CHAPTER III

Cardamom Cultivation Pattern and Marketing of Cardamom

3.1. INTRODUCTION

Large cardamom (amomum subulatum), is one of the main cash crops cultivated in Theni district of Tamil Nadu. With annual production of over 4,500 MT from a total cultivation area of about 23,500 hectares, large cardamom is the main cash crop of Theni. India is the largest producer of large cardamom with 54% share in world production, and Theni contributes up to 88% of India’s production. It is also cultivated in Nepal and Bhutan. It is used as a spice in several ayurvedic preparations. It contains 2-3% essential oil and possesses medicinal properties. Large cardamom has a pleasant aromatic odour, due to which it is extensively used for flavouring vegetables and many food preparations in India. It is also used as an essential ingredient in mixed spices preparation. Apart from aroma, large cardamom also has high medicinal value. It is also reported that large cardamom seeds are used as preventive as well as curative measure for throat troubles, congestion of lungs, inflammation of eyelids, digestive disorders and in the treatment of pulmonary tuberculosis.

Climate and soil

The crop grows well under the shade of forest trees at altitudes ranging from 1000-2000 metres with a rainfall of 3000-3500 mm per annum. Deep and well drained soils with a loamy texture are best suited for cardamom. The soil in Sikkim is generally rich in organic matter and nitrogen, medium in available
phosphorus and medium to high in available potash. The soils have a pH range from 4.5 to 6.0. Even though the crop can be grown in undulating and steep terrains, land with a more moderate slope is preferred.

Propagation

Propagation of large cardamom is done through seeds and suckers. Propagation through seeds enables the production of a large number of seedlings. Virus diseases are not transmitted through seeds and therefore the seedlings are free from viral diseases, if adequate care is taken to isolate and protect the nursery from fresh infection. Plants raised from seeds need not necessarily be high yielders even if they are collected from very productive plants due to cross-pollination. The major pollination is done by wild bees and the rest by honey bees. Planting suckers on the other hand ensures true to type and high productivity if they are collected from high yielding plants.

Plant Characteristics

The habitat of small cardamom is the evergreen forests of Western Ghats. It is grown in areas where the annual rainfall ranges from 1500-4000 mm with a temperature range of 10-35 ºC and an altitude of 600-1200 m above MSL. Cardamom is generally grown in forest loam soils rich in available phosphorus and potassium. The crop is raised mainly on well drained, deep, good textured soils rich in humus.
3.2. SELECTION CRITERIA FOR PLANTING MATERIALS

Nursery

Ripe capsules of the desired cultivar are collected from high yielding plants during September-October. The seeds are extracted by gently pressing the capsules. In order to increase the germination percentage, seeds can be treated with concentrated sulfuric acid or nitric acid for not more than two minutes. The extracted seeds are washed in cold water four times to remove the mucilaginous coating. The washed seeds are drained and mixed with ash and allowed to dry in shade for 2 or 3 days. The seeds should be sown in the nursery within a fortnight. Sowing in September is the best for high germination. Sowing during southwest monsoon and winter should be avoided.

When it becomes necessary to store the seeds, it is advisable to store them in capsule form. It can be preserved in this form for one month, without deterioration of viability. Polythene lined gunny bags can be used for this.

In Kerala and Tamil Nadu, 18 month old seedlings are used for planting. The seeds are sown in primary nursery from where the young seedlings are transplanted to a secondary nursery and maintained for one year before planting in the main field.

Primary Nursery

The nursery site is selected in open, well-drained areas, near a source of water. The land is dug to a depth of 30 cm, cleared of all stubbles and stones; and clods are broken. Beds of size 6 x 1 x 0.3 m are then prepared. Jungle soil is spread in a thin layer over the nursery bed. Seeds are shown on the bed in lines. For an area of 1 m², 10 g of seed is required. Sixty grams of seeds will be required for a
nursery bed of 6 m². The seeds are covered with a very thin layer of fine soil. The nursery bed is mulched with dry grass. Potha grass (Grenetia stricta) commonly seen in high range areas is a suitable material for this purpose. Grass is spread to a thickness of about 2 cm. Paddy straw can also be used for mulching. After sowing, beds have to be watered every day in the morning and evening. The mulch should be removed on commencement of germination. The seedlings have to be protected by providing shade pandals. Regular watering, weeding and protection from pests and diseases are to be attended to. During June-July, seedlings from the primary nursery are transplanted to the secondary nursery.

Secondary Nursery

After preparing the site properly, form nursery beds of 6 x 1 x 0.3 m. Mixing of well decomposed cattle manure and wood ash with the top layer of the soil will help the seedlings to establish well and to grow vigorously. During June-July, the seedlings from the primary nursery are transplanted at a spacing of 25-30 cm. Shade pandals should be provided before transplanting. Overhead pandals or individual pandals for each bed may be erected. Mulching the bed with dry leaves will help to conserve soil moisture. Regular watering during dry months, weeding, application of fertilizers, control of pests and diseases and mulching are the essential operations for the maintenance of the secondary nursery. One month before uprooting, the pandal should be removed to encourage better tillering.

Sucker multiplication nursery

As mentioned earlier, suckers should be generated only in sucker multiplication nursery where adequate precautions are taken to ensure that viral diseases are not transmitted through the suckers produced. The site for such a
nursery should be located at least 500 metres away from large cardamom plantations. They are established either under the shade of forest trees or under shade *pandals* with 50% shade using black agro shade nets. Trenches of 30x30 cm are prepared at convenient lengths with an inter space of 30 cm. Well decomposed cattle manure or compost is mixed with the soil and the trenches are filled to the brim. Then the suckers from high yielding disease free plantations, with one grown up shoot with an emerging bud are planted at 30 cm apart in the trenches. The time for planting is May-June. After planting, the plant base is mulched with dried forest leaves. The multiplication rate in this method is about 1:8 in one years time. The grownup tillers are split into units of one tiller with an emerging bud and planted in the main field during June-July.

**Polybag Nursery**

Polybags can be used for raising secondary seedlings. For such nurseries, seeds are to be sown in beds in primary nurseries in September and transplanted to polybags in December-January. These seedlings would be ready for planting in June-July. In this case, nursery period could be reduced by 6 to 7 months.

**Rhizome multiplication**

This may be taken up from the first week of March to the first fortnight of October. The site is selected in open, gently sloping and well-drained areas near a source of water. Trenches of 45 cm width, 45 cm depth and convenient length are taken across the slope or along the contour 1.8 m apart. They are filled with equal quantity of humus rich topsoil, sand and cattle manure. Uproot a part of the high yielding disease free mother clump identified in the plantation. Trim the roots and separate the suckers so that the minimum planting unit consists of one grown up
tiller and a growing young shoot. Plant them at a spacing of 1.80 m x 0.60 m in filled up trenches. Provide irrigation once in a fortnight and adopt necessary plant protection measures. Apply fertilizers @ 100:50:200 kg/ha N:P2O5:K2O in six splits at an interval of two months. Apply neem cake @ 100-150 g/plant along with fertilizers. On an average, 20 to 30 suckers / initial planting unit can be produced within one year of planting. Care should be taken to identify and collect mother clumps only from areas totally free from ‘katte’ disease.

Soil treatment in nursery

It is recommended that the primary and secondary nursery soil may be drenched with formalin 2% solution and covered with polythene sheets for 3 days. Planting should be taken up only 15 days after treatment to avoid phytotoxicity.

