

VARIATION IN GERMINATION PATTERN OF COCONUT CULTIVARS AND HYBRIDS

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ABSTRACT

The coconut varieties, West Coast Tall, Chowghat Dwarf Green, Laccadive Ordinary, Gangabondam, Strait Settlement Apricot, and Tall × Dwarf show variations in the number of days taken for germination from the date of harvest and in the optimum period of storage as indicated by the minimum number of days taken for germination. Though within variety variation exists in the W.C. Tall 85 per cent of the families conform to the general trend of the cultivar. S.S. Apricot is one which takes a noticeably less number of days for germination. The significance of the pattern of germination in taxonomic and genetical studies in the crop is indicated.

INTRODUCTION

THE general practice on the West Coast of India is to use coconuts harvested during February-May (Summer) for seed purposes. For this, they are stored till the onset of monsoon in June when the weather conditions become satisfactory for germination. Studies on different aspects such as the optimum storage period, suitability of using coconuts harvested in different months for seed purposes, and the effect of maturity on germination have been done on the West Coast Tall variety (Kailash Rao *et al.* 1968; Marar *et al.*, 1958, 1963). They advocate a storage for one or two months. Some of the workers opined that though seednuts collected during February-April show better germination, the nuts collected from other months also can be used if proper shading and irrigation are provided. Attempts to study these aspects in relation to various cultivars are that of George (1964) and Whitehead (1966). George (1964) used 26 cultivars for the study but drew conclusions from a pooled sample. However, Whitehead (1966) observed, on the basis of his studies with Jamaica Tall, San Blas, Malayan Dwarf and Malayan Dwarf × Niu Leka, that there was considerable variation in germination pattern between different varieties and indicated that speed of germination could be used as a character of taxonomic significance.

The present study was taken up to investigate the germination pattern of seed coconuts of five cultivars and one hybrid under five different periods of storage.

MATERIAL AND METHODS

A total of 2,446 nuts belonging to five cultivars, West Coast Tall, Chowghat Dwarf Green, Laccadive Ordinary, Gangabondam, and Strait Settlement Apricot, and a hybrid Tall × Dwarf were sown in Randomised Block Design in the years 1966, 1967, and 1968. Observations were recorded on the number of days taken for germination from the date of harvest (character A), the number of days taken for germination from the date of sowing (character B) and the percentage of germination. Observations were also taken on another set of seednuts of 46 W.C. Tall trees in 1970-71 to study the variation within this variety. In all the cases, fully mature nuts (12 months from the date of pollination) were collected in the months of February, March, April, May, and June and sown in June to give storage periods of 4 months, 3 months, 2 months, 1 month, and no storage, respectively. The storage was done in fine sand.

Since tannin has been reported to inhibit germination (Leopold, 1964), its amount was estimated in seednut samples. This was done by oxidation with standard potassium permanganate using indigo carmine as the indicator and the result expressed as per cent galloannic acid (A.O.A.C., 1955).

RESULTS AND DISCUSSION

John and Narayana (1942) have observed that the best way to store seednuts is by pre-

serving them in fine sand. It is interesting to note that this condition is not much different from the one in the nursery. Under this system of storage, the nuts harvested in February remain under conditions similar to that of the nursery for four more months when compared to the nuts harvested in June, before it is sown. It is therefore only reasonable to expect that, when the number of days taken for germination from the date of sowing is considered the nuts harvested earlier will take only less time. This is then likely to lead to erroneous conclusions and this can be minimised by calculating the number of days taken for germination from the date of harvest itself. Therefore, the number of days taken for germination from the date of sowing is not discussed in detail in this paper.

The results obtained here on the best period of storage very well conform with that of those previous workers, who had calculated the number of days taken for germination from the date of sowing for comparison of germination characters in W.C. Tall nuts.

When character A is considered it becomes clear that storage is not an absolute necessity and that in fact, in some cultivars long storage even delays germination (Table II).

When character A alone, for reasons already indicated, is considered, storage does not appear to be necessary for all the cultivars. In fact, cultivars like Laccadive Ordinary, and Gangabondam are even deleteriously affected by longer storage. The nuts of S.S. Apricot usually germinate 50-80 days after harvest and sprouts emerge if stored for longer than about two months. This explains the negative values for B in Table I. The nuts of this cultivar usually mature in eleven months as compared to the twelve months required by the others. The cultivars, Laccadive Ordinary, Dwarf Green and T × D fall in the same group for these characters.

