

PRODUCTION TECHNOLOGY OF CARDAMOM



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- World's 3rd most expensive spice and known as 'Queen of Spices'.
- First introduced in Guatemala by Oscar Majus Kloeffer.
- It is now biggest producer and exporter followed by India.
- Cineole and α -terpenyl acetate is index of

distribution

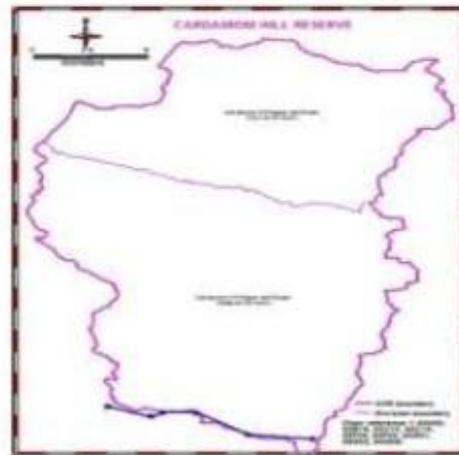
- Indigenous - southern stretch of evergreen forest of western Ghats.
- In India – cultivation takes place mostly in Kerala(60%), Karnataka(32%) and Tamilnadu(8%).
- Total area under cardamom in India is estimated to be approximately 69000 ha.

- ❑ Origin : Western Ghats of South India
- ❑ It is a Shade bearer species.
- ❑ Grows well in well distributed rainfall areas (1500-3000 mm in western Ghats.)
- ❑ Temperature required 10° - 35° C.
- ❑ Suitable soils - sandy clay to sandy clay loam texture, acidic (pH 4.5-5.8)
- ❑ Raised by suckers or seedlings of high yielding

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Map showing
the study area
of Cardamom
Hill Reserves
(shaded) in
Indian
Cardamom Hills,
Kerala.



➤ History:

❖ The world doesn't know the actual time period when cardamom originated but it is considered that the cardamom plants firstly came into existence in the monsoon forests of the western ghats in southern India as wild herbs.

❖ A medicinal literature summary written in between 6th century BC to 2nd century AD in India named **Charak Samhita** provides us with the first ever written inscriptions about cardamom. . .

❖ Cardamom was written in an article of Greek trade during

uses of cardamom.

In the 11th century in Indian cardamom was included in the list of ingredients for **panchasugandha-thambula**.

The cultivation of cardamom in India was actively taken up by the Travancore Government in 1823 A.D.

Till 19th century, cardamom grew wild and was searched in the monsoon forests.

Nowadays it is grown as a secondary crop with the coffee plantations.

Active Constituents :

The essential volatile oil in the seeds contain;

α -terpineol 45%,

myrcene 27%,

limonene 8%,

menthone 6%,

β -phellandrene 3%,

1,8-cineol 2%,

sabinene 2% and heptane 2%.

Abundant starch in



limonene



β -myrcene



β -ocimene



α -terpineol



menthone



β -phellandrene

Moisture	7 -10%
Protein	7-14%
Carbohydrate	42.1%
crude fibre	6.7-12.8%
Starch	39.0-49.9%
Volatile oil	7.4%
Calcium	0.3%
Iron	0.012%
phosphorus	0.21%

□ **Part use:**

Dried **unripe** seeds of *Elettaria cardamomum*.

□ **Family:** Zingiberaceae.

“Recently separated from the fruits”

- **The seed:** Embryo; straight Kind; albuminous
Ovule; anatropous Outgrowth; arillus
- **The fruit:** Kind; loculicidal capsule



➤ **Brown / Black cardamom**



➤ **Cardamom powder**



➤ **Green cardamom**

BLACK CARDAMOM VS GREEN CARDAMOM



- ❖ **Green and Black cardamom** are from the **same plant** .
- ❖ The pods of the **black cardamom** are harvested much later and are also dried over **large fire pits**. In the case of **green cardamom**, both the pod and the seeds are used for flavouring.
- ❖ **Flavour-** Green cardamom (very strong and intense aroma and flavour)
Black cardamom (smoky and vaguely camphor-like flavour)
- ❖ **Green cardamom** is harvested before it reaches maturity and the pods are often used whole. **Black cardamom** is intensely dried and the seeds are extracted.

USES



1. Cardamom is used for **flavouring various food preparations, confectionary, beverages and liquors.**
2. It is also used for medicinal purposes, both in **Allopathy and Ayurveda** systems.
3. In the Middle East countries, cardamom is mainly used for preparation of **Gahwaí.**

It is basically a psiohytic plant growing under shade in evergreen forests.

