Cardamom

G. St. J. BREAY,

Western Highlands District

In the search for new crops for Papua and New Guinea, considerable attention has been given to the spice crops. One such crop is cardamom, which grows very satisfactorily in the altitude range of 2,000 *to* 3,500 *ft above sea-level. A rainfall of* 100 *to* 125 *in. per year is required and a temperature bewteen* 56° *and* 80°*F.*

AS a cash crop, cardamom has the great advantage that little processing needs to be done before marketing. The seeds are not removed from the pod. The whole pod is dried in a dark curing house or kiln so that the green colour of the pod is retained. The first crop (admittedly a small one) is obtained only 18 months after planting out, and three years after the nursery is first established. Weeding is necessary in the first year only, so this does not add to regular production costs. The nursery work needs careful management however, and skill is required to decide when the pods are ripe for picking.

The true cardamom of commerce (*Elettaria cardamomum* Maton) belongs to the same family as ginger, Zingiberaceae, and it looks like ginger, with thick clumps of stems bearing large leaves which grow to a height of 8 to 10 ft. As with ginger, the stems multiply from a

(Photo: D.I.E.S.)

Plate I.—Cardamon in first nursery ready for transplanting to second nursery

Plate II.—Cardamon in second nursery ready for planting out (Photo: D.I.E.S.)

thick underground bulb (known technically as a rhizome). The flowering stems or panicles grow separately from the rhizome and are 2 to 4 ft long. The flowers appear on a short secondary panicle off the main panicle. The egg-shaped capsules or pods which form after flowering contain from 15 to 20 highly flavoured or aromatic black seeds. An aromatic oil can be extracted from the seeds.

The two main Indian varieties of cardamom are known as Mysore, with erect growing panicles, and the Malabar variety with panicles which creep along the ground. There is also the Ceylon variety with erect panicles. The Ceylon variety is larger than the Indian varieties and it will grow at lower elevations.

The Indian varieties grow best at an altitude range between 2,500 and 4,000 ft above sea-level. Cardamoms will grow at a higher elevation than 4,000 ft but they take longer to come into bearing.

Soils

Cardamoms grow best on reasonably flat land with good drainage. The soil should be rich in humus. Stiff clay soils are unsuitable. Banks of streams sheltered from high winds are also suitable for the crop. Exposed ridges should be avoided.

Propagation

Cardamoms can be cultivated both by splits and seeds. Growth from splits is more rapid and selection from high yielding clumps is possible. Seed is used when splits are not obtainable and when a large and rapid expansion of an area is required.

Nursery

Seed beds require careful preparation. The soil to a depth of 3 inches should be heat-treated to destroy all insects and seeds of weeds. The soil, if possible, should contain

2/3rd leaf mould and 1/3rd sand. Beds are made 3½ ft wide and raised about 1 ft above ground.

In New Guinea where regular rain showers are experienced, dark overhead rain-proof shade should be erected about 3 to 4 ft over the germinating beds and the beds should be lightly watered regularly. The surface soil should be kept slightly damp. Excessive rain or hand-watering will cause erosion of the soil and the seeds will be washed away. The edge of the seed beds should be sprayed or dusted with an insecticide to prevent ants taking away the seeds. Two per cent Chlordane (1 fluid oz of 80 per cent concentrate in 2 pints of water) is suggested for this. The seed is spread evenly over the bed, and soil or sand to a depth of ¼ in. is spread over the seed. The top soil should be firmed with the palm of the hand after sowing the seed.

Depending on the air and soil temperature, seed can take from 36 days to 6 months to germinate. There are about 50,000 seeds to a pound and a 30 per cent germination can be considered satisfactory.

(Photo: D.I.E.S.)

Plate III.—The first flower-head emerges from the ground 2 to 2½ years after germination, when the plant is about 6 ft high

Seedlings can be transplanted if they are removed with care from the germinating bed when two pairs of leaves have formed or when the seedlings are 3 in. high.

First Nursery Transplant

The nursery beds should be 4½ ft in width. At least the top 2 to 3 in. of soil should be rich in humus. Seedlings should be transplanted 6 x 6 in. apart. Overhead shade must be erected over the beds at a height of about 5 ft from the ground. The top shade should permit rain water to percolate through to the beds. About 30 per cent sunlight only should be allowed to penetrate through the top shade.

Seedlings must not be planted deep in the soil. The surface soil must be covered with leaves, grass, or sawdust after the seedlings have been planted so that soil does not creep up the stems of the seedlings and cause them to "damp off" (rot at the base).

Secondary Nursery

The beds are prepared in the same way as the first nursery. When the plants are 9 in. high in the first nursery, every alternate plant may be removed and planted in the second nursery at a spacing of 1 ft x 1 ft. When the plants in the first and second nurseries are 2 ft high, they may be transferred to a permanent position in the plantation, provided the plantation is in an area which receives regular rain showers. If rainfall is restricted to seasons, the plants should remain in the second nursery until they are 2½ ft high.

Permanent Planting

Cardamoms may be spaced at a distance of 7 to 10 ft apart depending on the type of soil and depth of humus. The greater the depth of humus the closer can be the planting.

Prior to planting, holes 18 in. x 18 in. x 9 in. deep must be dug. It is preferable to leave the holes open for at least three weeks. The excavated soil should be returned to the holes, and compost or well-rotted manure added to the soil, if available. Additional soil from the top side of the hole may be scraped into the hole. One or two seedlings, or one large rhizome, may be planted in the centre of the hole. Care should be taken not to plant the seedlings or rhizomes too deep in the soil. Plants more than 1½ ft high should be tied

(Photo: D.I.E.S.)

