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Research Articles

# NURSERY STUDIES ON WEST COAST TALL COCONUT TO SELECT SEEDLINGS FOR EARLY TRANSPLANTING

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ABSTRACT

**Possibility of selecting West Coast Tall coconut seedlings at the fifth month itself in the nursery has been indicated based on the high and positive correlation of growth characters like collar girth and leaf production from the fifth month after germination with those of the later months. Studies on the rate of growth of seedlings in respect of collar girth and leaf production indicated that the growth rate which was high in the beginning decreased slowly till the sixth month and thereafter increased gradually. This could be attributed to the utilisation of endosperm by the seedling till the sixth month and thereafter a gradual change over to full dependence on photosynthesis. Selection of seedlings at early stage in the nursery reduce the setback in growth immediately after transplantation.**

## INTRODUCTION

Early transplanting of coconut seedlings from the nursery to the field has been recommended in almost all the coconut growing countries to avoid the shock sustained during the removal of older seedlings from the nursery (Sumbak, 1968, 1970; Anonymous, 1977; Satyabalan, 1983). In areas where conditions are favourable for early transplanting, selection of seedlings has to be necessarily done during their early stages of growth. According to Foale (1968 a), two basic aspects of coconut nursery management are: to transplant seedlings early to prevent a severe setback, and to select only the most vigorous seedlings. Trials conducted in Solomon Islands have shown that the optimum time for transplanting seedlings from the nursery to the field is 4-5 months after germination or 3-5 leaf stage counting all green leaves including the first small ones (Anonymous, 1967). An experiment carried out by Romney et al (1968) in Jamaica indicated that young seedling of 30–60 cm height are much better planting material than older and bigger seedlings and suffer less damage from wind. A good deal of meat in the seednut is still left in the case of young seedlings to supply nutrient and water

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while a feeding root system in the soil is being established.

To investigate the possibility of selecting vigorous seedlings based on two growth characters namely, collar girth and leaf production in the early stages of their growth in the nursery, studies were carried out on seedlings raised from open pollinated seednuts of West Coast Tall palms harvested during January - May. The results are reported in this paper.

## MATERIALS AND METHODS

Well matured seednuts were harvested during January to May preserved in sand under shade till they were sown vertically in the nursery at the beginning of the south west monsoon in June. The nuts harvested each month were marked and sown separately. The seedlings were irrigated during the summer season and shaded properly to avoid sun scorch. The date of germination of each nut was noted when the tip of the sprout just emerged out of the husk. The number of seedlings raised were 89 from nuts harvested in January, 127 from February, 158 from March, 208 from April and 67 from May. The total number of leaves produced and the collar girth in cm of each seedling were recorded every month from the date of germination. The mean data on leaf production and collar girth of seedlings from seednuts harvested in each month were worked out. Similar data of the same seedlings but germinated during different month were worked out separately from the collected data. Out of a total of 649 seedlings, 35 had germinated in July, 263 in August, 145 in September, 155 in October and 51 in November. Data on leaf production and collar girth for nuts germinated in different months (irrespective of date of harvest) were also computed. Coefficients of correlation between leaf production from the first to the ninth month with that of the tenth month were worked out separately for (1) the seedlings from nuts harvested in different months; and (2) nuts germinated during different months. Similarly, coefficients of correlation between collar girth of seedling from the first to the ninth month with that of the tenth month were also worked out separately.

## RESULTS AND DISCUSSION

Mean data on the total leaf production and collar girth in cm of 649 seedlings raised from seednuts collected during January to May, and coefficients of correlation of the collar girth as well as leaf production from the first to the ninth month with that of the tenth month are presented in Table I. The data indicate that the correlation is high and significant from the third month onwards in the case of all months of harvest indicating that selection of seedlings could be done based on collar girth from the third month onwards from the time of germination. In the case of leaf production also the correlation is high and significant from the third month onwards showing that seedling selection could be done based on leaf production from the third month onwards from

Table I. *Relationship of characters in the nursery for the nuts harvested in different months*