It is propagated through **seeds, suckers** and **tissue culture plantlets**.

Cardamom plants mature in about 20-22 MAP.

Economic yield starts from 3rd year of planting and it continues up to 10-14 years for high yielding varieties depending upon the level of management.

The life span of a cardamom plant is **20 years or more**,.



A well known spice used in Indian cooking.

Effective remedy against *halitosis*, tooth, gum and oral disorders.

Volatile oil in cardamom is ideal solution for host of digestive problems and *Aromatherapy*.

Can act as a diuretic and also helps in relieving

varieties

- Two varieties are observed:-

1) *Elettaria cardamomum* :-

Var. major comprised of wild indigenous types of Srilanka.

2) *Elettaria cardamomum* :-

Var. minor comprised of cultivars like Mysore, Malabar and Vazhukka.

➤ CULTIVAR MALABAR :

- Medium sized with height of 2-3m on maturity.
- This type is considered less susceptible to thrips.
- Mostly cultivated in Karnataka.
- Can thrive under low rainfall and short duration rainfall.



- It is natural hybrid of Malabar and Mysore types.
- Cultivated in Kerala and Tamilnadu.
- Robust as cv. Mysore.



➤ *Cultivar Mysore* :-

- This type are robust with height of 3-4m.
- Thrive well under assured, well distributed rainfall conditions.
- Mostly cultivated in Kerala.





Description

1. A mature cardamom plant may measure **six to twelve feet in height**.
2. It is a **shallow rooted plant**.
3. **Tiller production** takes place throughout the year. However, peak period is from **January to March**.
4. Flowers are borne on **panicles**, which emerge directly from the swollen base of the aerial shoot.
5. It is a **cross-pollinated plant** and pollination occurs by external agents like **honeybees**.





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1. The panicles are **erect in Mysore, prostrate in Malabar** and **intermediate (pendent) in Vazhukka**.
2. Panicles may be **branched or simple**.
3. The peak period of panicle emergence -**November to March**.
4. Flowering normally commences from February and extends to October; May- August being the peak flowering period.
5. After fruit set, about **90-120 days** are required for the fruits to attain maturity.



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1. The capsules are **globose** or **ovoid** or narrowly ellipsoid to elongate in shape, **trilocular**, containing **15-20 seeds**.
2. On maturity, seeds turn dark brown to black in colour and capsule is pale green to dark green.





Characteristics of cardamom varieties

Variety	Plant Stature	Panicle Type	Capsule Type	Adaptability	States Recommended
Malabar	Dwarf (2 to 3m)	Prostrate	Round / oblong	Lower elevation	Karnataka and Kerala
Mysore	Robust (3 to 4m)	Erect	Bold / elongated	Higher elevation(900 to 1200m)	Kerala, Karnataka and Tamil Nadu
Vazhukka	Robust (3 to 5m)	Semi erect	Round / oblong	Higher elevation(900 to 1200m)	Kerala and Tamil Nadu (suited for wide range of environmental condition)

CULTIVATION PRACTICES





NURSERY MANAGEMENT

- suckers or seedlings of high yielding varieties suitable to the location are to be used.
- If virus free production of planting material could be ensured, vegetative propagation through **suckers is the best method.**
- Sucker propagation is the accepted practice in **Kerala and Tamilnadu.**
- **Traditionally**, cardamom plantations were raised from **seeds.**
- It is still the common and advisable practice in **Karnataka** mainly because of the rampant virus disease infestation.



VEGETATIVE (SUCKER) PROPAGATION

- Vegetative multiplication ensures **true to type plantlets** from high yielding mother plants.
- Plants raised from rhizome show **uniformity in growth and come to bearing earlier** than the seedling-raised plants.
- Sucker multiplication was used to be taken up from the **first week of March to September**.
- The site was selected in open gently slopping well-drained areas **near water source**.
- Trenches of 45 cm wide and 45cm deep and convenient length were taken across the slope along the contour at 1.8 meter apart.



CONTD..

- They were filled with equal quantity of humus rich **topsoil, sand** and **composted cattle manure**.
- Uprooting a part of the high yielding **disease free mother clump identified in the plantation** was the first step.
- Trimming the roots and **separating the suckers** to enable the minimum planting unit consisting of one grown up tiller with a growing young shoot had to be performed.
- They were planted in a spacing of **100cm** in filled up trenches making a small pit.