Shade

Since inadequate as well as excessive levels of shade are harmful to the crop, regulation of shade is inevitable. There should be sufficient shade to protect cardamom plant during the hot season. By regulating the shade before the monsoon, more light becomes available to the plant during the rainy season. Red cedar or chandana-vempu (Toona ciliata) is an ideal shade tree. It sheds the leaves during rainy season and thus provides natural shade regulation. Some of the other shade trees are kurangatti (Acrocarpus fraxinifolius), vellakil (Dysoxylum malabaricum) and thelli (Canarium strictum).
3.3. VARIETIES

- ICRI-1, ICRI-2, PV-1 and PV-2.
- Cultivars
  - Malabar: Suitable for areas from 600 to 1200 m elevation
  - Mysore: Suitable for areas from 900 to 1200 m elevation
  - Vazhukka: Suitable for areas from 900 to 1200 m elevation

3.4. SEEDS AND CULTIVATION

Land preparation

Planting is done during June-July when there is enough moisture in the soil. The land selected for planting is cleared of all undergrowth, weeds, etc., for new planting, or if it is replanting, old plants may be removed. Pits of size 30x30x30 cm are prepared on the contour of the hill at a spacing of 1.5 x1.5 m after the onset of monsoon showers. The pits are left for weathering for a fortnight and then filled with topsoil mixed with compost at the rate of 1-3 kg. per pit. Seedlings/suckers are planted in the middle of the pit. Care should be taken not to plant the seedlings/rhizomes very deep in the pit. After planting the seedling/suckers may be staked and the base of the plant is mulched with dry leaves.

Weeding

Weed control in the plantations is important for the maximum utilization of the available soil moisture and nutrients by the plant. Three rounds of weeding are required for effective control of the weed growth in the initial two to three years. Weeding can either be hand weeding or sickle weeding depending upon the intensity of weed growth. From around the plant base the weeds can be pulled out
by hand and the weeds in the inter space need only be slashed with a sickle. While weeding, dried shoots and other trashed materials can be used as mulch around the plant base to conserve moisture in the ensuing dry months, and to prevent weed growth around the plant base.

**Soil and moisture conservation**

Cardamom is mainly grown in hilly terrain. The topography and the wet climate of Sikkim permits soil erosion to a considerable extent. Intensive operations which loosen and expose the soil will increase soil erosion and therefore only minimum tillage operations should be followed. As far as possible, contour terraces may be made well before taking up planting operations. This helps in reducing soil erosion and soil moisture conservation. Though contour terracing is expensive and requires high initial investment, the long term benefit will compensate the initial extra expenditure.

**Irrigation**

In some of the large cardamom plantations, water sources are available which can be exploited to irrigate the crop by gravity flow, either through pipes, sprinklers or flood irrigation through open channels. It is observed that productivity is higher in plantations where irrigation is provided. For sustainable and better yield the plants may be watered during the dry months. Depending on the availability of water sources, hose, or sprinkler or flood irrigation through channels can be adopted. Hose irrigation can be done at the rate of 40-50 litres per plant at fortnightly intervals. In case of sprinkler, irrigation equivalent to 35-45 mm of rain at fortnightly intervals is recommended.
Main field planting

Cardamom plantation is raised in forests under the shade of tall trees. For raising a new cardamom plantation, the undergrowth of bushes is cleared. When open areas like marshy valleys and grasslands are selected for raising new plantation, shade trees have to be raised before planting cardamom seedlings. The quick growing shade trees like dadap (Erythrina lithosperma) is generally used for this purpose. Cuttings of this tree are used for planting. But this tree is a host of root knot nematode, which infests cardamom. Other quick growing trees like Albizia can also be used. Useful trees like jack and eucalyptus can be used along with red cedar, wild nutmeg, kurangatti etc.

Spacing

Mysore and Vazhukka: 2 x 2 m to 3 x 2 m depending on the fertility of the soil Malabar: 1.5 x 1.5 m to 2 x 2 m depending on the fertility of the soil. The recommended size of pits is 60 x 60 x 35 cm. The pits are filled with rich topsoil at least two months in advance of planting the seedlings. Application of well decomposed FYM or compost or leaf mould and 100 g of rock phosphate with the topsoil in the pit will help in proper establishment and quick growth of plants. If the selected site is a hill slope, terraces may be formed before digging pits. Planting can be done with the commencement of southwest monsoon, before the heavy rains. A small pit may be formed inside the pit by scooping out soil at the centre of the pit for planting seedlings. The soil may be put just to cover the rhizomes. Care should be taken to ensure that the rhizomes do not go deep into the soil.
Cultural operations

A regular schedule of cultural practices consisting weeding, mulching, trashing, shade regulation, fertilizer application, irrigation, etc. will have to be undertaken. Sufficient mulch should be applied at the base of the plant during December to reduce the ill effects of drought during summer months and to conserve soil moisture. Sickle weeding is essential which has to be carried out frequently depending upon the intensity of weeds. Forking is necessary in hard soils, which is to be carried out in October-November.

Trashing (removal of old and dried shoots, leaves and dried panicles) should be taken up once in a year during June-July, with the commencement of monsoon. This will help to prevent the spread of diseases and expose the panicles to easy visit by honeybees. Soil conservation measures, maintenance of drainage channels and such other operations may be taken up promptly.

Bee-keeping for better pollination

The main pollination agent in cardamom is honeybee (Apis cerana indica). Maintaining four bee colonies per hectare during the flowering season is recommended for increasing fruit set and production of capsules.

3.5. NUTRIENT MANAGEMENT

Application of organic manures such as FYM, cow dung or compost @ 5 kg / plant or neem cake @ 1-2 kg / plant may be done during June-July. The present recommendation of nutrients for cardamom in Kerala is N:P2O5:K2O @ 75:75:150 kg/ha. The fertilizers may be applied in two split doses, before and after the southwest monsoon, in a circular band of 20 cm wide and 30-40 cm away from the base of the clumps, and mixed with soil.
3.6. PEST MANAGEMENT

Control of pests and diseases in the nursery Rhizome weevil (Prodioctes haematicus)

This is a serious pest in the secondary nursery especially where seedlings are raised continuously year after year. The grubs feed on the rhizome and basal portion of the stem. This results in drying of leaves and breaking of stem at the base. Drenching the nursery beds with chlorpyrifos at 0.04% can control the pest.

Shoot fly (Formosina flavipes)

The pest is observed in the nursery during January to May. Dead heart or decay of the central spindle is the external symptom. Spraying of quinalphos 0.025% or application of phorate granules @ 1 g ai/m2 is recommended for the control of the pest.

Shoot borer (Conogethes punctiferalis)

The caterpillar bores into the stem and feeds on the internal contents. This results in the decay of the central spindle and production of dead heart. Faecal matter of the caterpillar can be seen coming out through the holes. Spraying with quinalphos 0.025%, carbaryl 0.1%, monocrotophos, fenthion or dimethoate at 0.05% or phenthoate at 0.1% is recommended against the shoot borer.

Nematodes

Nematodes are observed as serious pests in cardamom nurseries. Roots of cardamom seedlings are infested mainly by root knot nematode (Meloidogyne incognita). Lesion nematodes (Pratylenchus) are also seen in cardamom roots and soils. The main symptoms of nematode infestation are galls on the root tips, profuse tillering, stunted and weak tillers, yellowing and drying of leaves and
production of narrow, brittle and abnormal leaves. Treatment of soil as detailed above is an effective method to control nematode.

Fumigation of primary and secondary nursery beds with methyl bromide is another effective method for the control of nematodes in the nursery. Five hundred gram of methyl bromide is required for 10 m² area. The treated area has to be kept covered with polythene sheet for two to three days. Pruning of infested roots tips before planting is also recommended.

Treat the plants in the nursery with carbofuran @ 5 kg ai/ha after 10 days of germination and this is repeated after 3 months. In secondary nurseries, the plants may be treated with carbofuran @ 10 kg ai/ha after transplanting and every three months thereafter.

