

# Growth and yield performance of West Coast Tall seedlings germinated during different months (August to October) on the West Coast of India

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## ABSTRACT

Studies on the growth and yield performance of West Coast Tall seedlings germinated during different months (August to October) on the West Coast of India have indicated that 1) there was very little difference in the rate of leaf production from the time of germination in the nursery in the seedlings germinated during August to October 2) there was not much difference in the rate of leaf production per year during a period of ten years after transplanting in the field in the seedlings germinated during August and September. But October germinated seedlings recorded a high rate of leaf production only during fifth to seventh year after transplanting and afterwards the rate of leaf production was similar to those in the other two

groups. The total number of leaves produced from the time of germination was more in October germinated seedlings than in the other two groups 3) the time of germination had no influence on the height of the seedlings, attained during a period of 26 years after transplanting and 4) there was no significant difference in the mean yield of nuts of the seedlings in the three groups. But the cumulative yield per palm was more in September and October germinated seedlings than in August germinated ones. It is evident from these studies that if the seedlings are measured for their growth characters from the time of germination to a particular period, there may not be much difference between them, whether they germinate early or

late and their mean yield difference may not be significant. Hence early germination cannot be considered as an important criterion for selection of seedlings.

All workers on coconut have stressed the importance of early germination in the selection of seedlings for planting out in the field. Patel (1938) obtained a negative correlation between the number of leaves produced and the time taken for germination which indicated that early germinated seedlings grow faster. Liyanage (1955 a, b) got a highly significant positive correlation between sprouting of seednuts and flowering of palms and a negative correlation between sprouting and yield showing thereby that seednuts sprouted early give rise to palms

that flower in a shorter period and are more productive than those sprouted later. Menon and Pandalai (1958) have stated that correlation studies also show that palms with larger number of leaves begin to flower earlier than those with smaller number of leaves and it is therefore expected that early germinated seedlings will flower early. According to them, early germination is a very important criterion for seedling selection and is not dependent upon the date of sowing. Liyanage and Abeywardane (1958) studied the correlations between seednut, seedling and adult palm characters and reported that the sprouting period and the flowering period are significantly correlated only for between parents. They have stated that although, the sprouting period is not directly correlated with yield, the within correlation is significant and negative when flowering is kept constant. Results of nursery studies on the germination of seednuts harvested during January to May and sown in the nursery in June or July have indicated a distinct trend in the germination of seednuts harvested during different months and that seednuts harvested earlier than April germinate earlier than those harvested later (Satyabalan 1983). Further studies on seedling growth in seednuts germinated during different months have shown that if the growth characters viz. collar girth and leaf production of the seedlings are studied from the time of germination to a particular period, there may be only little differences between them, though they had germinated at different times and these minor

differences can be attributed to only changes in the climatic factors during the development of the seedlings (Satyabalan 1984). Growth measurements in seedlings from nuts germinated during July to November from the first to the tenth month from the time of germination also indicated that there is not much difference in collar girth and leaf production in the seedlings germinated during July to November (Satyabalan 1934). These studies show that late germinated seedlings are not inferior to early germinated ones and that all the seedlings germinated during different times will have more or less the same growth if the growth characters are measured from the time of germination to a particular period and not from the time of sowing. On the West Coast of India seednuts harvested during January to May are sown in the nursery during the South West monsoon period and the seedlings are transplanted in the field during the South West monsoon period in the following year. Maximum percentage of germination of seednuts occurs during the months August to October in the nursery. In this paper results of studies made on the growth and yield performance of West Coast Tall seedlings germinated during the months August to October and planted in the field during the next South West monsoon period on the West Coast of India are presented and discussed with reference to their germination period.