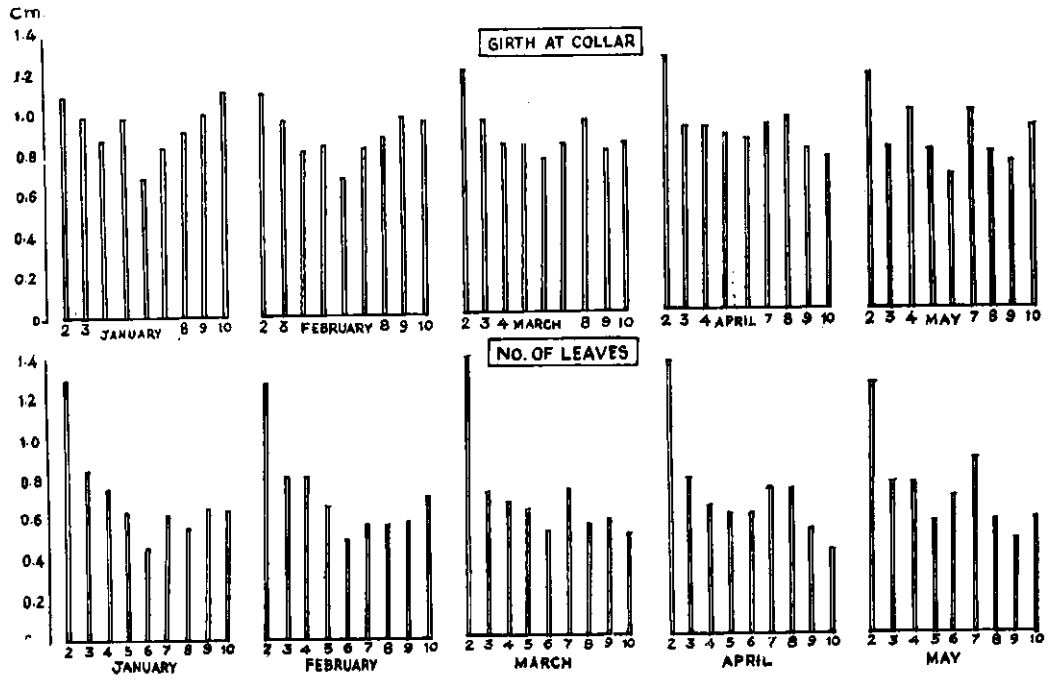
| Month of observation | | Coefficient of correlation between the values in the different months with that of the tenth month | | | | |
|---|---|---|---|---|---|---|
| | | Month of harvest | | | | |
| | | January (n=89) | February (n=127) | March (n=158) | April (n=208) | May (n=67) |
| | Mean girth at collar (cm) | | | | | |
| 1st | 4.98 | 0.2898 | 0.4770 | 0.3620 | 0.2978 | 0.2396 |
| 2nd | 6.15 | 0.6263 | 0.5895 | 0.5400 | 0.4311 | 0.5110 |
| 3rd | 7.09 | 0.6315 | 0.7168 | 0.6221 | 0.5983 | 0.5160 |
| 4th | 7.97 | 0.7168 | 0.7418 | 0.6824 | 0.6620 | 0.6102 |
| 5th | 8.83 | 0.7946 | 0.8215 | 0.7345 | 0.7753 | 0.6857 |
| 6th | 9.58 | 0.8321 | 0.8744 | 0.7564 | 0.7664 | 0.6824 |
| 7th | 10.46 | 0.8471 | 0.8953 | 0.8041 | 0.8067 | 0.6061 |
| 8th | 11.38 | 0.8914 | 0.9222 | 0.8436 | 0.8675 | 0.6423 |
| 9th | 12.23 | 0.9415 | 0.9442 | 0.9365 | 0.9455 | 0.7114 |
| 10th | 13.11 | | | | | |
| | Mean no. of leaves | | | | | |
| 1st | 0.44 | 0.3370 | 0.3325 | 0.2017 | 0.1813 | 0.1198 |
| 2nd | 1.75 | 0.3577 | 0.4289 | 0.4333 | 0.4019 | 0.4992 |
| 3rd | 2.52 | 0.5094 | 0.5699 | 0.6551 | 0.5524 | 0.6132 |
| 4th | 3.21 | 0.6324 | 0.7162 | 0.6416 | 0.6054 | 0.6643 |
| 5th | 3.81 | 0.5927 | 0.6660 | 0.6943 | 0.6864 | 0.6474 |
| 6th | 4.37 | 0.5896 | 0.6779 | 0.7303 | 0.7065 | 0.6801 |
| 7th | 5.05 | 0.7117 | 0.7430 | 0.6723 | 0.7313 | 0.6818 |
| 8th | 5.65 | 0.7161 | 0.7758 | 0.7534 | 0.7613 | 0.7589 |
| 9th | 6.21 | 0.7289 | 0.7497 | 0.7668 | 0.8046 | 0.7663 |
| 10th | 6.74 | | | | | |