**Control of pests and diseases in the plantation**

**Cardamom thrips (Sciothrips cardamomi)**

This insect is a serious pest of cardamom. It colonizes and breeds in unopened leaves, leaf sheath, flower bracts and flower tubes. It lacerates and feeds on the exuding sap from the aerial parts. Infestation on the panicle and flower buds results in stunted growth of panicles, shedding of flower buds and warty growth on the surviving capsules. The infested capsules are light in weight, inferior in quality and fetch very low price in the market. Since the pest population is high during dry months from December to May, pesticide application during this period is important. Four sprayings or dusting of insecticide during this period is recommended. Insecticide application can be skipped during rainy months of June and July. Three more sprayings are to be given during the period from August-November. Any of the following insecticides are recommended for thrips control.
**EC formulations:** Quinalphos 0.025%, fenthion 0.03%, phenthoate 0.03%, phosalone 0.05%, monocrotophos 0.025%, fenitrothion 0.05%, formothion 0.03%, dimethoate 0.05%.

**Dust formulation:** Quinalphos 1.5%, carbaryl 10%, phosalone 4% or phenthoate 4% each at 25 kg/ha

Shoot/capsule borer (Conogethes punctiferalis)

It is a serious problem to cardamom growers of Kerala, Tamil Nadu and Karnataka. At the early stage of the crop, the caterpillars of this yellow coloured moth bore into the core of the aerial stem resulting in the death of central spindle, which appears as characteristic dead hearts.

At the time of flowering, when the caterpillars attack the panicles and spikes it may lead to flower shedding and drying up of the attacked portions. At a later stage of the crop, the caterpillars bore into the capsules, feed on the seeds and make them hollow. The presence of excreta at the region of attack indicates presence of the caterpillars in the pseudostem, inflorescence and pods.

Pest infestation is pronounced in three seasons viz. January-February, June and September-October.

**Control**

Late stages of larvae bore into the pseudostem and remain there. Insecticides sprayed at this time may not give adequate control of the pest. For an effective management of the pest, the insecticides have to be targeted on early stages of the larvae, which are usually present within 15-20 days after adult emergence in the field. Spraying fenthion 0.05% or monocrotophos 0.05% is recommended during the months of February-March and September-October.
Leaf eating caterpillars

There are 10 species of caterpillars feeding on cardamom leaves. Out of these, seven species are hairy and appear in large numbers during certain seasons causing extensive defoliation. For controlling the leaf caterpillars, mechanical collection and destruction and spraying of any contact insecticide are recommended.

Cardamom whitefly

It is a serious pest in cardamom growing tracts of Kerala. The adult is a small soft-bodied insect, about 2 mm long and having two pairs of white wings. The nymphs are elliptical and pale green. The nymphs secrete sticky honeydew, which drops on to lower leaves. On these, black sooty mould develops, which interrupts photosynthesis of the leaves.

Control

The flies are attracted towards yellow colour. So metal sheets painted yellow and coated with sticky materials, such as castor oil or poly-venyl butanol would serve as traps. By placing such yellow sticky traps between rows of cardamom plants, population of adults can be monitored and adults trapped to some extent. Nymphs are effectively controlled by spraying the lower surface of leaves with a mixture of neem oil (500 ml) and triton (500 ml) in 100 litre of water. Acephate 0.075% and triazophos 0.04% are equally effective. The spray may be repeated two or three times at 15 days interval.
**Cardamom root grubs (Basilepta fulvicorne)**

The grubs of a small, greenish blue beetle cause damage. The grubs are short, stout, pale white in colour and often assume a shape resembling 'C', which feeds on cardamom roots. The symptoms start as yellowing of leaves, which later result in the drying up and death of the plant.

**Control**

Collect the beetle with hand nets or sticky traps at the time of mass emergence (March-April and August-September) and destroy. Early stages of the grub which are usually present in soil during May-June and September-October can be controlled either by drenching chlorpyriphos 0.04% @ 3-4 litre per clump or by applying phorate @ 2-4 g ai/ha 10-15 cm around the plant.

**Cardamom scale (Aulacaspis sp.)**

This scale insect is found on the lower surface of leaves, leaf sheath, panicles and fruit stalk. As a result of damage, capsules get shrivelled, panicles become dry and the leaves become yellow. The pest is mostly seen during summer months.

**Control**

Spray monocrotophos or fenthion @ 0.05 % during the peak season.

**Nematodes (Meloidogyne sp.)**

Root knot nematodes are the most common nematode species associated with cardamom plantations. Common symptoms are necrosis of leaf tips and margins, narrowing of leaves, thickening of veins, reduction of internodal length and consequent appearance of leaves as rosette. Roots branch heavily and galls appear on them. Plant becomes highly stunted.
Control

Frequent change of nursery beds will help to reduce nematode infection in nurseries. In case of infection in primary nurseries, application of carbofuran @ 80 g per 6 m² bed and in secondary nurseries, application of carbofuran @ 200 g / 6 m² bed will control the pest. In plantation, carbofuran @ 60-80 g/plant or 20-40 g of phorate with 300-500 g of neem cake per plant may be applied. Application may be repeated after three months.

3.7. DISEASE MANAGEMENT

Nursery Diseases

Damping off

This disease is caused by Pythium vexans and Rhizoctonia solani. Infection is observed at the collar region. Provide good drainage, and spray and drench the nursery with 1% Bordeaux mixture or 0.2% copper oxychloride.

Nursery leaf spot

This disease is caused by Phyllosticta elettariae. Pale specks appear on the leaf lamina, which dry up and become paper white. Spraying the plants with mancozeb 0.25% at fortnightly intervals is effective in controlling the disease. The other diseases are Sphaceloma leaf spot, Cercospora leaf spot, rust and sooty mould.

Mainfield Diseases

Katte or mosaic

This is a virus disease, which is transmitted by the banana aphid, Pentalonia nigronervosa. The symptoms consist of discontinuous stripes of light green colour running almost parallel to each other from the mid-rib to the margin of the leaves,
which form a mosaic pattern. On young shoots, such stripes are seen on the leaf sheath also. The infected clumps will be smaller in size with fewer tillers.

**Control**

Eradication of the source of inoculum by destroying infected plants and destruction of the vector by insecticide application are effective. Regular application of insecticide against cardamom thrips controls the aphids also. Avoid using katte-infected rhizome for planting. Destruction of plants showing symptoms of the disease should be done promptly once in two months. Removal of all alternate hosts of virus is also recommended.

**Azhukal**

This is a fungal disease caused by Phytophthora sp. occurring during the rainy season. It affects the leaves, tender shoots, panicles and capsules. On the infected leaves, water soaked lesions appear first and rotting and shedding of leaves along the veins occur thereafter. The infected capsules become dull greenish brown and decay. This emits a foul smell and subsequently shed. Infection spreads to the panicles also.

**Control**

Trashing and destruction of the infected parts should be done as a phytosanitary measure just prior to the onset of southwest monsoon. Remove the trash (dried leaves and leaf sheaths) from the basal region of the plant to the extent possible. Spray the shoots with 1% Bordeaux mixture with adhesive (rosin soda or any other sticker) by the commencement of the monsoon and continue the spraying operation two or three times up to November-December according to the intensity of the disease and rainfall. Give a copious spray to the panicle with 1% Bordeaux
mixture @ 3 l/plant during July-August when the disease intensity is maximum.

Trichoderma can be used along with cowdung for controlling this disease.

**Clump rot or rhizome rot**

This disease is caused by Pythium aphanidermatum, P. vexans, Rhizoctonia solani and Fusarium oxysporum. The affected shoots become brittle and easily break off from the rhizome at the bulbous base.