#### EXPERIMENTAL RESULTS

About thirty years back, open pollinated seedlings of high yielders of West Coast Tall variety

germinated during the months August, September and October in the nursery were transplanted in the field during September of the following year. The number of seedlings planted varied between 12 and 16 in each month. At the time of planting in the field, the seedlings germinated in August were 13 months old, those germinated in September were 12 months old and those germinated in October were 11 months old based on the month of germination. Leaf production in each of the seedlings of these three groups was recorded from the time of germination in the nursery and also during a period of ten years after transplanting in the field. The seedlings were planted at random in a sandy loam plot with the recommended spacing of 7.5 m in regular planting and were grown under rainfed conditions with the normal dosage of manuring and same cultural treatment. The data on leaf production in the seedlings of the three groups till the time of transplanting in the field and after transplanting for a period of ten years are presented in Table 1. The mean number of leaves produced in the nursery from the time of germination till the time of transplanting in September of the following year was 7.9 in the case of seedlings germinated in August, 7.5 in the case of those germinated in September and 7.1 in the case of those germinated in October which indicated that there was not much difference in the rate of leaf production among them. At the time of transplanting in September in the field, the number of functioning leaves (green) on the seedlings were 5.7 in those germinated in August,

5.5 in those germinated in September and 5.6 in those germinated in October which again showed that there was not much difference among them. During the four month period from the time of transplanting in September to December of the same year, the seedlings in the three groups had produced 1.1 to 1.3 leaves only. The number of leaves produced by them varied between 4.2 and 4.4 during the next year, 5.4 and 5.6 during the second year, 5.5 and 5.9 during the third year and 5.5 and 6.5 during the fourth year. This reduction in leaf production from the time of transplanting up to the fourth year is attributed to the transplanting shock sustained by the seedlings as a result of damage and disturbance to the roots during transplanting (Satyabalan 84). The data also show that the effect of the transplanting shock on leaf production and the rate of leaf production were similar in the seedlings of the three groups. Only during the fifth year after transplanting, the data indicate that the seedlings whether they germinate in August, September or October attain their earlier rate of leaf production shown by them in the nursery. During the three year period 5th to 7th year the data indicate that the rate of leaf production was high in the seedlings germinated in October than in those germinated during August and September. From the eighth year onwards there was not much difference in the rate of leaf production between these three groups. The total number of leaves produced by the seedlings during the period of ten years from the time of transplanting were 80.9, 79.5 and

86.6 in August, September and October germinated seedlings respectively whereas the total number of leaves produced by them from the time of germination were 88.8, 87.0 and 93.7 in August, September and October germinated ones, respectively. These observations have indicated that early germinated seedlings did not exhibit a high rate of leaf production. The total number of leaves produced from the time of transplanting was more in October germinated seedlings than in the other two groups.

The data on the height of the palm - the length of the stem from the ground level to just below the crown of leaves - in the seedlings germinated during August to October, attained during a period of 26 years from the time of transplanting are presented in Table 2. The data show that the seedlings germinated in August had grown to a height of 452.7 cm during the first 16 years after transplanting and those germinated in September to a height of 448.5 cm and those germinated in October to a height of 467.3 cm during the same period. During the next ten year period the mean heights attained were 389.0 cm in those germinated during August, 350.7 cm in those germinated in September and 374.6 cm in those germinated in October. During a total period of 26 years from transplanting, both August and October germinated seedlings had attained the same mean height of 841.7 and 841.9 cm respectively while the mean height in September germinated ones was 799.2 cm. These data also indicate that the time of germination had no

influence on the growth of the seedlings.

The data on the yield of nuts produced by these seedlings in the three groups from the time of first harvest have been recorded to study the effect of germination on yield. In Table-3 are presented the data on the mean yield of nuts of the palms in the three groups at the 11th, 15th and from 20th to 27th year after transplanting, mean yield of the last four years and the mean cumulative yield per palm from the time of transplanting. The data indicate that at the 11th year, September germinated seedlings had produced 7.8 nuts whereas August and October germinated ones had produced 6.2 and 5.3 nuts respectively. At the 15th year after planting, September germinated seedlings maintained its lead over the other two groups. But from the 20th to 27th year either August or September or October germinated seedlings gave more yield per palm per year indicating that early or late germination had no effect on yield. The mean yield during the last four years (24th to 27th) was 100.8 nuts for both August and October germinated seedlings and 104.4 nuts for September germinated ones. There is no significant difference in yield of nuts per palm per year in the seedlings of these three groups. Nampoothiri *et al* (1975) have reported that correlation coefficients of yield with number of days taken for germination was insignificant. But the cumulative yield per palm was more in September and October germinated seedlings than in August germinated ones.

