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Short communication

Standardization of seednut storage techniques for Kalpasree variety of coconut

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ABSTRACT

The study was conducted to standardise the storage conditions of seednuts of Kalpasree, a dwarf variety of coconut. Seednuts were stored under four conditions *viz.*, sand, saw dust, dark room and normal storage for period of 15, 30, 45 and 60 days. Higher germination of upto 85% was recorded in seednuts stored in sand and saw dust for a period of 60 days, whereas only 53% germination was observed in normal storage for the same period. The nut weight reduction was 35-43% in dark room and normal storage whereas it was only 10-15% in sand and saw dust storage even after 60 days of storage. The significantly higher weight reduction for nuts stored under normal and dark room condition may be attributed to the drying up of nut water, which in turn adversely affects germination. Studies revealed that Kalpasree seednuts should be sown within a period of 15 days under normal storage condition and it can be stored upto 60 days in sand and saw dust without affecting germination.

Key words: *Cocos nucifera*, seed nut storage, germination, dwarf varieties.

The coconut palm *(Cocos nucifera* L.*)* is an important crop for millions of people, supporting their livelihoods and sustaining their environment. It is a multipurpose palm serving the various human needs such as food, fibre, edible oil, feed, beverage, shelter, etc. It also provides essential nutrition to people in coconut growing communities. Furthermore, the interest in coconut products has been rapidly growing around the world during the recent decade, particularly for products contributing to human health such as coconut milk, coconut virgin oil, coconut sugar and coconut water.

The coconut palm is propagated only through seeds. The seednuts are usually sown in the nursery and seedlings raised are later selected for vigorous growth and transplanted in the field. Along the West Coast of India, the seednuts of coconut collected during summer months (February-May) are stored till they are planted in the nursery which coincides with the outbreak of the South-West monsoon in May/June. The environment during May/June sowing period is favourable and the weather conditions are helpful for germination and growth of seedlings. Studies on different aspects such as optimum storage period, suitability of using nuts harvested in different months and the effect of maturity on germination have been done only on West Coast Tall variety, the commonly grown commercial coconut cultivar in Kerala (Kailasa Rao and Sreerama Rao*,* 3; Krishna Marar and Balakrishnan, 4). They advocate storage for a period of one or two months. John and Narayana (2) have observed that the best way to store the seednuts is by way of preserving them in fine sand. The general practice is to store the seednuts in sand for a period of two months. According to Menon and Pandalai (7) the seednuts after harvest are not immediately sown in the nursery but are generally stored in shade for about a month till the husk become dry. During this interim period between harvest and sowing which is hottest season of the year, large number of seednuts gets dried up in spite of storing them in shade. Child (1) has stated that it is a common practice to store seednuts but it is unnecessary and if the period exceeds six weeks, germination is mostly delayed. Seednuts are stored to prevent the drying of nut water and suitable methods are adopted to store them. Investigations on seednut storage have indicated that storing them for a month or two prior to sowing in the nursery has beneficial effects (Krishna Marar and Balakrishnan, 4).

Dwarf varieties of coconut are becoming popular mainly because of its short stature and precocious bearing. Among the dwarfs, Chowghat Green Dwarf is a popular dwarf variety, indigenous to the Chavakkad area (Trichur District) of Kerala. A selection from this cultivar was released as 'Kalpasree' for the root (wilt) disease prevalent tracts (Thomas *et al*., 10). On account of its dwarf stature and easiness to harvest, there is huge demand for seedlings of this variety. There are reports from many coconut

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seed farms that seednuts of dwarf varieties have very low germination. Moreover, the seednut storage techniques are standardized for West Coast Tall cultivar. Hence, there was a need to carry out a thorough investigation to standardize the best storage method for seednuts of dwarf varieties of coconut that will guarantee optimum seed germination and production of quality coconut seedlings.

The study was carried out at ICAR-CPCRI, Regional Station, Kayamkulam for consecutive years during 2011-2014. There were four storage condition, *viz.*, sand, saw dust, dark room storage and storage in open condition as control. Seednuts harvested during March - May was used for the experiment and the seednuts were stored for a period of 15, 30, 45 and 60 days under each treatment. In the treatments with sand and saw dust storage, the seednuts were fully covered with sand/ saw dust. There were two replications with fifty seednuts per replication. The length and weight of seednuts before and after storage were recorded. After sowing the seednuts in the nursery, the days required for 50% germination and total germination percentage five months after sowing was also recorded. The four year's data was pooled and statistical analysis was carried out.