**Control**

Drench with 0.2% copper oxychloride (2-3 litre per plant) and repeat this two times at monthly intervals. As a bio-control measure, inoculate seedlings with native arbuscular mycorrhiza, Trichoderma and Pseudomonas fluorescens at the time of planting in the nursery and main field, and apply during pre-monsoon period in established plantations.

**Leaf blotch disease**

The fungus Phaeodactylium venkatesanum causes this disease. The disease is characterized by the appearance of large blotches of irregular lesions with alternating shades of light and dark brown necrotic tissues. This is mainly observed on mature leaves. On the lower surface of the lesions ash coloured white superficial growth of the fungus appears during moist weather conditions.

**Control**

The fungicides, Bordeaux mixture (1%), mancozeb (0.3%) and carbendazim (0.1%) are effective in controlling the disease.
Chenthal disease

Chenthal disease is characterized by the appearance of rectangular linear reddish brown lesions mainly on the lower surface of the leaves. The lesions are clearly visible even on dried leaves. The incidence of the disease appears to be more severe in areas, which do not have proper shade. Even though Corynebacterium and Colletotrichum gloeosporioides have been isolated from the infected leaves, the pathogenicity of these organisms could not be established.

Control

Providing adequate shade is the only measure recommended pending confirmation of etiology of the disease.

Waiting period of insecticide / fungicide

Quinalphos 30 days

Monocrotophos 30 days

Mancozeb 30 days

3.8. HARVESTING AND CURING

The indication of the time of harvest is when the seeds of the topmost capsules turn brown. To enhance maturity, bearing tillers are cut to a height of 30-45 cm and left for another 10-15 days for full maturity. The spikes are harvested using special knives. The harvested spikes are heaped and capsules are separated and dried. The cured capsules are rubbed on a wire mesh for clearing and removal of the calyx (tail).

Traditionally large cardamom is cured in a bhatti where the capsules are dried by direct heating. Under this system the cardamom comes in direct contact with smoke which turns the capsules to a darker browner black colour with a smoky
smell. Improved curing techniques are available by which cardamom is processed to give better quality and appearance. One such method is the ICRI Spices Board improved *bhatti* system of curing in which the cardamom is dried by indirect heating at 45-50 degrees °C. After studying the traditional *bhatti* system used for curing of large cardamom in Theni. It was observed that apart from energy efficiency, emphasis for technological development should be to improve the quality of dried cardamom.
Fig. 1. Cardamom based cropping system

Fig. 2. High yield Variety
3.9. SPICES BOARD ASSISTANCE

The Spices Board is trying to promote the cultivation of large cardamom in the following schemes:

1) **Certified nursery scheme**: The Board supports the raising of nurseries in farmers fields by offering a grant-in-aid of Rs. 10,000 per nursery producing 10,000 suckers.

2) **Replanting scheme**: This scheme is intended to encourage growers to take up replantation of senile and uneconomic gardens. A subsidy of Rs. 6,000 per hectare is offered to the growers.

3) **Supply of sprinkler irrigation units**: To tide over the drought situations during summer, the Board assists growers in procuring and installing sprinkler units and accessories by providing 50% of the cost as subsidy with a ceiling of Rs. 2500 per set.

4) **Low cost driers**: In order to improve the quality of the cured large cardamom the Board helps the growers to replace their traditional *bhatti* curing system with improved driers by providing a subsidy of Rs. 10,000 per drier.

5) **Processing units**: The conventionally cured cardamom does not fetch the right price because of unscientific processing and packaging. In order to overcome this situation, the Board proposes to assist the growers in setting up their own processing/powdering/packaging units by providing assistance to the tune of 50% of the cost, subject to a maximum ceiling of Rs. 50,000 per unit.
3.10. PROCESSING

Sun-drying

Capsules are dried directly under sunlight for five to six days or more. Frequent turning is done. This method can result in surface blemishes and may not give an attractive green colour. This method is practiced if the cultivar yields fruits that turn yellow before they are ready for picking and where facilities for green curing are not available.

Artificial drying

Processing of capsules is done in specially built curing houses. The harvested capsules are washed in water to remove dust and soil particles. Then they are spread on wire net trays in curing chamber. Burning firewood in the iron kiln produces heat required for drying. The heat thus produced is passed through pipes made of galvanized iron sheets. The process of drying takes about 18-24 hours, depending on the ambient temperature. The capsules are spread thinly in the wire net trays and stirred frequently to ensure uniform drying. They are initially heated at 50 ºC for the first 4 hours and heat is then reduced to 45 ºC by opening ventilators and operating exhaust fans till the capsules are properly dried. Finally the temperature is raised to 60 ºC for an hour.

The dried capsules are rubbed on wire mesh to remove the stalk and dried portion of flower from the capsules and then graded according to size by passing through sieves of sizes of 7, 6.5, 6 mm etc. The graded produce is stored in polythene lined gunny bags to retain the green colour during storage and also to avoid exposure to moisture. A relatively new innovation in the curing procedure is blanching by soaking the fruits in 2.0 per cent washing soda for 10 minutes prior to
drying. This inhibits colour loss during drying operation and extends colour retention during subsequent storage from three months to ten months.

**Bleaching**

A proportion of the crop is bleached after sun drying by exposing the capsules to fumes from burning sulphur to get uniform colour and appearance. Steeping capsules in a dilute solution of potassium metabisulphite solution induces a slight improvement in keeping quality.

**Oleoresin**

Solvent extraction of ground spice yields 10 per cent oleoresin. Cardamom oleoresin is used for flavouring food after being dispersed in salt, flour etc. One kilogram of oleoresin replaces 20 kg ground spice.

**Decorticated seeds / seed powder**

Decorticated seeds command a lower price due to rapid loss of volatile oil during storage and transportation. Seed powder is marketed to a limited extent.

**Origin**

Southern India and Sri Lanka. Indian cardamom is slightly smaller, but more aromatic. Although India is the largest producer of cardamom, only a small share of the Indian production is exported because of the large domestic demand. The main exporting country is Guatemala, where cardamom cultivation has been introduced to less than a century ago and where all cardamom is grown for export.

There several related plants in genera *Amomum*, *Aframomum* and *Alpinia*, many of which have aromatic seeds; these may appear as cardamom substitute or adulteration, although the flavours of most of them differ markedly from true cardamom. Some of these have a eucalypt-like flavour worth dealing with in their
own right (see black cardamom) while others are more pungent and almost peppery (see grains of paradise); yet many of them are quite disagreeable. These wild cardamoms can hardly be used as a substitute for the real thing.

Two South East Asian species, however, should be mentioned because their flavour comes very close to true cardamom: Siam cardamom, *Amomum krervanh* Pierre ex Gagnep. = *A. testaceum* Ridley (sometimes misspelt *Amomum krevanh*) is native to peninsular South East Asia. Its small, almost spherical pods are used in the cuisines of Thailand and Cambodia and imitate cardamom’s aroma pretty well. Another species, round cardamom (Jawa cardamom, *Amomum compactum* Soland. ex Maton = *A. kepulaga* Sprague & Burkill), from Indonesia also has a good, cardamomy flavour. If cardamom is ever asked for in recipes from the indicated areas, the local varieties are meant; substitution by true cardamom is perfectly possible.
Thai cardamom, Amomum krervanh
Etymology

The spice has identical or at least phonetically similar names in almost all languages of Europe, e.g., Cardamom (German, English), kardemomme (Norwegian, Danish), cardamomo (Italian, Portuguese, Spanish), kardamon (Polish, Croatian, Bulgarian, Russian) and kardemumma (Finnish). Yet there is no satisfying explanation of that name.

