MODEL SUCKER NURSERY

LARGE CARDAMOM

(GUIDELINES & PRACTICES)

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MODEL SUCKER NURSERY IN LARGE CARDAMOM

Large Cardamom (*Amomum subulatum* Roxb.)

Large cardamom (*Amomum subulatum* Roxb.), a member of the family, Zingiberaceae under the order Scitaminae is the main cash crop cultivated in the sub-Himalayan state of Sikkim. It is also cultivated in Arunachal Pradesh, West Bengal, Nagaland and Uttarakhand. It grows within an altitude of 600 m-2000 m MSL receiving annual rainfall of 2000-3500 mm approximately. A model nursery in Large Cardamom should have a mother block and an active sucker producing nursery area.

Establishment of Mother block:

Essentials of mother block:

- A mother garden has to be established using a single plant progeny under partial shade for uniform establishment.
- Selection of the cultivars/varieties based on the altitude. Only selected *elite clones to be used.

  High altitude (>1515 m MSL): Ramsey, Varlangey, Ramla and ICRI Sikkim 1

  Medium altitude (975-1515 m MSL): Sawney, ICRI Sikkim 2

  Low altitude (< 975 m MSL): Golsey, Seremna.
- An area of 1 ha mother garden is required to establish a sucker nursery of 1 acre.
- Maintenance of the mother garden has to be done regularly by providing the recommended nutrient package.
- Adopt scientific management practices for control of pests & diseases. Care should be taken immediately to uproot and destroy the plants with viral symptoms – Zero tolerance to viral diseases.
- Mother block need to be re-planted once in ten years.
- Regular monthly inspection of the mother garden has to be done and the registers should be maintained with monthly calendar of operations **(Annexure I).**
- Proper fencing and boards displaying name of the cultivars and details should be displayed in the mother garden.
- 10 % of the mother plants is to be allowed to yield.
- If the nursery men does not have mother garden of their own, then sucker collection can be done from other high yielding plantations, provided the specific standards for mother garden should be strictly followed.

***elite clones -** The suckers collected from high yielding, pest and disease-free, plantations having one mature tiller with one or two immature tillers or vegetative buds is used as planting units.

Selection of site

- Forest loamy soil with gentle to medium slopes

Natural shade of 50 % is ideal. The most common shade trees are *Alnus nepalensis* (Utis in Nepali), *Terminalia myriocarpa* (Panisaj), *Bucklandia* spp. *(Pipli), Macaranga denticulata* (Malato), *Edgeworthia gardneri* (Argeli), *Viburnum erubescens* (Asare), *Macsa chisia* (Bilaune), *Symplocos theifolia* (Kharane), *Albizzia lebbeck* (Siris), *Erythrina indica* (Phaledo), *Eurja tapanica* (Jhingani), *Schima wallichii* (Chilaune) etc.

Soil Type

- Deep, a well drained soil with loamy texture with pH 5.0-5.5 is best suited.
- Soil should be rich in organic matter.

Land preparation

- Selected land is cleared for weed growth before onset of monsoon.
- Optimum spacing of 1.5 m x 1.5 m from the centre of the pit is recommended for all cultivars.
- Pits of size 30 cm x 30 cm x 30 cm are prepared on contours. Pits are left open for weathering for a fortnight and then filled with top soil mixed with cow dung compost/ FYM @2-3 kg/pit.
- Pit making and filling operation should be completed in the third week of May before onset of pre-monsoon showers.

Planting

- Planting is done in June- July.
- A mature tiller with 2-3 immature tillers/ vegetative buds is used as planting unit.
- Planting materials of single plant progeny has to be collected from certified nurseries.
- Suckers are planted by scooping a little soil from the center of the pits and planted up to the collar zone.
- Deep planting should be avoided.
- Staking is needed to avoid lodging from heavy rain and wind.
- Mulching is done at the base of the plant.

Nutrient management

- Application of well – decomposed cattle manure/compost or organic products @ 5 kg/plant at least twice a year in April-May and August-September is beneficial.
- Vermicompost may be applied @ 1 kg/clump in two equal doses in combination with FYM.

Mulching and soil management

- Mulching at the plant base with dry leaves/grass or other easily degradable organic materials is good for conserving both moisture and soil during the month of November - March.