In all the storage methods, the length of seednuts decreased slightly with duration of storage. The percent decrease in length and weight of seednuts after storage is presented in Table 1. The reduction in length was maximum (2.79%) when seednuts were stored for 60 days in open condition and it was minimum (1.52%) in seednuts stored in saw dust for 15 days. Reduction in seednut length was on par in sand and saw dust storage methods when stored upto 45 days. But beyond 30 days of storage, the reduction in length was more in seednuts stored under dark room and open condition. This may be due to shrinking of seednuts as a result of moisture loss from the husk. This may be the reason for reduction of length of seednuts after storage. When the seednuts were stored in sand and saw dust, the moisture evaporated from the husk might have been absorbed by sand or saw dust and later it got imbibed by the dry husks and thereby compensating the reduction in seed nut length. This may be the reason for comparatively lower reduction in length of seednuts stored under sand and saw dust.

In all the treatments, there was a gradual decline in nut weight with duration of storage. Among different methods of storage, maximum reduction in nut weight was observed in seednuts stored under open condition for period of 60 days (42.87%), followed by dark room storage for 60 days (35.86%). The significantly higher seednut weight reduction might be due to the loss of water from the husk and also due to the drying of nut water. Seednut weight reduction was minimum in seednuts stored for a period of 15 days in sand (5.70%) followed by storage in saw dust (7.11%). This may be due to covering of seednuts with sand and sawdust which prevent direct loss of water from seednuts. However, beyond 45 days of storage, the weight reduction was significant in sand and saw dust storage methods. Since the seednut were not covered in open and dark room condition, the loss of moisture from seednuts were faster and significant nut weight reduction was observed even 30 days of storage.

Mathew & Gopimony (6) have reported that higher germination was positively correlated with coconut production and is also highly heritable. This suggests that when coconut seedlings are selected on the basis on germination the seedlings in the next generation will also be vigorous and precocious. An early 50% germination was observed in nuts stored in saw dust for 15 days (took 85 days for 50% germination) followed by sand (90 days) and it took 92 days for seednuts in open condition whereas it was 98 days for dark room storage (Fig. 1). More than 140 days was taken for attaining 50% germination in seednuts stored under dark room and open condition stored for period of 60 days. In general, as the duration of storage increased, the days required for attaining

Table 1. Reduction in length and weight of seednuts (%) after storage.

Method of storage	% reduction in seednut length				% reduction in seednut weight			
	Duration of storage (days)				Duration of storage(days)			
	15	30	45	60	15	30	45	60
Sand	1.76[a]	1.53 [a]	1.87 [a]	2.41 [ba]	5.70 [a]	7.34 [a]	11.68 [a]	18.99 [b]
Saw dust	1.52 [a]	1.54 [a]	1.61 [a]	2.38 [ba]	7.11 [a]	9.43 [a]	14.84 [a]	25.88 [b]
Dark room	1.87 [a]	1.92 [a]	2.35 [ba]	2.56 [ba]	10.37 [a]	16.52 [b]	26.13 [b]	35.86 [bc]
Control	1.89 [a]	2.43 [ba]	2.68 [ba]	2.79 [ba]	11.68 [a]	18.52 [b]	32.73 [bc]	42.87 [cd]
(CD treatment: 0.399, CD interaction: 0.797, CV(%) : 10.335)					CD treatment: 4.894, CD interaction: 9.788, CV (%) : 19.703)			