Values of correlation coefficient in different levels of significance

| Significance level | January (n=89) | February (n=127) | March (n=158) | April (n=208) | May (n=67) |
|---|---|---|---|---|---|
| P = 0.05 | 0.205 | 0.174 | 0.159 | 0.138 | 0.240 |
| P = 0.01 | 0.267 | 0.228 | 0.208 | 0.181 | 0.314 |

the time of germination. Mean data on leaf production and collar girth of the same seedlings but germinated during the months of July to November and the coefficients of correlation in the case of seedlings germinated during different months are presented in Table II, which indicate that in collar girth the correlation is high and significant from the fourth month onwards. But in leaf production the correlation is high and significant from the fifth month onwards in the cases thereby showing that selection of

FIG. 1. THE MEAN RATE OF GROWTH IN EACH MONTH IN COLLAR GIRTH (CM) AND NUMBER OF LEAVES FROM THE TIME OF SEEDNUT GERMINATION IN SEEDLINGS FROM NUTS HARVESTED DURING JANUARY TO MAY

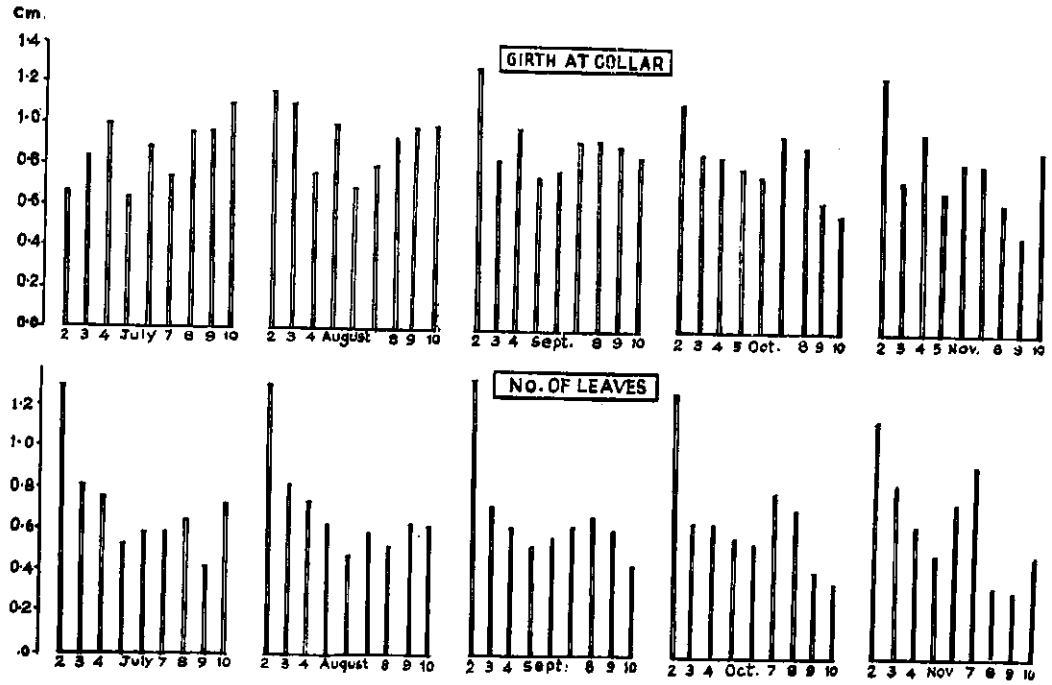



seedlings can be done from the fifth month onwards from the time of germination.

If the coefficients of correlations presented in Tables I and II are taken into consideration for selection of seedlings based on these two growth characters which are reported to be genetically correlated with yield of the adult palms (Nampoothiri, Satyabalan and Mathew, 1975) selection can be made during the fifth month from the time of germination. Satyabalan and Mathew (1983) reported high and positive correlation of growth characters like collar girth and leaf production of the seedlings from the fifth month of growth of the seedlings with those of the later months. This finding enabled them to identify palms of superior genetic value based on the growth characters of the progeny even from the fifth month.

The rate of growth of the seedlings for these two characters from the first month to the tenth month for both the groups was high in the beginning and decreased slowly till the fifth or sixth month and thereafter slowly increased for both the characters in both the groups (Figs. 1 and 2). According to Foale (1 968a, b), the relative growth rate (R) dropped from a high early value to an almost constant level after 4

FIG. 2. THE MEAN RATE OF GROWTH IN EACH MONTH IN COLLAR GIRTH (CM) AND NUMBER OF LEAVES FROM THE TIME OF SEEDNUT GERMINATION IN SEEDLINGS FROM NUTS GERMINATED DURING JULY TO NOVEMBER




months. The haustorium reached full activity at the fourth month giving a constant absolute rate of use of endosperm thereafter. He has stated that photosynthesis first contributed assimilate to the plant at the fourth month and by 11th month was supplying over 90 per cent of dry matter gain. He has concluded that at any age, when photosynthesis contributes the greater part of the dry matter gained by the plant, an interruption of the water uptake (due to transplanting) would seriously retard development and this indicates the need for early transplanting *i. e.*, at 4th or 5th month when the endosperm is still the major contributor to plant growth. According to Jenkin and Foale (1968) the seedlings should receive no shade in the nursery where they should remain for not more than six weeks after sprouting. If they remain longer their reserve of copra will be exhausted before they are transplanted.

