

Growth Studies in Coconut Seedlings*

In coconut, selection of planting material from the nursery is mainly done based on the vigour of the seedlings as determined by growth measurements such as girth at collar, height and number of leaves (Liyanage, 1953; Harland, 1957; Ninan, Pankajakshan and Abdu, 1964). Since growth is a function of dry matter production, the understanding of the factors contributing to the higher dry matter production is very important. Ramadasan, Satheesan and Balakrishnan, (1980) reported that girth at collar and leaf area (LA) contribute mostly to the shoot dry weight (SDW) which is associated with high vigour of the seedlings. The transplanting of the seedlings based on the vigorous growth characters has been stressed by Foale (1968). As the transplanting of the seedlings are mainly done one year after sowing of the seednuts, there will be severe set back in the growth due to the transplanting shock. Hence the work was carried out to understand the relationship between the growth parameters at different stages of growth of coconut seedlings in the nursery and exploring the possibility of using the results for selection of vigorous seedlings at an early stage of growth.

One hundred seedlings of open pollinated WCT cultivar growing under identical conditions were selected for the study. The nuts were sown in early June at 0.3m² apart and the observations were recorded from December to June (at 6th month growth stage to one year

old stage). The morphological parameters such as girth at collar, height and number of leaves were recorded at an interval of 3 months upto 12 month. Regression equations were used for the estimation of LA (Satheesan, Narasimhayya and Ramadasan, 1983) and SDW (Ramadasan et al, 1980). All the other growth characteristics such as net assimilation rate (NAR) relative growth rate (RGR), crop growth rate (CGR), leaf area ratio (LAR) and leaf area index (LAI) were estimated as described by Sestak, Catsky and Jarvis, (1971).

Table I. Growth parameters during different periods of seedling growth—months after sowing (Mean values)

Characters	6th	9th	12th
LA (Sqm)	0.18 ± 0.009	0.37 ± 0.022	0.51 ± 0.040
SDW (g)	37.77 ± 4.036	92.77 ± 6.472	132.33 ± 9.663
LAI	1.95 ± 0.099	4.17 ± 0.255	5.59 ± 0.445
LAR (cm ² g ⁻¹)	52.96 ± 6.239	40.64 ± 1.502	38.19 ± 1.797
NAR(gm ⁻² week ⁻¹)	—	17.48 ± 0.839	7.55 ± 0.594
CGR(gm ⁻² week ⁻¹)	—	62.70 ± 4.006	42.88 ± 0.752
RGR (gg ⁻¹ w ⁻¹)	—	0.005 ± 0.005	0.03 ± 0.002

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As the seedlings grew there was a steady increase in the LA and SDW. The LA and SDW increased from 0.19m² to 0.51m² and 40.7 gms to 133.4 gms respectively from the 6th to 12th month. Table I gives the mean and SE of the growth characteristics during different stages of the seedling growth. A LAI of 5.8 has been achieved at the one year old stage. The NAR at the one year old showed a decrease which may be due to the mutual shading of the leaves. Since CGR and RGR are dependent on NAR there was a decrease in these values during the period. At the 12th month stage (Table II) the data showed a high positive correlation between RGR to LAR and NAR. A similar correlation was observed between CGR to LAI and NAR. Between LAI and NAR a negative corre-

lation was obtained. According to Watson although LAI and NAR are the primary determinants of crop growth, the NAR estimates would have little value in selection as it changes according to growing condition. (Watson, 1952)

Table III gives the correlation matrix of the characters studied. Significant positive correlation was observed between the 6th month seedling growth characters with that of 9th and 12th month. The total LA, SDW and LAI of 6th month showed significant positive correlation with the LA, SDW, LAI and LAR of 9th month as well as the LA, SDW and LAI of 12th month. This denotes that the vigour of the seedlings is expressed at the 6th month growth itself.

Table II. *Correlation coefficient of growth characteristics at the 12th month stage*

	LAR	NAR	LAI
RGR :	0.6709**	0.7222**	—
CGR :	—	0.4328**	0.6193
LAI :	—	-0.2824**	—

** Significant at 1% level

In one year old seedlings of WCT a highly significant correlation between LA and SDW and a high heritability in the efficiency of dry matter production were reported (Ramadasan et al, 1980; 1985). In the present study a significant correlation was observed between the LA of 6th month seedling growth with the SDW of 12th month. This showed

Table III. *Correlation matrix of the 6th month growth characters with that of 9th and 12th month growth characters*

Character	6th month				9th month				12th month			
	LA	SDW	LAI	LAR	LA	SDW	LAI	LAR	LA	SDW	LAI	LAR
LA	0.6090*	0.8344**	0.6331*	-0.6281*	0.7183*	0.7591**	0.7178*	0.0345				
SDW	0.4555	0.6864*	0.4859	-0.6290*	0.4036	0.4835	0.4031	-0.0276				
LAI	0.6093*	0.8340**	0.6329*	0.6263*	0.7185*	0.7597**	0.7180*	0.0333				
LAR	-0.4012	-0.5814	-0.4323	0.5920	-0.4097	-0.4299	-0.4096	-0.0967				

* Significant at 5% level

** Significant at 1% level

that the seedling growth at 6th month will give an indication of its efficiency for dry matter production.

As the seedling vigour is decided by the LA and SDW, the possible factors that influence the LA development in the early stages of growth merit serious consideration. It was observed that in the seedlings raised in the open condition the LA varied from 0.1 m^2 – 0.7 m^2 and SDW 15.0 gms–175.0 gms, whereas under the shade it was 0.06 m^2 – 0.2 m^2 and 8.0 gms–66.0 gms respectively. This indicates that the seedling vigour is highly influenced by the nursery management. Studies in Sri Lanka also showed by shading of the nursery the seedlings will show lanky growth (Ohler, 1984).

Based on the correlation obtained between dry matter production at the 6th month growth stage with that of 12th month, the result suggest the possibility of selection of seedlings at the 6th month growth stage, having higher efficiency for dry matter production. This corroborate the findings of Satyabalan and Mathew (1983).

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