Cardamom was known in Ancient Greece as an expensive item of commerce and known as kardamomon on the Linear B tablets). The name has not satisfying explanation, yet there is a similarity to the second element in the Greek name of cinnamon; and there is also the name amomon for an aromatic spice similar to cardamom. Modern Greek has inherited that confusion: Both cardamom and cress may be called kardamo.

Also Roman sources tell of two similar spices: amomum and cardamomum, both of which were of Eastern origin. The more expensive kind, cardamomum, is generally assumed to have been identical to what we call cardamom today; amomum, on the other side, may have been a type similar to black cardamom. Again, no etymology is known for these two names.
Cardamom Flower

Cardamom Inflorescence
In the New Testament (which was largely written in Greek), the name *amomon* appears in reference to an aromatic plant. This could be derived (and some books state so) from the adjective *amomos* blameless, without reproach; given, however, that *amomos* is a regional and poetic form, this seems less probable than (what other books state) the derivation from Aramaic *hemama*.

The modern genus name *Elettaria* is derived from the local name in a South Asian tongue; cf. Hindi *ilaychi* and Punjabi *ilaichi* green cardamom; see below for similar names meaning black cardamom. The common source is Sanskrit, where cardamom is called *ela* or *ellka*, which is itself a loan from a Dravidian language. From the corresponding Dravidian root, all modern names of cardamom in the major Dravidian languages are directly derived, e.g., Kannada *elakki*, Telugu *yelakulu*, Tamil *elakkai* and Malayalam *elakkay*.

### 3.11. USES OF CARDAMOM

Cardamom is often named as the third most expensive spice in the world (after saffron and vanilla), and the high price reflects the high reputation of this most pleasantly scented spice. Despite its numerous applications in the cooking styles of Sri Lanka, India and Iran, 60% of the world production is exported to Arab (South West Asia, North Africa) countries, where the larger part is used to prepare coffee.

Cardamom-flavoured coffee, almost a symbol of Arab hospitality (*qahwa al-arabiya*), is usually prepared by grinding coffee beans and (possibly toasted) cardamom pods together and boiling the mixture with sugar in a wood-handled coffee pot (*ibrik, ibriq*) alternatively, a few cardamom pods may be steeped in the hot coffee. In any case, the finished coffee is served in tiny cups (*finjan*) and
slowly sipped. Bedouins (Arabic nomads) sometimes own coffee pots that can keep several cardamom capsules in their spouts; the coffee gets in contact with the spice only during being poured into the glass.

In Ethiopia, preparing coffee plays an important rôle and involves highly developed rituals (coffee ceremony). Coffee beans are always toasted immediately before usage, often together with spices (clove, cardamom). After letting them cool, they are ground, and the coffee is prepared. On serving, other flavourings might be added, e.g., fresh leaves of rue. Yet not all cardamom is consumed for coffee in Arab countries; it is also used for cookery. The spicy mixture baharat (see paprika) from the Arabic peninsular contains cardamom as well as the fiery paste zhug (see coriander) from Yemen.

Cardamom is often employed for Oriental rice-and-meat dishes, e.g., Turkish pilav and Arabic kabsah (see also rose). To prepare these, meats (more rarely vegetables) are braised in a thick, aromatic sauce; then, uncooked rice is added and cooked slowly so that it absorbs the sauce and all its flavour. In Central Asia, Uzbekistan is most famous for its highly complex rice dishes. Uzbeki rice dishes, called plov, are usually cooked in two layers: An aromatic thick sauce, which usually contains meats, fruits (plums, apricots, barberries) and a large proportion of carrots, is covered with presoaked rice, then the cook adds water and simmers slowly, without any stirring, till the excess liquid has been absorbed by the rice. Uzbekistan also has sweet variants without any meet. The Central Asian recipes use less spices than their Arabic counterparts.

Iran is also famous for elaborate rice recipes (polo). The rice is cooked alone, with water and salt only, and may be stained with saffron water after
cooking. Sometimes, it is mixed with dried fruits like barberries or cornels. In a
second step, the boiled rice may be layered with aromatic meat or vegetable stews.
The latter are often flavoured with cardamom, cinnamon and other spices. This
type of preparation ensures a highly fluffy texture in the rice. The cooking in
much of Northern and parts of Southern India (see also black cumin). North
Indian biryani, is made by placing layers of cooked rice and yoghurt-based
aromatic meat or vegetable stews in a large pot; after addition of dried fruits
(e.g., raisins, fresh or dried pomegranate seeds), nuts (e.g., almonds or
cashews) or even saffron water, the pot is sealed and heated in the oven so that the
different flavours mingle. These recipes require fluffy, non-sticking long-grain rice
like Indian basmati.

The flavouring for biryani involves a selection of the most aromatic spices:
The initial boiling of the rice involves spices like cadamom, cloves, cinnamon and
particularly Indian bay-leaves as signature flavours, and these are always used
whole. Also mace is often used, while it is otherwise less common in India; more
elaborate recipes also involve saffron. The korma component, however, may
contain the whole repertoire of Indian spices, for example cumin, ginger and garlic.
Differences in flavouring between the rice and the meat component contribute to
the extreme deliciousness of the dish.
"Biryani" is also prepared in South India, particularly in Muslim-influenced Hyderabad (Andhra Pradesh) and in cosmopolitan Kerala. Yet, according to the local tastes, it is prepared much hotter, with significant chiles in the meat stew component, but commonly without dried fruits. *Hyderabadi biryani* is served with some of the spicy stewing liquid in an extra little bowl. In the South, star anise is commonly included in the spice mixture for the rice, and the Indian bay-leaf may get omitted or replaced by leaves of cinnamon or all spice which are locally grown. Particularly in Kerala, coconut milk may be employed instead of yoghurt for the meat component. See also coconut for another South Indian rice dish of non-*biryani* type.

In Sri Lanka, the pods are added to fiery beef or chicken curries, together with cinnamon. Cardamom-flavoured sweets are found all over the Indian subcontinent, e.g., *gajar halva*, a creamy dessert made from milk, grated carrots, palm sugar and ground cardamom, and *shrikhand*, which is based on strongly sweetened thick yoghurt (curd).
Furthermore, cardamom is a popular spice in Northern Africa and Eastern Africa, where population is predominantly Arabic: It appears in the Moroccan mixture *ras el hanout* or the famous Ethiopian spice *berbere*. In Europe, cardamom is rather unknown, but may appear in some cookie recipes (for example, German *Lebkuchen*). Nevertheless, usage is low, except in Scandinavian countries, where cardamom is popular not only for cookies and sweet breads but also for pastries and sausages;

Some brands of *curry powders* contain small amounts of cardamom; cardamom is also frequently added to the Northern Indian *garam masala*, especially in the North West Indian region Kashmir, where the Moghul influence is strongly felt in the local cooking.

Kashmiri people like sweet green tea flavoured with cardamom pods, which amazingly is called *kashmir kavah*, although words like *kavah* designate coffee almost everywhere else. No-one who has ever visited Kashmir and lived in one of the famous house boats of Srinagar will ever forget the taste of cardamom-flavoured green tea, but for the rest of their life associate this tea with Kashmiri family life and endless talks and discussion in front of the fuming water pipe (*hookah*, from Arabic *huqqah*).

In the rest of India, black tea is much more common than green tea. In its simplest and most common form, tea leaves are just boiled with milk and sugar for a few minutes. Tea with spices, an item commonly found on the menus of Indian restaurants in Western countries, is also a genuine Indian drink and very popular, although tea stalls on the street will usually serve the unspiced version. Spiced tea (*chai masala*) is, in India, a luxury not everyone can afford every day.
Unripe cardamom pods

Greater cardamom, sterile plant
To prepare the spice tea, water, milk, sugar, and spices are simmered together for a short time, then the tea leaves are added, and simmering continues for another few minutes; after straining, the tea is ready to drink. For Thai spiced ice tea (*cha dam yen*) and epazote for more on the word tea.