Weed management

- Three rounds of weeding are required for effective control of weed growth in initial two to three years.
- From around the plant base weeds are pulled out by hand and in inter-space needs only slash weeding with sickle.
- Clean weeding is not advised as the crop is found to be a good colonizer.
- While weeding dried shoots and other thrashed materials are used as mulch around the plant base for conserving moisture in the ensuing dry months.
- Cover the exposed roots with the top soil and prevent weed growth around the plant base.

Water management

- Irrigation is required at least once in 10 days during dry months in October to March depending upon the moisture level in the soil.
- Irrigation using hose/sprinkler/surface irrigation through small channels is advised.
- Water harvesting pits made in between four plants of nearby rows during rainy season can to some extent support the water requirement of the crop.

Shade management

- Dense shade or less shade hinders optimum crop growth and production.
- About 50% shade is found ideal. The lopping of branches to remove excess shade has to be done before the onset of the monsoon (May – June).
- Over-exposure to direct sunlight causes yellowing of leaves. Therefore, judicious shade management is very important for good growth.

Establishment of Active Sucker Nursery

- Only selected clones of the relevant cultivars are to be used for multiplication.
- For sucker planting one mature tiller with two immature tillers or vegetative buds are used as planting unit.
- 20,000 suckers can be maintained in 1 acre of nursery.

Site of the nursery

- Nursery should be about 500 m away from the main plantation to avoid occurrence of pests and diseases due to vector movement.
- Irrigation facility should be available and should be easily accessible by road.
- Should be in open areas where pandal can be erected with 50% shade net to ensure uniform shade condition.

Irrigation

- Irrigation using hose/sprinkler and the flowing water should not be allowed inside the nurseries.

Preparation of trenches

- The trenches should be of 45 cm (1½ ft.) width and 30 cm (1 ft.) depth with convenient length and may be made across the slopes of the field.
- Top soil 15 cm (½ ft.) to be kept separately from the trench on the upside.
- Lower side 15 cm soil to be forked thoroughly.
- Dried leaves to be first applied as layer in the trench.
- Then the trench to be filled with top soil mixed with cow dung compost.
- Spacing of 30 cm is required in between two trenches.
- The planting units to be planted at spacing of 45 cm (1 ½ ft.) in between with proper staking.

Planting season

- Last week of May to June.

Erection of Pandals/Structures

- Overhead pandals using 50% shade net is mandatory for uniform establishment of the plants in the nursery.

Maintenance of the nursery

- Thick mulching with dry leaf/grass to be applied at the base of plant.
- Irrigation to be done during October-March depending on the soil moisture condition.
- Well decomposed cattle manure should be applied during May–June & September–October depending on soil moisture.
- The disease and pest incidence to be monitored from time to time. Viral disease affected plants to be uprooted and destroyed immediately.
- Labeling and tagging of the cultivars for sale should be done.
- Calendar of operations has to be displayed in the sucker nursery.
- Timeline for large cardamom sucker Nursery from site selection to Main field planting need to be followed **(Annexure II)**.

- Stock and sale registers has to be maintained and regularly updated.

Cost for establishment of pandals

- Establishing a sucker nursery of large cardamom in an area of one acre involves an expenditure of Rs. 3.00 lakhs, if pandal is raised on bamboo poles and Rs. 5.00 lakhs, if the pandal is raised on iron pole **(Annexure III).**

Pests and their Management in Mother block and Sucker Nursery

1. Leaf eating Caterpillar: *Artona chorista* Jordon

Seasonal occurrence: The pest occurs sporadically in epidemic form every year in all the cardamom growing area.

Symptoms: The leaf caterpillar is monophagous and is highly host specific. The larvae are gregarious in nature and feed on lower layer of the leaf, leaving transparent epidermis and veins (skeletonization). The mature larvae cause defoliation of the plant leaving the mid rib of the leaves.

Management:

i) Collect the larvae and destroy in June-July and October-December.

ii) There are some natural enemies which kill the larvae and pupae of leaf caterpillars. Pentatomid bug and syrphid fly larvae are recorded as predators on leaf caterpillars. Two dipteran, *Nedina* sp., *Bactromyra sp.* and two hymenopteran *Venturia* sp. and *Nesochorus* sp. parasitoids are recorded as natural enemies of leaf caterpillars.

iii) Insecticides like Quinalphos 25 EC (0.05%) @ 2.0 ml /l of water are found effective against this pest and may be applied in areas not declared as organic and hence mechanical method of control is suggested to encourage the activity of natural enemies.