These studies have shown that in leaf production, height and yield of nuts per palm there is not much difference between the early or late germinated seedlings. Early or late germination of the seednut depends on so many factors like quality of nut, presence of inhibiting factors of germination in the nut and climatic factors at the time of germination. Maceda (1933) had reported that round nuts germinated earlier than oblong nuts of equal volume and that there was no significant difference in percentage of germination between the two types. Patel (1938) has also recorded that spherical nuts germinate earlier than others. Umali (1940) has reported that thin husked

nuts germinated earlier than thick husked nuts. Tannin has been reported to inhibit germination (Leopold 1964) and percentage of tannin is likely to vary in the nuts of the palms of West Coast Tall variety. Nampoothiri *et al* (1973) have stated that cultivars which germinated faster had lower tannin content. According to Thampan (1975), if the period of germination coincides with the dry period, germination and the growth of seedlings will be severely affected. Hence early germination cannot be considered as an important criterion for selection of seedlings. It is possible that in some mother palms germination of seednuts may be early or late depending

on the seednut characters. But if the seedlings from them are measured for their growth characters from the time of germination to a particular period there may not be much difference in the growth characters between the seedlings, whether they germinate early or late and the performance of such seedlings vigorous, and intermediate studied by Kannan and Narayanan Nambiar (1979) has shown that the yield difference between them is not significant. Similar studies on growth and yield performance of seedlings of other cultivars germinated early or late in other areas where climatic conditions are different are also likely to yield similar results.

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Table I

Leaf production in seedlings germinated during August to October in the nursery and in the field during a period of ten years after transplanting

Month of germination & age of seedling (months) from the time of germination	Total No. of leaves produced in the nursery till the time of transplanting	No. of functioning leaves at the time of transplanting	No. of leaves produced during										Total from the time of transplanting	Total from the time of germination	
			Sep. to Dec. of the year	I yr.	II yr.	III yr.	IV yr.	V yr.	VI yr.	VII yr.	VIII yr.	IX yr.			X yr.
August 13 months	7.9	5.7	1.2	4.2	5.5	5.5	5.7	7.5	9.4	9.2	9.4	11.2	12.1	80.9	88.8
September 12 months	7.5	5.5	1.1	4.4	5.4	5.6	5.5	7.1	9.5	9.4	9.0	10.6	11.9	79.5	87.0
October 11 months	7.1	5.6	1.3	4.3	5.6	5.9	6.5	8.8	10.6	10.8	9.7	11.2	11.9	86.6	93.7

**Table 2**

Height attained by the seedlings (germinated during August to October) in the field during a period of 26 years after transplanting

Month of germination	Height attained during the first 16 years	Height attained during the next 10 years	Height attained during a period of 26 years
August	452.7 cm (320.0 to 609.0 cm)	389.0 cm. (257.0 to 542.5 cm)	841.7 cm (587.5 to 1142.5 cm)
September	448.5 cm (249.0 to 580.0 cm)	350.7 cm (267.5 to 435.0 cm)	799.2 cm (595.0 to 960.0 cm)
October	467.3 cm (352.3 to 565.1 cm)	374.6 cm (285.5 to 500.0 cm)	841.9 cm (657.5 to 997.5 cm)

(Figures in paranthesis denote the range)

**Table-3**

Mean yield of nuts of seedlings (germinated during August to October) from the time of transplanting

Month of germination	Year from the time of transplanting											Mean yield per palm during the last four years	Mean cumulative yield per palm till 27th year
	11th	15th	20th	21st	22nd	23rd	24th	25th	26th	27th			
August	6.2	43.9	79.6	61.1	98.1	82.2	92.8	126.5	107.1	76.6	100.8 nuts	1088.8 nuts	
September	7.8	51.7	69.6	80.5	110.8	71.3	119.7	105.5	113.7	78.5	104.4 nuts	1136.3 nuts	
October	5.3	44.9	89.8	69.6	124.2	73.4	109.3	113.9	98.0	82.0	100.8 nuts	1141.8 nuts	

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