Cardamom seeds lose their flavour quickly when ground; even if left whole, the seeds show a loss of about 40% of the essential oil per year. Therefore, only whole cardamom pods should be bought; before usage, the pods should be crushed. Green pods are significantly superior in fragrance to the yellow or white bleached ones.

Black cardamom (or brown cardamom) is a collective name of several cardamom related plants growing in mountains from Central Africa to Vietnam. Most frequently, the Nepalese cardamom is traded in the West. This spice’s taste differs drastically from that of green cardamom; neither can act as a substitute for the other.

### 3.12. THE WORLD MARKET FOR CARDAMOM

Cardamom is among the world's oldest spices, and is the third most expensive spice following saffron and vanilla. The name cardamom is used for herbs within two genera of the ginger family *Elettaria* (small cardamom) and *Amomum* (large cardamom). Both varieties take the form of a small seedpod, triangular in cross-section and spindle-shaped, with a thin papery outer shell and small black seeds. *Elettaria* pods are light green in color, while *Amomum* pods are larger and dark brown.
Small cardamom, *Elletaria cardamomum*, popularly known as the 'Queen of spices,' is grown extensively in hilly regions of South India, but also in Sri Lanka, Papua New Guinea, Tanzania and Guatemala. It is typically 7 mm in size with green coloration and has a slightly sweeter fragrance than its larger cousin. Large cardamom, *Amomum subulatum*, also known as Nepal cardamom, is a spice cultivated in the sub-Himalaya state of Sikkim and West Bengal, northeastern India. It is typically 20 mm to 50 mm in size with black/brown coloration. Of the two, small cardamom is the more heavily produced globally, at a ratio of 3:2 as of 2008 (Center for Agricultural Policy with Prosperity Initiative, 2011).

Cardamom is used mainly in the Middle East where *gahwa* is a popular cardamom-coffee combination. It features heavily in curries, pickles, custards and spice blends such as *garam masala* in India, and is also chewed as a nut and used as an aromatic and essential oil in perfumes. Cardamom can be purchased in organic or conventional forms and has a mild, ginger-like, sweet flavor.

### 3.13. GLOBAL PRODUCTION

Cardamom plants take about three years to bear fruit and are commercially productive for four to six years before yields decline. The pods, which grow spaced at intervals along the panicle, contain brown or black seeds so tiny that it takes four pods to fill a quarter-teaspoon, making it one of the worlds' most expensive spices. According to the most recent available data, global production of small and large cardamom was approximately 70,000 MTs in 2008, with Guatemala and India accounting for 45 per cent and 21 per cent of total production, respectively.
Guatemala only produces small cardamom, while India produces both types. Guatemala and India have dominated cardamom production, but since 2003, Indonesia has emerged as an additional key producer. In 2008, Indonesia was the number three producer accounting for 18 per cent of total production. With respect to large cardamom production, Indonesia was the top producer accounting for 45 per cent of production, with Nepal (23 per cent), India (15 per cent) and China (14 per cent) accounting for most of the remainder in 2008.
Chart 3.1
World Imports of Cardamom

Source: UN Comtrade
3.14. MARKETS

The Middle East, South Asia, South East Asia and Europe are the main markets for cardamom consumption. From 2008 to 2010, global demand for cardamom rose steadily from 31,448 MTs to 37,712 MTs. Following the global financial crisis of 2010, imports dramatically dropped to 25,566 MTs but rebounded slightly to 26,946 MTs in 2011.

Saudi Arabia is the world's largest import market for cardamom. Coffee consumption appears to be a strong driver of demand for cardamom in Saudi Arabia. Ready-ground cardamom coffee in a retail store in Arabia will typically amount to five or 10 grams of ground spice per 250 grams of coffee. However, for special occasions, or to honor a guest with a particular display of generosity, large quantities of cardamom may be used. During the period between Ramadan (August 2011) and the Hajj (November 2011), the Muslim pilgrimage to Mecca, consumption tends to increase as between one and two million Muslims enter the country during this three-month period.

The vast majority of Saudi Arabian imports come from Guatemala. In 2008, Saudi Arabia received 94 per cent of its cardamom shipments by volume from Guatemala, while in 2012 this figure fell to 78 per cent. Saudi Arabia imports a smaller percentage from India, although this is increasing with time. In 2008, Saudi Arabia imported 5 per cent of its cardamom from India, while in 2012 this figure increased to 18 per cent. Overall, Saudi Arabian import volumes fluctuated between 7,188 MTs and 10,300 MTs from 2008 to 2012 while import values rose from US$43.7 million to US$154.1 million over this period.
India is the world’s largest consumer market for cardamom, but trails Saudi Arabia in imports. Unlike Saudi Arabia, India produces a substantial amount of cardamom domestically that is consumed at home. Taking into consideration international trade flows (imports and exports) and domestic production, India consumed approximately 18,100 MTs of cardamom in 2011.

European Union: From 2008 to 2012, EU imports of cardamom decreased from 1,666 MTs to 1,593 MTs. Germany (with imports of 445 MTs), the Netherlands (431 MTs) and the United Kingdom (414 MTs) were the primary EU importers in 2012. Traditionally, the UK has been the largest importer as cardamom enjoys strong demand among the country’s large Asian community. On the European continent, it has also become a popular ingredient in bakery and dessert products.

Like Saudi Arabia, the EU imports the majority of its cardamom from Guatemala. In 2012, the EU imported 1,368 MTs from Guatemala and only 225 MTs from the rest of world, including 159 MTs from India. Although EU import volumes were relatively stable over the period, values increased dramatically from US$5.4 million in 2008 to US$27.7 million in 2012 due in large part to price spikes.

United States: The US remains a minor importer of cardamom. From 2008 to 2012, US imports increased from 512 MTs to 660 MTs. Guatemala is the primary supplier. In 2012, the US imported 458 MTs from Guatemala and 202 MTs from the rest of the world, including 177 MTs from India. Similar to the EU, the US recorded major increases in import values over the period, from US$2 million in 2008 to US$13.4 million in 2012.
### Table 3.1
Saudi Arabian Imports of Cardamom

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>2008 MTS</th>
<th>$000s</th>
<th>2009 MTS</th>
<th>$000s</th>
<th>2010 MTS</th>
<th>$000s</th>
<th>2011 MTS</th>
<th>$000s</th>
<th>2012 MTS</th>
<th>$000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala</td>
<td>9,742</td>
<td>39,840</td>
<td>8,310</td>
<td>46,770</td>
<td>9,695</td>
<td>96,799</td>
<td>7,164</td>
<td>72,014</td>
<td>7,563</td>
<td>129,392</td>
</tr>
<tr>
<td>India</td>
<td>492</td>
<td>3,572</td>
<td>571</td>
<td>4,891</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>107</td>
<td>354</td>
<td>113</td>
<td>687</td>
<td>-</td>
<td>-</td>
<td>24</td>
<td>243</td>
<td>353</td>
<td>2,347</td>
</tr>
<tr>
<td>Total</td>
<td>10,342</td>
<td>43,766</td>
<td>8,994</td>
<td>52,349</td>
<td>9,695</td>
<td>96,799</td>
<td>7,188</td>
<td>72,257</td>
<td>9,681</td>
<td>154,184</td>
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</table>