2. Stem Borer: *Glyphepterix* sp. (Glyphiperidae: Lepidoptera)

Seasonal occurrence: Stem borer incidence is noticed throughout the year. But in four periods, December-January, March-April, May-June and September-October their abundance is more.

Symptoms: The larvae feed on the central portion of the shoot. The central leaf of the plant gets dried up and this symptom is known as dead heart. Infestation of this pest is also indicated by the presence of entry holes plugged with excreta.

Management:

i) This pest can be controlled by removing infested shoots along with caterpillar.

ii) Spraying of neem oil 0.15 EC (1500 ppm) @ 3.0 ml/ l of water during July-October (two times at 20 days intervals) is effective.

3. Shoot fly: *Merochlorops dimorphus* Cherian (Chlororpidae: Diptera)

Seasonal occurrence: It is present throughout the year in large cardamom growing tract. The high incidence is recorded in new plantations within 1-3 year.

Symptoms: The tip of the shoot becomes brown and later whole shoot dries up. Larva bores the young shoot and feeds on the core of the pseudostem from the top to the bottom resulting in damage of central leaf ultimately leads to death of the tiller.

Management:

i) Infested young shoots should be removed at ground level and destroyed.

ii) Adult shoot fly can be trapped using fish bait and then killed.

iii) Application of neem seed kernel extract also reduces the pest problem.

4. White Grubs: *Holotrichia* sp. (Melolonthidae: Coleoptera)

Seasonal occurrence: The newly-hatched grubs emerge during June-August and continue to develop up to October/November. Adult beetles emerge by March-April and lay their eggs in the soil.

Symptoms: The grubs are white and "C" shaped with brown head. The grub feeds away the feeder root of the plants and the infested plant shows yellowing and withering symptoms.

Management:

i) Collect the beetles using hand nets during peak period of emergence i.e., during April-May and kill them.

ii) Light raking of soil before the insecticide application is essential for effective control of root grubs.

iii) Applying Quinalphos 1.5 ml/l 20 EC 0.075% @ 3.75 ml/l of water/plant in May and in September -October is effective but not advised in organic cultivation.

5. Aphids: The aphids cause more damage as a vector rather than a pest. The aphid's area associated with the transmission of viral diseases *(Foorkey and Chirke)* of large cardamom.

Seasonal occurrence: The aphid population is recorded high during summer months at lower altitudes. The major species are:

II. *Pentalonia nigronervosa* (Aphididae: Hemiptera).

II. *Micromyzus kalimpongensis* (Aphididae: Hemiptera)

III. *Rophalosiphum maidis* Fitch (Aphididae: Hemiptera).

IV. *Rophalosiphum padi* (Lin.) (Aphidadae: Hemiptera)

P. *nigronervosa* and *M. Kalimpongensis* are known to be as vectors of *"foorkey"* or virus yellow disease. The aphids colonize at the base (rhizome) of the clump and if population is more, they move to aerial portion of the clump. They remain mostly to exposed rhizomes and dried leaf sheaths suck the sap from the pseudostem. Maize aphids, *Rophalosiphum maidis* and *R. padi* are used to be on the lower surface of the leaves of large cardamom, congregating near the mid-rib and veins. These aphids are known to be the vector of another viral disease, mosaic streak or *"chirke"*.

Management:

I) The removal and destruction of diseased plants is helpful in control of the disease and in reduction of aphid population, ii) Spraying of 0.03% Difenthion 80 gm/100 l @ 1 ml/l of water or Phosphamidon 100 EC @3.0 ml/10 l of water after removal of "foorkey" or "chirke" affected clump in March-April gives adequate control of aphids in areas which is not declared as organic.

In some occasion minor pest like hairy caterpillar (*Eupterote* sp.) cause considerable loss in cardamom plantation. Other minor pests are mealy bugs (*Planococcus* sp.) and thrips (*Heliothrips haemorrhoidalis*).

Diseases and their Management in Mother block and Sucker Nursery

1.Blight *(Colletotrichum gloeosporioides)*. Blight is caused by *Colletotrichum gloeosporioides* and its perfect state *Glomerella cingulata* lesions on leaf and sheath carry black dots and are rough in its texture. These dots are identified as perithecia of the pathogen.