According to Child (1974), the seednuts germinate from 6 to 8 weeks after planting in the nursery and from eighth to twenty fourth week, the total weight goes on increasing. After 24 weeks the total weight begins to decrease indicating that there is a slow change over. According to Foale (1968b), a gradual change over to full dependence on photosynthesis takes place from this period.

Table II. *Relationship of characters in the nursery for the nuts germinated in the different months*

| Month of observation | | Coefficient of correlation between the values in the different months with that of the tenth month | | | | |
|---|---|---|---|---|---|---|
| | | Month of germination of seednut | | | | |
| | | July (n=35) | August (n=263) | September (n=145) | October (n=155) | November (n=51) |
| | Mean girth at collar (cm) | | | | | |
| 1st | 5.00 | 0.0668 | 0.3728 | 0.3748 | 0.3152 | 0.3467 |
| 2nd | 6.15 | 0.4741 | 0.5868 | 0.4559 | 0.5450 | 0.5186 |
| 3rd | 7.10 | 0.6009 | 0.7062 | 0.4862 | 0.6035 | 0.5514 |
| 4th | 7.97 | 0.7330 | 0.7117 | 0.6452 | 0.7340 | 0.6133 |
| 5th | 8.83 | 0.8282 | 0.8094 | 0.6604 | 0.8081 | 0.6757 |
| 6th | 9.59 | 0.8585 | 0.8340 | 0.7078 | 0.8303 | 0.6469 |
| 7th | 10.46 | 0.8753 | 0.8673 | 0.7689 | 0.8683 | 0.6026 |
| 8th | 11.38 | 0.9134 | 0.8794 | 0.8168 | 0.9030 | 0.6448 |
| 9th | 12.93 | 0.9486 | 0.9427 | 0.9135 | 0.9465 | 0.6595 |
| 10th | 13.10 | | | | | |
| | Mean no. of leaves | | | | | |
| 1st | 0.44 | 0.1512 | 0.2644 | 0.1517 | 0.1277 | 0.1695 |
| 2nd | 1.76 | 0.3484 | 0.4232 | 0.2987 | 0.3279 | 0.5381 |
| 3rd | 2.52 | 0.1433 | 0.6128 | 0.4533 | 0.5232 | 0.6960 |
| 4th | 3.22 | 0.5725 | 0.6923 | 0.4339 | 0.5562 | 0.7339 |
| 5th | 3.81 | 0.5508 | 0.6871 | 0.5288 | 0.5947 | 0.7956 |
| 6th | 4.36 | 0.6189 | 0.6853 | 0.5791 | 0.6539 | 0.7145 |
| 7th | 5.05 | 0.7975 | 0.7397 | 0.5509 | 0.7004 | 0.7802 |
| 8th | 5.66 | 0.7015 | 0.7826 | 0.6525 | 0.7594 | 0.8358 |
| 9th | 6.21 | 0.8091 | 0.7516 | 0.6982 | 0 7696 | 0.7710 |
| 10th | 6.73 | | | | | |

Values of the correlation coefficient for different levels of significance.

| Significance level | July (n=35) | August (n=263) | September (n=145) | October (n=155) | November (n=54) |
|---|---|---|---|---|---|
| P = 0.05 | 0.324 | 0.138 | 0.159 | 0.159 | 0.273 |
| P = 0.01 | 0.418 | 0.181 | 0.208 | 0.208 | 0.354 |

The two growth characters, leaf production and collar girth are the main criteria to indicate the vigorous growth of seedlings. The rate of leaf production and increase in collar girth are more during the first four or five months than during the subsequent months. The decrease in leaf production after the fourth or the fifth month from the time of germination may be due to change over to dependence on photosynthesis as opined by Foale (1968b). Jaunet

(1968) reported from his studies in local West African palms that there was a close relationship between the number of external leaves and of internal leaves and that the number of any given leaf can be deduced with reasonable accuracy which enables to judge the precocity of development of the palm under observation. On the basis of this finding it will be possible to select vigorous seedling at the fifth month based on leaf production.

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