*Source: UN Comtrade*

### Table 3.2
EU Imports of Cardamom

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>2008 MTS</th>
<th>$000s</th>
<th>2009 MTS</th>
<th>$000s</th>
<th>2010 MTS</th>
<th>$000s</th>
<th>2011 MTS</th>
<th>$000s</th>
<th>2012 MTS</th>
<th>$000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala</td>
<td>1,346</td>
<td>4,012</td>
<td>1,316</td>
<td>6,025</td>
<td>1,292</td>
<td>12,543</td>
<td>1,365</td>
<td>12,944</td>
<td>1,368</td>
<td>24,234</td>
</tr>
<tr>
<td>India</td>
<td>202</td>
<td>902</td>
<td>220</td>
<td>1,073</td>
<td>167</td>
<td>1,024</td>
<td>199</td>
<td>1,353</td>
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<td>2,570</td>
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<tr>
<td>Others</td>
<td>118</td>
<td>551</td>
<td>106</td>
<td>596</td>
<td>132</td>
<td>1,193</td>
<td>57</td>
<td>607</td>
<td>66</td>
<td>937</td>
</tr>
<tr>
<td>Total</td>
<td>1,666</td>
<td>5,465</td>
<td>1,642</td>
<td>7,694</td>
<td>1,591</td>
<td>14,760</td>
<td>1,621</td>
<td>14,904</td>
<td>1,593</td>
<td>27,741</td>
</tr>
</tbody>
</table>

*Source: Eurostat*

### Table 3.3
US Imports of Cardamom

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>2008 MTS</th>
<th>$000s</th>
<th>2009 MTS</th>
<th>$000s</th>
<th>2010 MTS</th>
<th>$000s</th>
<th>2011 MTS</th>
<th>$000s</th>
<th>2012 MTS</th>
<th>$000s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala</td>
<td>468</td>
<td>1,898</td>
<td>512</td>
<td>2,562</td>
<td>565</td>
<td>6,172</td>
<td>465</td>
<td>5,515</td>
<td>458</td>
<td>11,042</td>
</tr>
<tr>
<td>India</td>
<td>38</td>
<td>151</td>
<td>45</td>
<td>149</td>
<td>62</td>
<td>354</td>
<td>56</td>
<td>545</td>
<td>177</td>
<td>2,021</td>
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<tr>
<td>Others</td>
<td>5</td>
<td>29</td>
<td>34</td>
<td>83</td>
<td>20</td>
<td>162</td>
<td>18</td>
<td>161</td>
<td>25</td>
<td>416</td>
</tr>
<tr>
<td>Total</td>
<td>512</td>
<td>2,078</td>
<td>591</td>
<td>2,794</td>
<td>647</td>
<td>6,688</td>
<td>539</td>
<td>6,221</td>
<td>660</td>
<td>13,478</td>
</tr>
</tbody>
</table>

*Source: USITC*
3.15. SUPPLIERS

Guatemala is the leading supplier of cardamom in the world, producing approximately 23,000 MTs annually. Guatemala exports the majority of its production to the Middle East, with small amounts to the EU. Due to its place as a market leader, Guatemalan cardamom production strongly impacts global prices. When the quality and/or quantity of the spice from Guatemala drop, global prices climb. In 2009, the export value of Guatemalan cardamom reached an historic high of US$137.2 million. In 2011, this figure was surpassed with exports reaching US$172.3 million. In regards to trade, five to six companies account for 80 per cent of exports.

The cardamom cultivated in Guatemala is *Elettaria cardamomum*, a native of India's Malabar coast. It is typically grown at an altitude of 250 to 1,500 meters with an annual rainfall of 1,000 mm to 3,500 mm and temperature of 10°C to 35°C (50°F to 86°F). Unlike in India, where cardamom is cultivated under forest canopy, Guatemalan cultivation is in the open without shade and at higher altitudes where low temperatures are present. Regionally, the Department of Alta Verapaz accounts for approximately 70 per cent of Guatemala's production.

India is the second largest producer of cardamom in the world, and was once the world export leader with an estimated 56 per cent of the global market in 1970. Guatemala overtook India during the 1979/1980 production season. India’s share of the world market has declined due to high domestic prices, high production costs and low yields Cardamom cultivation is labor intensive and account for 60-70 per cent of the total cost of production (Center for Agricultural Policy with Prosperity Initiative, 2011).
In general, India’s total cardamom production (i.e. large plus small cardamom) surpassed 15,000 MTs per year from 2003 to 2011. The sole exception occurred during the 2009-08 seasons when total production equaled 14,390 MTs. India typically imports more cardamom than it exports due to high domestic consumption. An analysis of import data shows that India imported 4,554 MTs in 2003 and 5,846 MTs in 2011, while it exported 1,714 MTs in 2003 and 3,025 MTs in 2011. The difference between imports and exports becomes more pronounced during years of low domestic production. For example, during the low production season of 2009-08, India’s net imports (i.e. imports minus exports) were 7,816 MTs of cardamom to supplement production.

3.16. SEASONALITY

Guatemala's producers harvest year round due to favorable weather conditions, with the main crop being harvested between September and March. This provides the country with substantial advantages during the off-season. In India, the harvest season runs from September to February, with the peak period being October through November, immediately following the rainy season. In general, India's production is seasonal, as growers tend to utilize rain-fed production during the summer monsoon period. The harvest season in Nepal, China and Vietnam is shorter and runs from September to December.

With respect to the seasonality of Saudi Arabian imports, a Guatemalan small cardamom exporter noted that imports peak from September to January. This time period coincides with the high holidays of Islam (i.e. Ramadan and the Hajj) and the peak harvesting periods of Guatemala.
3.17. PRICES

The Spice Board of India provides spot prices at markets in Indian municipalities (i.e. Bodi, Gangtok, Siliguri) for various grades of small and large cardamom. The small cardamom grades are Alleppey Green Extra Bold (AGEB), Alleppey Green Bold (AGB), Alleppey Green Superior (AGS) and AGS1 (lower quality grade of AGS). The large cardamom grades are Badadana, Chottadana, Kanchicut and non-kanchicut. At the beginning of 2012, both small and large cardamom prices rose. Small cardamom prices peaked in July 2012 and January 2011. Since January 2011, small cardamom prices have been declining. Large cardamom prices reached a peak in May 2011, but have since been in steadily declining since then.

As of September 2011 (most recent available data), AGEB was approximately US$16,400 per MT, AGB was US$13,700 per MT, AGS was US$13,300 per MT and Badadana approximately US$20,000 per MT. The Public Ledger provides Guatemalan CIF (Cost Insurance Freight) prices for the small cardamom varieties of Bold Green and Seeds. At the beginning of 2012, a strong price increase to nearly US$30,000 per MT was recorded for both varieties due to high demand and tight supplies. One EU cardamom trader quoted by the Public Ledger stated that farmers and/or exporters in Guatemala may have been holding on to produce for as long as possible to fuel scarcity fears and lend support to prices. In October 2012 prices declined but rebounded slightly by the end of the year. Prices spiked again in January 2011 due to concerns over a potential crop shortfall and high demand in the Middle East (Ramadan). By the spring of 2011, prices steadily declined as crop output was better than expected. A dramatic drop
recorded at the end of October 2011 due to increased crop output. As of November 2011, the Public Ledger quoted Bold Green at US$15,000 per MT and Seeds at US$17,000 per MT.

According to a Public Ledger article published in November 2011, Indian cardamom prices have decreased in 2011, but are still $1,000 to $2,000 per MT more expensive than Guatemalan small cardamom (varieties not given). Please note that the Guatemalan CIF prices include the shipping costs to the port of destination (i.e. Saudi Arabia, USA, UK, Netherlands, etc.). This is in contrast to the Indian spot prices, which are the immediate price of sale at the regional market and do not include shipping costs.

3.18. STANDARDS AND REQUIREMENTS

**Tariff and Trade** No tariffs or import duties are levied on cardamom imports into the US, EU, Saudi Arabia, Egypt or India.