Seasonal occurrence: The disease appears generally with the advent of the pre-monsoon showers in April-May and progresses rapidly during the rainy season. However, in some areas the incidence starts during winter months (January-March).

Symptoms: Water-soaked lesions appear either at margins or tips or any other point on the leaves which rapidly enlarge, coalesce and cover major portion or the entire leaf lamina giving a blighted appearance. The advancing lesions are blackish brown in colour and margins give a yellow halo. In some cases, the entire lamina becomes yellowish and blighted.

The affected area becomes necrotic and dry up. Leaf sheath covering the pseudostem show blackish brown discolouration which extends up to rhizomes and subsequently turn into greyish or blackish patches with brown margins. Gradually the pseudostem becomes brittle and breaks in the middle or at the collar regions. In most cases, the lesions on the pseudostem become necrotic as a result the entire leaves dry out giving a burnt appearance. In other cases, flowering and seed-setting takes place but the seeds do not mature and remains whitish or light brown instead of natural black. Generally the roots are not infected. In the cultivar Varlangey the newly formed tillers in the diseased clump show pale yellowing and rosetting of leaves giving a stunted appearance as compared to the healthy plants.

Management: The mature bearing tillers cut during harvesting along with leaves and residues must be composted. During the composting process, temperature increase and most pathogens are killed. Compost pits for the purpose may be made at convenient places in each plantation prior to harvest. Use of EM (Effective Microorganisms) solution or cow dung slurry may be encouraged for easy composting. If this is followed at least for 2-3 years, the adoption of other management practices such as application of bio-control agents or permissible chemicals etc. would give better results. The tillers cut during harvest and other plant debris can also be burnt, wherever possible for safe disposal. However, burning is not permitted under organic norms. Most of the cultivars were found susceptible to the disease under natural conditions. The disease can be managed by the following methods.

- Proper phyto-sanitation by removal and destruction of disease affected plants/plant parts in the plantation and nursery.
- Pre-treatment of suckers with bioagent *Pseudomonas fluorescens* @ 5 l in 100 l water or Copper oxychloride @ 0.3% (i.e. 300 gm in 100 l water) at the time of planting in nursery/field.
- Destroy the collateral host plants such as Marigold, *Amomum dealbatum* (Churumpa), Canna, wild Colocasia, ornamental Basil etc.
- Regulate shade in thickly shaded areas and also ensure proper shade in open conditions.
- Apply biocontrol agent *Trichoderma* mixed with FYM (1:100) @ 2 kg / clump at plant soil basin.
- Prophylactic spraying and drenching of *Pseudomonas fluorescens* @ 3-4 l/clump during April last week or May 1st week. Repeat the application again in August & September (mix 3-5 liters of the bioagent in100 liters of water) or application of 1% Bordeaux mixture as prophylactic spray before onset of monsoon and after monsoon. Spray and drench 0.3% (i.e 300 gm in 100 lit water) Copper oxychloride (50% WP). Three sprays at 20 - 25 days interval may be given based on disease intensity. If the soil is drenched with Copper oxychloride or spray Bordeaux mixture, bioagents should be applied

only after 15 days interval. Avoid mixing Copper fungicides with biocontrol agents.

Carbendazim + Mancozeb @ 0.3% (150 g + 150 g in 100 l water) may be sprayed at 20 days interval in areas of traditional cultivation based on disease intensity and is not advisable for organic system.

2. Phoma leaf spot disease

Seasonal Occurrence: Rapid spread during continuous rain and consequent damage indicate its potential to devastate. The disease was found to occur during late winter and peak rainy periods.

Symptoms: Numerous water-soaked lesions, round in shape appear on the lamina which coalesce and become yellowish and dry out.

Management

- Field phyto-sanitation by removal and destruction of disease affected plants or plant parts.
- Provide adequate drainage.
- Spray 1% Bordeaux mixture at 20-25 days interval during rainy days based on disease severity.
- Spray Carbendazim + Mancozeb @ 0.3 % (150 g + 150 g in 100 l water) in areas of traditional cultivation and not for organic system.

3. Leaf streak disease *(Pestalotiopsis royenae)*

Symptoms: The formation of numerous translucent streaks on young leaves along the veins. The infection starts from emerging folded leaves.

Management

- Three rounds of 0.2 % Copper oxychloride (i.e., 200 g in 100 l water) or 1% Bordeaux mixture at 15 days interval can control the disease.

