

DORMANCY AND STORAGE OF SEEDS IN *GARCINIA CAMBOGIA* DESR. (KODAMPULI)

Garcinia cambogia Desr. belongs to the family Guttiferae is a dioecious plant. The economic part is its fruits which are yellowish to orange in colour, oval to globular in shape with 8 to 12 cm in diameter having 7 to 12 deep longitudinal furrows. Seeds are as many as that of grooves in the fruit. They are flattened, oval in shape with veiny, pale brown testa surrounded by copious juicy yellowish aril. The dried rind is rich in non-volatile acids like tartaric and hydroxy citric acids, sugars and phosphoric acid and has got commercial value and the concentrate from the rind is now capturing the market. Seeds yield fat (36% on dry weight basis) which contain many glycerides of stearic and oleic acids which resembles that of kokkam butter (Verghese, 1991).

Commercial nurserymen have a great problem in getting the seeds of *Garcinia cambogia* germinated both for seedling production and rootstock multiplication. Keeping this in mind, an experiment was taken up to investigate the problems related to storage, viability and delay in germination of *Garcinia cambogia* seeds and to work out suitable remedial measures for overcoming these problems.

Seeds collected from freshly harvested ripe fruits were used in the study. After removing the rind and aril, they were stored in different conditions namely polythene bag, gunny bag and moist sand for one month, two months and three months duration and then sown for studying the viability of the seeds. In order to study the effect of time of sowing on germination percentage, seeds collected were stored in moist sand and sown at monthly intervals for seven months starting from May i.e., soon after the harvest. *Garcinia cambogia* seeds exhibit a long term dormancy. To break the dormancy, the seeds were subjected to seven treatments after classifying them into two groups namely seeds with seed coat and seeds without seed coat. The different treatments included soaking the seeds in

gibberellic acid 250 ppm, 500 ppm and 750 ppm (12 h), concentrated sulphuric acid (5 min), 3% thiourea (6 h), hot water (30 min), running water and control. In all the above studies, germination percentage and time taken for germination were recorded.

Table 1. Mean percentage of germination and time taken for seed germination in *Garcinia cambogia* under different storage conditions

Sl. No.	Treatment	Mean germination %	Time taken, months
1	Sown immediately after harvest	78	13
2	Stored in moist sand for one month and sown	79	12
3	Stored in moist sand for 2 months	76	11
4	Stored in moist sand for 3 months	74	10
5	Stored in polythene hag for one month	62	12
6	Stored in polythene hag for two months	30	11
7	Stored in polythene hag for three months	0	0
8	Stored in gunny hag for one month	70	12
9	Stored in gunny hag for two months	35	11
10	Stored in gunny hag for three months	10	10

The results obtained in the storage studies showed that highest germination percentage (79) was obtained when the seeds were sown one month after harvest (after storing in moist sand). Seeds sown immediately after harvest also registered a higher germination percentage (78). A fairly higher percentage of germi-

nation was noticed in the seeds stored in moist sand even up to three months of time.

Table 2. Mean percentage of germination and time taken for germination during different months

Month of sowing	Mean germination %	Time taken, months
May	78	13
June	80	12
July	79	11
August	72	10
September	68	9
October	68	8
November	6	7

Seeds stored in gunny bag and polythene bag for one month recorded satisfactory germination percentages (70 and 62). When the storage time was doubled, the germination percentage fell down to half and at three months of storage, it became very low (10%) in gunny bag and nil in polythene bag. Seeds of *Garcinia cambogia* lose viability very quickly especially if they are allowed to dry. Seeds stored in polythene bag and gunny bag lose moisture and it has resulted in poor germination. The suitable combination of moisture and temperature obtained in moist sand has perhaps helped in retaining the viability of seeds even after three months. Shanmughavelu and Rao (1977) and Mathew (1992) also reported the retention of viability under moist sand storage in tree crops.

Normally, kodampuli seeds take more than one year for germination if they are sown soon after harvest (Table 1). It is also evident from the table that as the storage time increases, the time taken for germination decreases irrespective of all the storage methods. In other words, including the storage time, the seeds require almost one year for germination under natural conditions.

The experiment conducted to know about the best season for germination indicated that seeds sown during the month of June recorded highest germination percentage followed by May and July sowing (Table 2). Seeds required about one year for germination including the storage time, i.e., the time in storage is accounted in the total time for germination.

Table 3. Effect of different seed treatments on the germination of *Garcinia cambogia* seeds

Treatment	Germination %		Time taken, weeks	
	WSC	WOSC	WSC	WOSC
GA 250 ppm	69	90	48	4
GA 500 ppm	75	85	50	4
GA 750 ppm	65	84	50	4
Conc. H ₂ SO ₄	66	25	50	4
Hot water	67	30	51	4
Thiourea, 3%	65	75	51	4
Soaking in water, 12 h	70	85	50	4
Control	68	85	52	5
t test	NS	Sig	NS	NS

WSC - Seeds with seed coat; WOSC = Seeds without seed coat; NS = Not significant; Sig = Significant

From the above two experiments it was evident that whatever be the storage time, viable storage method and time of sowing, *Garcinia cambogia* seeds remain dormant for a period of one year. This is a major limiting factor in the large scale production of rootstocks for *garcinia* grafts. Various seed treatments are reported to have pronounced influence on breaking the seed dormancy of different tree species (Ramamoorthy *et al.*, 1989; Bhagat *et al.*, 1992).

Generally tree species exhibit two types of dormancy viz., physiological dormancy and mechanical dormancy. Studies conducted in this line revealed that compared to seeds with seed coat, those without seed coat recorded a higher percentage of germination in all the treatments except that in hot water and

concentrated sulphuric acid (Table 3). Lowest concentration of GA (250 ppm) recorded the highest germination percentage (90). As the concentration of GA increased, a declining trend was noticed in the germination of naked seeds. The lesser germination percentages found in hot water and sulphuric acid treatments may be due to their deleterious effects on the embryo. From the above observations it appears that seed coat is one of the most powerful barriers for the germination of kodampuli seeds.

Among the different treatments given to seeds with intact seed coat, GA 500 ppm resulted the highest germination percentage (75) on comparing with others.

Irrespective of any seed treatment, naked seeds required only about 4-5 weeks for germination while seeds with intact seed coat needed 48 to 52 weeks for germination. This finding again stresses the fact that in *Garcinia cambogia* seed coat is the important mechanical barrier

which delays the germination. Burslem (1989) also reported that seed coat inhibited germination in Cinnamon seeds possibly by restricting the availability of oxygen.

From the above results it may be concluded that *Garcinia cambogia* seeds exhibit a mechanical dormancy for one year in the natural condition. This can be overcome by the removal of the seed coat before sowing. The practice of removal of seed coat is not so easy because of the gummy substance gamboge present in the seed and the adhering nature of the seed coat to the kernel soon after harvest. Removal of the seed coat can be made easy by allowing the seeds to dry in shade for two weeks without losing the moisture per cent below 80 as it reduces the viability of the seed. The viability of the seeds can be retained for about one year by storing the seeds in moist sand in open condition. The germination percentage of the seeds can be improved by treating them with gibberellic acid.

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