

Preliminary Studies on Raising Cardamom Nurseries Successfully.

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Introduction : Cardamom are propagated in two ways. Old grown up clumps are lifted and split into planting units of each with a piece of underground stem (Rhizome) and one or two aerial shoots (pseudo stems). Each of these units is planted in a pit. Now aerial shoots develop from the rhizomes planted and a thick clump is formed in the course of two or three years. This is vegetative propagation. By adopting this method propagation is possible only to a limited extent as a clump cannot ordinarily be split up into more than 20 units for planting. The transport of planting materials to distant places will be a task especially in hills where alone cardamom grows. The planting will have to be done within a week after lifting the rhizomes as they will deteriorate if kept longer. Further pests and diseases may pass on to the new plantation through the mother rhizomes and aerial shoots attached to them.

The second method of propagation is by sowing seeds, raising seedlings in nurseries and transplanting them in the field. The seeds that can be obtained from each clump are large in number, over 1,000 per clump per year. Hence an extensive propagation is possible by adopting this method. The seed material can be transported easily through any distance and can be treated against pests and diseases to shut out the possibilities of its carrying infection to the new plantation.

Much difficulty is being encountered by cardamom growers in raising cardamom nurseries successfully. Some planters experience trouble in getting satisfactory germination; others complain about extensive failures of seedlings after germination.

Investigations to evolve suitable methods of raising cardamom nurseries successfully were taken up in 1945 at the Cardamom Research Station, Singampatti Hills, Madras and the results achieved are described in this paper briefly for the benefit of cardamom cultivators with practical hints to raise the cardamom nurseries successfully.

Investigations : (1) *Seed Viability:* It is believed that cardamom seeds are best sown immediately after harvest. This appears to be against the common belief that seeds need some "rest" before sowing. Experiments were laid out to find out how long cardamom seeds retained their viability. Seeds were sown soon after harvest, 15 days after

harvest, a month after harvest and so on at intervals of a fortnight. Germination counts were recorded once a week and the data gathered showed that there was a clear and significant difference between viability of the seeds sown soon after harvest and that of the seeds sown after a "rest" of varying periods. If sowing is deferred by 1½ months, the loss of viability was 60% and if it is deferred by 4 months the loss was as high as 93%. Thus the common belief that cardamom seeds should be sown soon after harvest appears to be sound (for data vide Appendix I).

(2) **Best Season for Sowing:** Though fresh cardamom seeds are available almost throughout the year, it is believed that the best time for sowing seeds is the dry period preceding the South West Monsoon. Experiments conducted to determine the most suitable season for sowing showed that best results were obtained if sowings were done during the period between December and March (for data vide Appendix II).

(3) **Soil Texture:** Attempts were made to find out the most suitable soil texture for inducing good germination in seed beds. Well rotton black jungle soil spread on the nursery beds 1" thick was taken as control in this experiment. Mixtures of either sand, leaf mould, wood ash or cattle manure with the black jungle soil were compared with the control as four different treatments. Observations recorded showed that the percentage of germination in beds that received ash and cattle manure was significantly higher than that in the control beds. The seedlings that received those two treatments were taller and more vigorous than those that got other treatments (for data vide Appendix III).

(4) **Mulching:** Next to soil texture, mulching seed beds is an important factor that determines good germination. The merits of dry leaf mulch, jungle debris mulch (well decayed wood in powdery form) and dry grass mulch evenly spread on seed beds were compared with no mulch. It was seen that the grass mulch was the best and the jungle debris mulch next best in inducing good germination (for data vide Appendix IV).

(5) **Seed Pre-Treatment:** Two experiments were laid out to find out the effect of pre-treatment of seeds on their germination. In one experiment, seeds were soaked in cowdung slurry, tapid water, cold water or Hortome A (0.3%) each for 12 hours and then sown. There was no significant difference in germination under the above treatments. Vigour of seedlings also was not affected by the treatments. In the second experiment, the seeds were treated with fungicides such as copper sulphate, corasan, agrosan, sulphur and mercuric chloride. These treatments were also found to have no effect on germination. The seeds so treated did not give any significantly higher percentage of

germination, than the untreated control. But it was found that by shaking the seeds in a bottle with fine coarse sand germination was improved. This is probably due to the scratches made (scarification) on the seed coat by shaking with the coarse sand. The increased percentage of germination of scarified seeds was significant (for data see Appendix V).

(6) **Spraying Trials:** Spraying the seedlings with Bordeaux mixture and colloidal copper of different concentrations as a prophylactic measure were tried at intervals of a week and a fortnight. Observations showed that in the untreated plots the seedlings were fewer than and not as healthy as in the treated plots. The good effects of spraying were thus apparent. Both the fungicides were effective in controlling "Nursery Katte". Fortnightly treatments were better than weekly treatments (for data vide Appendix VI).

Useful Hints to Planters: Based on the results of the above investigations, some useful hints are given hereunder for the benefit of the planters to guide them in the methods of raising cardamom nurseries successfully.

(1) **Preparation of Seed Beds:** The selection of a suitable site for locating the nurseries is of primary importance. A site near a water source is preferable as it will reduce the cost of watering. It is better if the site is surrounded by jungle trees affording protection against hot sun in summer. If the land is slopy, terraces are to be formed and reinforced with logs and poles. Prepare beds each about 3' x 3' on the terraces. Stir the soil and pick out the pebbles and stones in them. Import well decomposed black soil from the jungle and spread it over the beds 1" thick. Spread a thin layer of mixture of equal quantities of well rotten cattle manure and wood ash over the jungle soil. Some unwanted seeds are sure to exist in the original and imported soils in the seed beds. To get rid of them water the beds frequently for a period of about a fortnight. Such seeds will germinate and can be removed. Put up suitable sheds with the materials available in the forest to give protection to seed beds against sun and rain.