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- Some 50 grams of **Mycorrhizae (AM) fungi** was applied before planting of the suckers in the pit. Sufficient mulch and stake each planting unit was to be provided.
- Overhead pandal had to be erected as in the case of seedlings nursery and removal shading material with onset of monsoon should be attended to provide irrigation once in a fortnight and adopting necessary plant protection measures.
- Applying fertilizers **25: 25: 50** grams per sucker NPK in two to three splits from two months after planting



FIELD PLANTING AND MANAGEMENT

- For planting in a new area, ground should be cleared and if it is a replanting area, old plants should be removed.
- **Shade regulation, terracing** and preparation of pits should be done during summer months.



SHADE REGULATION

- Shade regulation is one of the important practices that should be attended during summer (March-April) in the new planting areas and during **May-June** after the receipt of summer showers in the existing plantation.
- If there is **thick shade**, branches should be **chopped to provide filtered light of 40 to 60 percent of the open area**.
- Cutting branches from all the sides ensures a balanced canopy. **South-Western slopes** should be provided with more shade than North-Eastern slopes.
- Shade trees should have **small leaves, tap root system** and in summer, it should **not shed leaves**.



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➤ If area is open due to tree fall, planting of quick growing tree spices like **Karuna** (*Vernonia arborea*), **Corangati** (*Acrocarpus fraxinifolius*), **Chandana**, **Viambu** (*Toona ciliata*), **Njaval** (*Syzygium cumini*), **Jack tree** (*Atrocarpus hetrophyllus*) etc. should be taken up to protect the plants from direct sun light.



FIELD PREPARATION

- objective of **preventing soil erosion and to conserve soil moisture.**
- In **sloppy areas**, soil should be protected from soil erosion for which planting should be taken up in **terraces.**
- Terraces should be made at required distances on contours depending on the spacing adopted.
- Pits of **90x90x45** cm can be prepared before commencement of monsoon, about 1/3 of the pit should be filled with top soil and 1/3 should be filled with 1:3 mixture of organic manure and top soil.



PLANTING

- For **Mysore and Vazhukka** cultivars (7.5x7.5 meters),
- A spacing of 10x10 meters is recommended for **Tamilnadu**,
- 6.5x6.5 meters spacing is suitable for *Malabar* in **Karnataka**.



WEED MANAGEMENT

- Two or three rounds of hand weeding at the plant base during **May, September and December/January.**
- **Use of spade for weeding is to be avoided** as it will loosen the soil and cause soil erosion.
- The weeded materials may be used for **mulching.**



IRRIGATION

- critical periods of plant growth where development of young tillers and panicles takes place
- Irrigation can be done through different methods such as pot irrigation, hose irrigation, sprinkler irrigation, drip irrigation or micro-sprinkler/mist/fogger irrigation.



FORKING AND MULCHING

- Essential to keep the plant base mulched (5-10 cm thick), except during periods of heavy monsoon (June to September).
- In situations where soil has become compact and hard, forking the plant base to a distance up to 90cm and to a depth of 9-12 cm may be beneficial to enhance root proliferation, better infiltration of summer showers and for improving soil aeration.
- Forking could be done with the cessation of north east monsoon during **November/December** taking care to cause least damages to the root system



Trashing and pruning

- Trashing consists of **removing old tillers, dead rhizome and dry leaves and leaf sheaths.**
- carried out **once in a year** at any time after the onset of the pre-monsoon showers, in **May.**
- Pruning is the operation undertaken with **sharp sickles** for removing the dead and hanging leaves from the pseudo-stem. Care should be taken not to peel off the leaf sheath from the pseudo-stem. This operation can be done during **January** and during **September**



Earthing up

- Whenever, the top soil covering the plant base is washed away and the rhizomes and roots are exposed, earthing-up of the plant base with top soil is recommended during **November/December**.
- This operation helps to keep the top 10 to 15 cm soil loose and friable enabling easy root penetration and water percolation



Harvesting and post harvesting

- Flowering in cardamom continues normally for a protracted period of six to eight months.
- It takes 120 to 135 days to form a ripened capsule under favourable environmental conditions.
- Harvesting starts from **June and July** and continues till January and February in Kerala and Tamilnadu whereas in Karnataka it commences in August and continues till December and January.

➤ **Stages of Harvest:** Harvesting of capsules at correct maturity stage is a pre-requisite in improving the quality of the produce.

➤ Small **immature capsules** bring about **uneven shrivelled and undesirable colour after processing.**

➤ The capsules should be harvested when they **attain physiological maturity (Karikai) to fully ripened stage as to allow them for the proper seed development and to obtain higher recovery.**





Post harvest operations

washing, curing (10-12%), cleaning, grading, packing and storage.

Capsules may be washed in water to remove the adhering soil and other dirt to get good quality commodity.

Capsules **should not be stored after harvest** for longer duration as it adversely affects the quality of the end product.

THANK YOU