Chirke disease

The corn aphid *Rophalosiphum maidis* is one of the prevalent insect-vectors of the disease. Primary spread of the disease from one area to another is through infected rhizome and further spread within the field takes place by contaminated farm implements and aphids.

Symptoms:

- The disease is characterized by mosaic appearance on leaves.
- The symptom is more prominent on young emerged leaves where discrete pale green to yellow longitudinal stripes running parallel to each other can be seen.
- The above symptoms are masked on mature leaves.
- The flowering is greatly reduced, gradually reducing the yield over the years. The disease is caused by virus and transmitted through insect vector and mechanically through sap.

5. *Foorkey* disease

The causal agent of the disease is virus which is not transmitted mechanically through sap but through vector, *viz.,* banana black aphid, *Pentalonia nigronervosa* and *Micromyzus kalimpongensis*. It is transmitted in a persistent manner, means the virus can survive inside the aphid for a long time after acquisition feeding on infected plants. The virus also spread primarily through infected rhizomes.

Symptoms

- The affected plants produce many stunted shoots which fail to produce flowers. The leaves become small, lightly curled and pale green in colour. Sometimes, slightly broadened leaves resembling pan is also seen.
- The inflorescence becomes stunted, thereby producing no flowers and fruits.

Management of viral diseases

Viral diseases affected plants are difficult to cure. Early identification of the diseased plants and reducing the spread is the easy ways to tackle the problem.

1. Monitor the plantation every month particularly during rainy season and carefully identify the diseased plants.
2. The diseased plants may be uprooted and destroyed as and when they are seen. They should be taken to an isolated place, chopped into small pieces and buried in pits for quick decomposition. As an alternative, mass uprooting and burning of infected plants at the village /area level could be taken up for eradication of the disease.
3. Never collect planting materials from an infected garden or apparently healthy plants from severely infected gardens.
4. Establish nursery about 500 m away from main plantation in order to avoid aphid colonization.
5. Maintain clean clumps by removing old tillers with loosened leaf sheath so that aphids will not colonize.
6. During plantation monitoring, especially prior to harvesting, the plantation must be inspected carefully for identification of diseased plants. These plants may be uprooted and destroyed on priority. The knife and other implements used for the purpose should not be used on healthy plants since disease could be transmitted through sap. Dip the implements in hot water for half an hour for killing the inoculum before going to the healthy plants for harvesting or cleaning.

Crop Calendar for Mother Garden

Annexure I

January - February	• The base of the plants may be mulched with forest leaves. • Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals. • Leaf caterpillar/stem borer infested plant parts may be collected and destroyed mechanically. If infestation is more spray recommended pesticides. • Regular watering may be done based on available soil moisture in the mother garden.
March - April	• Irrigation may be done based on available soil moisture in mother garden. • Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals. • For management of *Colletotrichum* blight prophylactic spray and drench of *Pseudomonas fluorescens* (3-5 l. in100 l water) during April last week after removing blight infected plants (Phytosanitation) or spraying of COC 0.3% at the time of planting. • Regular inspections may be carried out to observe shoot fly/stem borer incidence if any, may be handpicked and destroyed mechanically. If infestation is more spray recommended pesticides. • One round of weeding may be done for easy movement of bumble bee and honey bee for pollination.
May - June	• Decomposed cattle manure/organic manure may be applied in the mother garden. • Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals. • For management of *Colletotrichum* blight prophylactic spray and drench of *Pseudomonas fluorescens* (3-5 l. in100 l water) during first week of May after removing blight infected plants (Phytosanitation) or spraying of COC 0.3% at the time of planting.

May - June	• Regular inspections may be carried out to observe caterpillar/stem borer/shoot fly incidence if any, may be handpicked and destroyed mechanically. If infestation is more spray recommended pesticides. • Suitable native shade tree saplings may be used for planting where shade is less and where shade is more it may be regulated by loping the excess shade. • Bordeaux mixture1% as prophylactic spray during onset of monsoon.
July – August	• Replanting/gap filling operation may be completed within 1st fortnight of July if not done earlier. • Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals. • For management of *Collectotrichum* blight prophylactic spray and drench of *Pseudomonas fluorescens* (3-5 l. in100 l water) during last week of August after removing blight infected plants (Phytosanitation) or spraying of COC 0.3% at the time of planting in nursery/ field. • Regular inspections may be carried out to observe caterpillar/stem borer/shoot fly incidence if any, may be handpicked and destroyed mechanically. If infestation is more spray recommended pesticides. • In lower elevation capsule start maturing and one round of weeding and threshing may be done for the plant allowed for yielding in mother garden. • Harvesting may be carried out based on maturity in August last.
September - October	• Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals. • For management of *Collectotrichum* blight prophylactic spray and drench of *Pseudomonas fluorescens* (3-5 l in100 l water) during first week of September after removing blight infected plants (Phytosanitation) or spraying of COC 0.3% at the time of planting in nursery/ field.