Sowing: It is better to start cardamom nurseries between the the month of December and March. During this period fresh cardamom seeds are available in plenty. Seeds harvested should be sown without much delay within a fortnight. The selection of seed material is a very important factor in cardomom cultivation. Seeds are to be gathered from plants that possess such desirable characters as good yield, bold pods, compact panicle, resistance or tolerance to pests and diseases. The pods selected are to be fully ripe. Gently squeeze out seeds from them and reject un-developed ones. It is necessary that the sweet

mucilagenous and sticky coating on the surface of the seeds is to be removed by washing the seeds for 4 times in a bucket of water. If one fails to do this thoroughly, the seeds stick on together and drop in lumps, while sowing. The sown seeds are also carried away from seed beds by ants which are attracted by the sweet mucilage. Sow the seeds shallow in beds. It is enough if the seeds are just buried on the surface. It has been found that for a bed of 3' x 3' size 720 seeds are quite enough. This works upto 80 seeds per square foot. Between adjacent beds, it is better to leave an interspace of about 6". After the sowing is over, cover the beds with a layer of fine sand about $\frac{1}{2}$ " thick. Over this spread a 1" layer of dry grass or leaves cut into fine pieces to serve as mulch. This mulch is useful to (a) retain moisture and (b) to maintain optimum temperature for the germination of seeds and development of seedlings. After the mulch is spread up irrigate the beds using rose cans for the purposes. Frequent watering is necessary in the early stages. Let the beds be moist always but not too wet. Germination usually starts one month after sowing and proceeds slowly little by little upto 7 or 8 months. When germination has advanced to an appreciable extent, periodical spraying with fungicides is necessary to protect the seedlings against fungus diseases. Even when the seedlings look healthy, it is wise to spray them once a fortnight with Bordeaux mixture (p. 5%) as a prophylactic measure.

When the seedlings are about one year old they will be fit for transplanting. It is not safe to transplant them in the field straight away. They need some more care-taking in a second nursery. The latter can be prepared in a convenient place near a water source and under the shade of jungle trees. Small pits 6" x 6" x 6" may be dug 2 to 3' apart either way in the area selected. A mixture of cattle manure and ash may be applied in small quantities to each of these pits. Seedlings can be transplanted in them in a slightly slanting position against the direction of the wind. It is very important to do the planting right in the thick of the monsoon season. Otherwise irrigating the second nursery will be very costly. After a care of one year in the second nursery the seedlings will be fit for transplanting permanently in the field.

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APPENDIX I.
Seed Viability

Treatment	Germi- nation as percentage on control	S. E. of the difference between two treat- ment means	Whether the difference is significant or not P-0.05	Critical difference
a. Seeds sown soon after Harvest - Control	100.0	14.81	YES	30.24
b. Seeds sown 15 days after Harvest	46.1			
c. Seeds sown 1½ months after Harvest	39.3			
d. " 2 months	22.5			
e. " 3 months	16.8			
f. " 3½ months	6.0			
g. " 4 months	2.8			
h. " 4½ months	4.2			
i. " 5 months	8.2			
j. " 5½ months	7.4			
k. " 6 months	5.7			
l. " 6½ months	2.5			

Conclusion: a b e d e i j f k h g l

APPENDIX II.
Best season for sowing

a. Seeds sown in March	119.6	22.94	YES	46.71
b. " January	114.7			
c. " December	106.2			
d. " February	100.0			
e. " May	92.9			
f. " July	92.4			
g. " April	92.0			
h. " October	83.1			
i. " November	79.6			
j. " June	71.1			
k. " September	58.2			
l. " August	23.6			

Conclusions: Mar. Jan. Dec. Feb. May July April Oct. Nov. June. Sept. Aug.

APPENDIX III.
Soil Texture

A. Control - Black jungle soil only	100.0	4.03	YES	10.45
B. Sand Black Jungle soil	103.32			
C. Leaf mould-black jungle soil	99.02			
D. Ash - Black jungle soil	131.42			
E. Cattle manure - Black Jungle soil	120.97			

Conclusion: D. E. B. A. C.

APPENDIX IV.

Mulching

Treatments	Germi- nation as percentage on control	S. E. of the difference between two treatment means percent	Whether the difference is significant or not P-0.05	Critical difference percent
A. Dry leaf mulch	203.92	} 90.1	YES	103.9
B. Jungle debris	436.27			
C. Green grass mulch	663.72			
D. Control	100.00			

Conclusions : C. B. A. D.

APPENDIX V.

Seed Pre-treatment

a. Seeds scarified	333.96	} 63.68	YES	138.76
b. Seeds scarified and treated with tapid water	167.00			
c. Seeds treated with tapid water	107.55			
d. Control - no treatment	100.00			

Conclusions : a. b. c. d.

APPENDIX VI.

Spraying Trials.

1. Bordeaux Mixture 0.5% weekly	135	} 61.4	YES	126.8
2. Bordeaux Mixture 0.5% fortnightly	186			
3. Bordeaux Mixture 1.0% weekly	133			
4. Bordeaux Mixture 1.0% fortnightly	151			
5. Colloidal copper 3.20 weekly	233			
6. Colloidal copper 3.20 fortnightly	277			
7. Colloidal copper 3.10 weekly	204			
8. Colloidal copper 3.10 fortnightly	260			
9. Control	100			

Conclusions : 6. 8. 5. 7. 2. 4. 1. 3. 9.