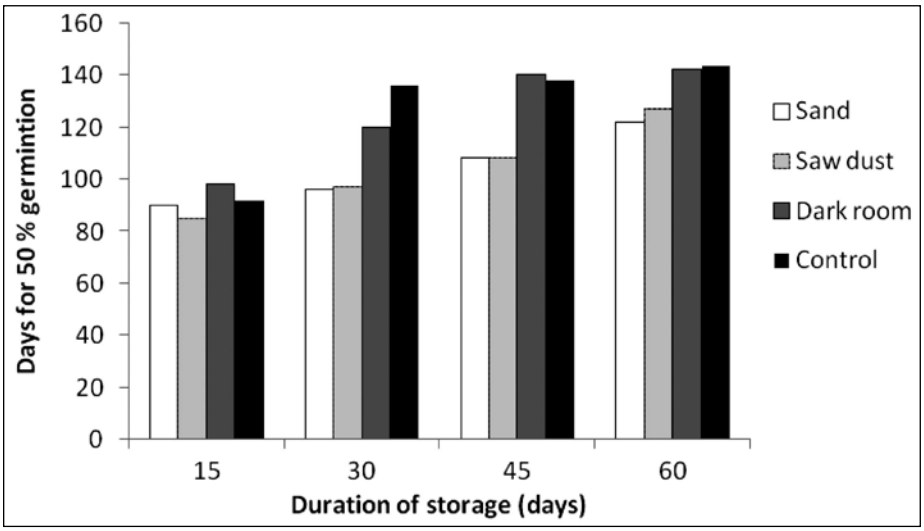

Fig. 1. Effect of method and duration of storage on days for 50% germination.

50% germination was also delayed. Nampoothiri *et al* (8) indicated that storage is not an absolute necessity and in some cultivars long storage even delayed the germination. According to Thampan (9) storing beyond one month does not give any added advantage. Thus it is clear that storage of seednuts of CGD beyond 15 days is absolutely not required and storing beyond 30 days even delayed the germination. In contrast, studies on effect of different periods of storage like no storage, thirty day and sixty days of storage after harvest have indicated that storing of WCT seednuts for thirty days after harvest improved the mean values of both germination and output of seedlings by about eight percent (Kailasa Rao and Sreerama Rao, 3).

Highest germination was observed in seed nuts stored under sand for a period of 15 days (92.25%) followed by storage in saw dust (90.5%) (Table 2). Irrespective of storage methods, the germination percentage decreased with duration of storage. However, the reduction in germination per cent was not significant in sand and saw dust method even upto a storage period of 60 days. As the duration of storage increased beyond 15 days, the germination per cent was significantly reduced in seednuts stored in dark room and open condition. Lowest germination was observed in seednuts stored for 60 days under open condition (53.56%) followed by dark room storage (58.11%) (Table 2). The germination pattern of coconut seednut is an important parameter since it is a significant attribute for outturn of quality seedlings. Studies on effect of seednut curing method on seedling germination revealed that under sand curing method, the increment in germination beyond the third month was very meager. Irrespective of

Table 2. Effect of different storage methods on germination percentage.

Method of storage	Duration of storage			
	15 days	30 days	45 days	60 days
Sand	92.25[a]	89.75 [a]	86.38 [ab]	83.88 [ab]
Saw dust	90.5 [a]	88.13 [a]	85.63 [ab]	84.25 [ab]
Dark room	89.56 [a]	74.50 [c]	69.56 [d]	58.11 [e]
Control	88.75 [a]	76.75 [c]	68.69 [d]	53.56 [e]

CD treatments = 0.232, CD (interaction) = 4.464, CV (%) = 3.925

varieties (tall, dwarf and hybrid), under sand curing, either one or two or three months did not adversely affect the germination but favourably influences early and uniform germination (Marimuthu, 5). He also reported that sand curing for three months recorded highest nut germination and it was on par with one month sand curing, two months sand curing and one month air curing. Though the total nut germination in sand and air curing method was comparable, the earliness and uniformity of germination was more favourable in sand curing method. Among the tall, dwarf and hybrids, dwarf (Malayan Yellow Dwarf) recorded lowest germination. Thus, from the present study, it is clear that seednuts of dwarf varieties of coconut should not be stored for a period of more than15 days and storing the seednut beyond that will affect the germination of seednuts. This may be due to the loss of nut water which is essential for germination.

From the study, it can be concluded that germination rate (days taken for germination) was markedly affected by storage period. The nut weight reduction was very minimal (10-15%) in sand and

saw dust storage methods even after 60 days of storage whereas almost 35-43% nut weight reduction was recorded in dark room and normal storage. The significantly higher weight reduction for nuts stored under normal and dark room condition may be attributed to the drying up of nut water, which in turn adversely affects germination. Germination of upto 85% was recorded in seed nuts stored under sand and saw dust for a storage period of 60 days whereas only 53% germination was observed in control for the same duration of storage. Kalpasree seed nuts can be stored in sand and saw dust for a period of upto 60 days without affecting the germination.

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