September - October	• Regular inspections may be carried out to observe caterpillar/stem borer/shoot fly incidence if any, may be handpicked and destroyed mechanically. If infestation is more spray recommended pesticides. • Capsule start maturing in higher elevation and one round of weeding and threshing may be done if not carried out earlier, for the plant allowed for yielding in mother garden. • Harvesting may be done when capsules are fully matured and curing can be carried out immediately earlier in the plant allowed for yielding in mother garden. • Second round of application of dried or powdered cattle manure/organic manure may be carried out in the mother garden to boost up the production.
November - December	• Harvesting has to be completed in higher elevation based on maturity. • Curing may be carried out immediately in the plant allowed for yielding in mother garden. • After harvest of the crop, the dried leaves and shoot may be dumped in pit for composting instead of using as mulching material. • The base of the plants may be mulched with forest leaves. • Viral disease (chirke and foorkey) infected plants may be destroyed by uprooting and burial at regular intervals.

Timeline for large cardamom sucker Nursery from site selection to Main field planting

Annexure II

I Year

March - April	• Selection of site with gentle to medium slopes, deep well drained soil with loamy texture with pH 5.0-5.5 • Prepare trenches and planting may be done • Overhead construction of pandal using 50% shade net • Application of cowdung compost
May - June	• Disease & pest affected plant parts may be removed and destroyed. • Planting may be completed in the case of new nursery • Staking should be given for each planting unit for protection from lodging
July – August	• Nursery bed may be mulched properly with dried leaves/organic matter/grass. • Disease/pest affected suckers may be removed and destroyed. If infestation is more apply recommended pesticides. • Weeding may be carried out if necessary.
September - October	• Sucker Nursery may be mulched properly with dried forest leaves. • Disease/pest infested suckers may be removed and destroyed. • Necessary weeding may be carried out. • Application of cowdung compost

November - December	• Nursery bed may be mulched properly with dried forest leaves/grass/organic matter. • Irrigate the nursery based on available soil moisture. • Disease/pest infested suckers/plant parts may be removed and destroyed. If infestation is more apply recommended pesticides.
January - February	• Regular watering may be done in sucker nursery based on available soil moisture. • If any symptoms of disease/pest infestation noticed it may be controlled immediately by the application of recommended pesticides. • Need based weeding and irrigation have to be done.

II Year

March - April	• Regular watering may be done in sucker nursery based on available soil moisture. • Disease/pest infested suckers may be removed and destroyed. • One round of weeding followed by forking of soil at plant base.
May - June	• Clones are ready for planting in main field.

Cost for Establishment of Sucker Nursery

Annexure III

S.No	Particulars	Quantity	Rate/Unit (Rs)	Total Cost (Rs)
I	**Labour**	Nos.		
	Trench Making	30	500	15,000
	Planting	20	500	10,000
	Application of FYM	10	500	5,000
	Irrigation	30	500	15,000
	Weeding	20	500	10,000
	TOTAL			**55,000**
II	**Inputs**			
	Suckers (planting material)*	20000	10	2,00,000
	Plant protection chemicals			10,000
	Agro Shade Net	4000 mt^2	30	1,20,000
	Iron Poles & Fencing	50		2,15,000
	FYM	10000 kg	4	40,000
	Vermicompost	4000 kg	15	60,000
	Transportation Cost			10,000
	TOTAL			**6,55,000**
III	**Others**			
	Land Lease/year			15,000
	Miscellaneous			25,000
	Total C			40,000
IV	**Total Cost of Production (I+II+III)**			**7,50,000**
V	Total number of sucker produced /Acre @1:5	1,00,000		
VI	**Cost per Sucker**			7.5
	*Planting material requirement 20000 nos. (One mature tiller with two vegetative buds total 20000 nos.) for one acre area.			