**Grades and Standards:** Cardamom is graded on the basis of color, clipping (i.e. pods with the tips trimmed), size, whether bleached or unbleached, the proportion of extraneous matter present, and product origin. Grading is carried out in accordance with a relevant national standard, if available, such as those used by Indian producers. In addition, ISO standard 882-1 provides some general guidelines on the grading, handling and packing of cardamom1.

In the US market, the American Spice Trade Association (ASTA) adopted the original Cleanliness Specifications for spices, seeds and herbs in 1969. These have been revised numerous times, the latest occurring in 2009. The ASTA Cleanliness Specifications were designed to meet or exceed the United States Food and Drug Administration (FDA) Defect Action Levels (DAL). The DAL refers to
Title 21, Code of Federal Regulations, Part 110.110 that allows the Food and Drug Administration (FDA) to establish maximum levels of natural or unavoidable defects in foods for human use that present no health hazard.

**Common Grades:** In general, the weight in grams per liter and the color are decisive in determining quality. The proportion of burst fruit pods ("open pods") also determines quality, as do color (green or yellow) and drying method (mechanical or sun).

**The following definitions refer to common Indian Grades:**

- **Bold** is a popular export grade where 90 per cent of the cardamom pods have a diameter of 6.5mm or above. The product has a mature green coloration with a weight in grams per liter of 415 grams.

- **Super Bold** is a high quality variety where all pods should have a diameter of 8mm or above. The product has a mature green coloration with a weight per liter of over 450 grams.

- **Extra Bold** is also a popular export grade where all pods will have a diameter of 7 mm or above. The product has a mature green coloration with a weight in grams per liter of 435 grams.

- **Bulk** is cardamom that has not been graded. As such, it contains all sizes, both mature and immature capsules, as well as black, yellow and/or split cardamom.

- **Small** is a grade with pods that measure between 5.5 mm and 6.5 mm in diameter. The weight in grams per liter is approximately 385 grams.

- **Open/Splits** is lower quality cardamom where over 60 per cent of the pods are “open” (i.e. seeds exposed) and the color of the pods may be
greenish/pale yellow. All pods will be mature with a diameter of 6.5 mm or above

- **Seeds** are the black/brown seeds of the cardamom pods (i.e. husk fully removed). The weight in grams per liter is typically 550 to 600 grams.
- **Fruit** are generally over matured pods with slight yellowish in color. The weight in grams per liter is 425 grams or above.

**The following definitions refer to common Guatemalan Grades:**

- **Jumbo Green** are extra-large green small cardamom pods.
- **Imperial Best Green** are large green pods.
- **Fancy Green Extra** are extra green pods.
- **Fancy Green** are medium sized green pods.
- **Imperial Mixed Green** are large pale green pods.
- **Mixed Green** are pods of assorted colors.
- **Mixed Green Split** are medium sized open green pods.
- **Yellow Mixed** are medium/large closed yellow pods
- **MYQ** or Mixed Yellow Quality is medium sized light-brown cardamom for grinding.
- **Seeds** is cardamom with the husk removed.

**Packaging:** Because of the high value of cardamom, it is generally packaged in double-layered bags (42 kg - 50 kg) and is seldom transported in boxes without bags. Increasingly used are single ply fabric bags lined with polybags. Black polybag liners are used for the better, green grades to protect them from light as color is an important determinate of price.
Premium grades from Guatemala are packed in protective bags and shipped in 5 kg cartons, with a master carton holding 8 of these. Cardamom husks are sometimes shipped in compressed bales of up to 300 kg or loose in bags.

3.19. INDIAN MARKET FOR CARDAMOM

Large cardamom is one of the major spices exported to international markets from Nepal. The government of Nepal has identified cardamom as an export oriented commodity along with tea and coffee. However, Nepal is still not in a position to export cardamom directly to the third countries and cash in foreign currency. India still remains as major markets for Nepalese cardamom. It is learned that the product after sorting and grading in India is further exported to the Middle East (Arabian countries) via Pakistan.

As most of the producing areas are remote there are no buyers available within the vicinity and farmers have to carry the produce long distances. In need of money some farmers still take advances from the local village merchants and settle the loan with interest by selling the produce to them. In another instances, traders buy the crops in the field itself before harvest. The process is known popularly as Dahadani. The farmers harvest the crop, dry it and dispose to the merchants who paid advance. The system seems to be handy to those who are in need of cash in advance, but the prices paid are far below average.

Nepalese cardamom exporters/wholesalers are mainly based in Birtamod (Jhapa) and Biratnagar. They collect the products from major wholesalers/Traders located in Dharan (Sunsari) and Fikkal (Dam). The wholesalers/traders in Fikkal collect the products along the Mechi corridor - Biblyate, Nepaltar, Ranke (in Ham), Phidim, Gopetar (in Panchthar), Fungling, Sighapur (in Tapplejung) and Dharan
based traders collect cardamom along the Kosih corridor - Hile (in Dhankuta) and Basantpur (in Terhathum).

The small traders/merchants located along the highways collect cardamom either directly from the growers or from village merchants spread all over the cardamom growing areas. Birtamod is the main cardamom trading centre whereas Dharan and Fikkal are two main sub centers in Nepal. Large cardamom from the major producing districts Ham, Taplejung and Pachthar are brought to Birtamod. The other main sub center is Hile where the products from Sankhuwasabha, Terhathum, Bhojpur and Dhankuta are brought. Each District Development Committee (DDC) levies tax on cardamom consignment, transferring out of the district. The tax varies from one district to another. For example, Dhankutta DDC charges NRs.3.00/kg whereas the rate for Ham is only Rs.100/kg. Sometimes traders have to pay the tax more than once. Cardamom purchased in Taplejung district is taxed before it leaves the district. If this produce is retained in Panchthar district for more than 24 hours, tax must be paid for that district too.

Tax incidence can happen again if the same produce is passed through another district and stocked there for more than 24 hours. (ITC - UNCTAD/WTO, 2009). Besides DDC tax there is a score of other informal tax to be paid along the highways incurring additional burden to the traders.

3.20. TRADERS

Village Level Traders

The role of village level traders is tremendous where small cardamom growers are concerned. These traders are helpful to those growers who have small quantity of produce. They collect from their farm gates and transfer them to either
road head collection points or to the district traders/merchants. The products from farms to road heads are transferred either by mules or by porters. From road heads they are transferred by tractors and/or trucks.

**Road Head Traders**

Road head traders engaged in cardamom collection are rare. There are some along the Mechi highway engaged in collecting at road heads and transfer the products to Fikkal. In fact, these collectors are involved not only in trading, they provide credit services as well in off seasons.

### 3.21. PRICING

**Farm Gate Price**

Pricing of any commodity is based on demand and supply configurations. Whenever demand of any product increases, the price associated with it increases accordingly. Same principle applies to pricing of large cardamom. Due to non-existence of any central marketing facility or an auction house in the country, the price of the commodity is dictated by the terminal markets in India. The price during last few years has been increasing gradually. The monthly wholesale price of the commodity in the previous fiscal year as recorded in Birtamod Wholesale Market is presented. Indeed there is not much price variation between minimum and maximum prices. The reason may be due the non existence of grading.

**Export and Import of cardamom**

Nepal is the top producer of large cardamom followed by India and Bhutan. The bulk of the entire production is consumed in India. In the countries other than India, there is preference for scientifically cured quality cardamom with good colour. Pakistan is the single largest market followed by UAE and Afganistan. The
major markets in India are Amristar, Kolkata, Delhi, Guwahati and Kanpur. In India, the major commercial grades of Large Cardamom are Bada dana, Chotta dana, Kainchicut and non-kainchicut. India is the largest market for Large Cardamom produced by Nepal and Bhutan.