Plate IV.—A close-up of the same flower-head as in *Plate* III.

to a stake. The surface soil around the plants should be covered with leaves to avoid soil erosion and provide additional plant food.

Field Preparation

(*a*) *Draining*. This is not necessary unless it is noticed that water remains on the surface after rain. Drains 2 ft deep will be sufficient to allow the water to run off.

(*b*) *Shade*. Cardamoms grow best under virgin jungle shade with a touching canopy of trees at least 30 ft high. Low shade trees, such as *Leucaena*, or *Erythrina*, are inadequate for cardamoms. All that is required in virgin jungle is to clear the undergrowth and excessive small trees, leaving the large top canopy of trees.

(*c*) *Weeding*. In the first year after planting, the area should be kept free of weeds. Very little weeding is necessary from the second year onwards. A single rhizome will produce as many as twenty stems or more. These stems gradually die and are replaced by new ones. Some removal of dry leaves from the clumps is necessary from the second year onwards.

Cropping

The first crop is produced in about one and a half years after planting out, or about three years from seed. The first crop is generally a small one, followed in the second year by a large crop. Thereafter, the crop fluctuates according to weather conditions during the year. Replanting is desirable after 12 years.

Cardamoms require light showery weather for good growth. Periods of ten days without rain during the cropping months will help to hasten ripening. Flowers do not appear together, hence the pods do not ripen at one time. Picking is usually undertaken every month over a period of six months.

Gathering

Pods should be gathered before they turn yellow. To determine whether a pod is ripe or half ripe requires skill, which is only gained after prolonged experience. Ripe pods will break away from the panicle with slight pressure by the fingers. Cutting pods with scissors is not necessary and is a slow and costly process.

(Photo: D.I.E.S.)

Plate V.—The pods of Malabar variety (left) are wider, and the seeds are darker, than those of Mysore variety (right)

If pods are over-ripe, there is a tendency for them to split open when the drying process takes place.

Curing

As far as possible the original green colour of the pod should be retained after the drying process has been completed. It is therefore best to cure cardamoms in a shed with the use of artificial heat. The simplest method of drying is to pass heat from a stove through a flue in a shed, raising the temperature of the air in the shed to 120°F. The pods are sufficiently dry when they contain about 10 per cent of moisture. Excessive heat or too quick drying will cause the pods to split.

Sun drying will bleach the pods or turn them yellow. Sun-dried cardamoms will fetch a lower price than kiln dried green cardamoms.

Preparation for Sale

When the drying process has been completed, the flower petals and stalk on the pods have to be removed. This can be done by rubbing the pods over a No. 18 wire mesh. Sorting into grades by using perforated metal sheets of varying sizes is usually necessary for export. All splits are removed by hand and sold separately. The crop is packed in wooden boxes lined with plastic or in jute bags with an inner lining of plastic.

Pests of Cardamon

The two main pests of cardamom are the hairy caterpillars which eat the leaves, and thrips, which enter the flowers and cause a shrinking of the pods, leaving a corky scar on the outside of the pod. This detracts from its value. Depending on the length of time to harvest, either DDT or carbaryl spray is suggested for control of these insects. DDT should not be used within 30 days of harvest. A dilution of 0.1 per cent may be prepared by adding 2 fluid oz of 25 per cent concentrate to 3 gallons of water. Carbaryl (Sevin[R], Septene[R], Resistox[R]) can be used up to three days before harvest. A 0.15 per cent dilution is prepared by dissolving 1 oz of 80 per cent wettable powder in 3 gallons of water.

Pigs will destroy the clumps and eat the rhizomes. Precautions must be taken against pigs entering the plantation.

Market Prices

The chief growers of cardamom at present are India and Guatemala. Most of their crop is exported to the countries of the Middle East.

As there is virtually no cardamom being exported from the Territory yet, it is not possible to give reliable figures on economic returns; it is not known how the Territory products would compare with overseas grades. Prices quoted in London during 1970 have ranged from 46/6 Sterling per lb to 39s. per lb (Aust. $4.99 to $4.18) for Ceylon No. 1 grade, and from 46s. to 24s. per lb (Aust. $4.93 to $2.57) for Indian No. 1 grade. The prices have fluctuated quite considerably over the last five years, with high prices in 1966, a drop to less than 20s. in 1967 and 1968, rising again to a high peak in early 1970.

The demand for spices is fairly stable in higher income countries. In Eastern countries, however, spices are an important part of the daily diet, and consumption is expected to increase with improved standards of living. Overall demand may be considered to be rather stable at present, but tending to expand in the future.

Basic Data

1 lb fresh fruit contains an average of 780 pods.

10 lb fresh pods produces 2½ lb of seed.

1 lb of pods contains about 50,000 seeds of which about 30 per cent will germinate.

Planting distance—7 ft x 7 ft = 889 to 10 ft x 10 ft = 436 plants per acre.

Time to come into bearing—3 years from seed (small crop only—full crop after 4 years).

One man can pick 8 to 10 lb of pods per day.

One well-grown healthy cardamom plant produces up to ½ lb dry pods per year.

One acre of cardamoms averages 150 lb/acre in the fourth year.

One acre of cardamoms averages 200 to 300 lb in the fifth year.

By good selection of high-yielding rhizomes, crops above 300 lb per acre could be obtained.