm or IAA 2000 ppm) is applied on the portion where the bark has been removed. Moist coir dust or coir husk is placed around the region where the hormone has been applied and is secured in position by wrapping with a polythene sheet of 20 cm length. Rooting takes place in 40-60 days. Most favourable season for air layering in cinnamon is July, followed by June and August/September. The maximum period required for complete rooting was 270 days (Rooting success rate= 90%). As rooting medium, sphagnum moss was found better than sand and saw dust in equal proportions (Nageswari *et al.*, 2000).

Agrotechnology

Pits of 50 cm³ are dug at a spacing of 2 x 2 m or 3 x 3 m (3-5 m in some areas) filled with compost and topsoil before plantation. Seedlings are transplanted when they are about 12 months old. Shade and irrigation are essential immediately after planting. Higher yields with superior quality of cinnamon quills were obtained from closer spacing of 1.2m x 0.6 m when compared to wider spacing (1.2m x 1.2m or 1.2m x 0.9m). Cinnamon can be intercropped with coconut/Areca nut/Mango. A combination of coconut + pepper + cacao/ cinnamon + pineapple cropping was found profitable.

Manuring and fertilization

- ❖ *First year:* 20 g N, 20 g P₂O₅, and 25 g K₂O/seedling.
- ❖ *Three years after planting:* 29 kg F.Y.M., 4 kg neem cake, 150 g N, 75 g P₂O₅ and 150 g K₂O per plant.
- ❖ *After ten years or more of planting:* 200:180:200 g/tree/year
- ❖ The fertilizers are applied in two doses during first week of September and in March.
- ❖ The Kerala Agricultural University has recommended a fertilizer schedule of 20:20:25 g of NPK along with 20 kg of compost per year during the first year of planting which is to be

gradually increased to 200:180:200g NPK and 50 kg of compost per year from 15th year onwards.

Training and pruning

When the seedlings attain the age of about 2 years and the diameter of the base of the stem is about 4-6 cm the main stem is coppiced or cut back to a height of about 10-15 cm from the ground level. The cutting is done with a sharp Keththa/instrument at an angle of 30° to 45° in such a way that the cut faces the inside of the clump. This will promote the tillers from the base and only three strong and straight tillers are left for better results. All the other shoots should be removed to promote the growth of these shoots as main stems. In addition, pruning of side branches will expose the base of the plant to sunlight to initiate more tillers from the base.

Yield

The yield varies with type of variety and age

- ❖ 3-4 year and onwards: 60 to 125 kg quills/ha.
- ❖ 10-11 year and onwards: 225 to 300 kg quills/ha.
- ❖ 75 kg of quilling's and featherings are additionally obtained.
- ❖ One ton of leaves (per ha) yielding 1 to 1.25 kg of oil are obtained per year.
- ❖ Yield of cinnamon leaf oil was 1.8-2.6 per cent in fresh leaves and 3.75 per cent in dried leaves.
- ❖ The first harvest may yield 30-50 kg quills/ha/year. Better harvests are expected after 10 years when 170-200 kg of dried quills/ha/year is obtained.

Sustainable harvesting

Bark harvesting in narrow patches and treating the patches with NSKE paste (100%) and Bordeaux paste (10%) could be suggested for higher regeneration of bark and increase in oil content. Highest dry mass of leaves and bark with higher bark oil content can be obtained by retention of seven sprouts per plant. (Hanumantha and Vasudeva, 2022).

Pest and diseases

The important pests affecting cinnamon trees include, Cinnamon butterfly (*Chilasa clytia*), The light infestation of *Chilasa clytia* may be controlled by removing infested branches, by manual removal of eggs, larvae and pupae. Heavy severe infestation may

be controlled by spraying quinalphos at 0.04 per cent concentration. Major diseases in Cinnamon include die back caused by *Colletotrichum gloeosporioides*, Red leaf spot caused by *Colletotrichum capsici* and Blight caused by *Glomerella cingulata* and *Pestalotiopsis palmarum*.

High yielding varieties developed in India

1. IISR Nithyashree
2. IISR Nithyashree
3. Konkan Tej
4. RRL(B) C-6
5. YCD.1
6. Sugandhini (ODC-130)
7. PPI (C) -1
8. Konkan Tejpatta

Cinnamon plantations established by farmers in utara kannada, karnataka

Name of the Farmer	Place	Taluk	No. of plants planted
Prasad Ram Hegde	Kankodlu	Yellapura	450
Gopal Achar	Gejjehalli	Hangal	150
Prakash	Manchale	Sagar	500
Ananth Hegde	Jaddigadde	Sirsi	150
Sadanad Gouda	Edur	Sorba	300
Annappa Gouda	Edur	Sorba	400
Ramesh Hegde	Kangod	Sirsi	250
Dinesh Gouda	Kunaje	Siddapura	800
Shashibushan Hegde	Siddapura	Siddapura	250
Dinesh Hegde	Karkisaval	Siddapura	1500

Benefit- cost analysis

Profit from immature fruit yield (data is obtained from the farmers)

- ❖ No. of plants per ha (Spacing 5 × 5 m) = 400
- ❖ Flowering and fruiting start from third year onwards
- ❖ Economic yield starts from 5-6 years: 0.5 kg/tree

- ❖ Average income from Immature fruits = 0.5 kg × 400 × Rs. 1500 = 3,00,000
- ❖ Income from leaves = 1.0 kg × 400 × Rs. 50 = 20,000
- ❖ Net Profit = 3,20,000 – 50,000 = 2,70,000

Yield increase as the tree crown increases; at the age of 10 years farmer can obtain net profit of about Rs. 5,50,000 per ha.

Yield and Profit/ha (3500 plants/ha)

Retenti on sprouts /plant	Yield/ha (kg)		Gross Inco me (Rs.)	Cost of Produ ction (Rs.)	Net Inco me	B: C Ra tio
	Qu ills	Lea ves				
Five	812 .0	420 0.0	6,83,5 54.00	2,04,1 07.00	4,79,4 47.00	3.3 5

(Khandekar *et al.*, 2016)

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