The analysis of tannin showed that the cultivars which germinated faster had lower tannin content (Table III).

The range of variability for germination pattern was studied using 46 families of W.C. Tall variety. Thirtynine families conformed to the finding discussed earlier for this variety, namely, that there is no difference in the number of days taken for germination from the date of harvest when the nuts are stored for different periods. The seven families which deviated from this originated from trees which have been throwing dwarf segregants (Bavappa

TABLE I

Mean number of days taken for germination from the date of harvest (A) and from the date of sowing (B)

Storage (in No. of months cultivar/hybrid)	A							B					
	Feb. (4)	Mar. (3)	April (2)	May (1)	June (0)	Mean	Feb. (4)	Mar. (3)	April (2)	May (1)	June (0)	Mean	
West Coast Tall	212	195	196	201	216	204	81	93	124	159	202	132	
Dwarf Green	175	173	133	145	164	158	41	65	64	101	153	85	
Laccadive Ordinary	190	163	139	150	142	157	58	61	67	109	131	85	
Gangabondam	143	147	111	96	89	117	19	59	50	65	85	56	
S.S. Apricot	56	72	78	58	67	66	-76	-31	6	17	61	-5	
T × D	173	162	146	137	167	157	44	62	78	98	159	88	
Mean	158	152	134	131	141	143	28	51	65	91	132	73	

Character A:

(i) Cultivars/hybrid

S.S. Apricot, Gangabondam, Laccadive, T × D, Dwarf, Tall CD — 26

(ii) Storage (in number of months)

1 2 0 3 4

Character B:

(i) Cultivars/hybrid

S.S. Apricot, Gangabondam, Dwarf, Laccadive, T × D, Tall CD — 28

(ii) Storage (in number of months)

4 3 2 1 0

TABLE II

Desirable storage periods for six cultivars and one hybrid

		Number of days taken for germination from the date of						Percentage of germination				
		Harvest			Sowing							
W.C. Tall	..	3	2	1	4	0	4	3	2	1	0	No significant difference between cultivars, storage or cultivars × storage
Dwarf Green	..	2	1	0	3	4	4	2	3	1	0	
Laccadive Ordinary	..	2	0	1	3	4	4	3	2	1	0	
Gangabondam	..	0	1	2	4	3	4	2	3	1	0	
S.S. Apricot	..	4	1	0	3	2	4	3	2	1	0	
T × D	..	1	2	3	0	4	4	3	2	1	0	

TABLE III

Percentage of tannin in relation to the germination pattern

Cultivar		S.S. Apricot	Gangabondam	Laccadive	T × D	Dwarf	Tall
No. of days taken for germination from the date of:	Harvest ..	66	177	157	157	158	204
	Sowing ..	— 5	55	85	88	85	132
Percentage of Tannin (as gallotannic acid) ..		6	8	14	8	6	19

et al., 1972). Differences between trees, within the groups can be expected, coconut being a cross pollinated seed propagated crop.

When the characters A and B are both considered, the variety Dwarf Green falls in the same group as that of Laccadive Ordinary and Tall × Dwarf, though this cultivar is very distinct for other characters like stature, flowering period, nature of pollination, yield, and nut characters are concerned. One possible reason is that some of the open pollinated nuts collected from the dwarf may have hybrid embryos to the extent of 17 per cent (Ninan and Satyabalan, 1964) which are late germinating.

The germination characters may be specially useful in the coconut since the genetics of this character can be studied in this crop unlike most others for reasons as heavy

commitments on area, plant material, time, and other resources. The fact that varieties show variations for this character indicate that it may be a useful character in varietal classification.

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DISCUSSION

SRIRAM: I would like to know whether studies on endosperm have been made in relation to germination pattern?

NAMPOOTHIRI: There are certain types like Macapuona where the embryos do not germinate because of endosperm abnormalities. This has been studied in some detail in the Philippines.

NAIR: Is it possible to identify the parental types from the hybrids on the basis of the germination data?

NAMPOOTHIRI: This seems possible at least in the case of certain cultivars like the Dwarf Orange.

VENKATESWARAN: 1. Were the seeds from the different varieties harvested in the same month and planted in different months after storage for different periods, or, were the nuts which were harvested in different months planted in the same month? 2. Were all the seednuts preserved in sand? 3. Whether any work has been done by the author on the seed dormancy of different varieties?

NAMPOOTHIRI: 1. The latter method was adopted.
2. The seednuts were preserved in sand.
3. This work is being done in Physiology section of my Institute,