

Leaf area and shoot dry weight in coconut seedling selection

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ABSTRACT

Path-coefficient analysis was used to assess the contribution of various seedling characters that are presently employed for selection of coconut seedlings from 1-year-old nursery. The girth at collar and the leaf area, contributed mostly to the dry weight of shoot. The number of leaves and the height of seedlings did not significantly contribute to vigour. A simple multiple linear regression equation was worked out for estimating the dry weight of shoot non-destructively. The girth at collar and the leaf area were found to be the most important characters to be considered in selection and breeding.

The characters that are presently suggested for the selection of planting material from coconut (*Cocos nucifera* Linn.) nurseries are based on the vigour of seedlings as indicated by girth at collar, height and number of leaves, besides early splitting of the leaves (Liyanage, 1953; Menon and Pandalai, 1958). Growth being a function of dry-matter production, information on the relationship between the different seedling characters—the total leaf area and the shoot dry weight—is of importance. The present study was aimed at analysing the relative direct and indirect effect of the different seedling characters on the dry weight of the shoot.

MATERIALS AND METHODS

Forty-five 1-year-old coconut seedlings of 'West Coast Tall' variety were used for the study. The girth at collar, number of leaves and height of each seedling were recorded. The leaf area was estimated using the regression equation $y = a + bx$, where $a = 27.3861$, $b = 0.6139$ and x is the product of length \times width (Sharma *et al.*, personal communication). Thereafter the dry weight of the shoot was determined after drying in a hot-air oven at 85°C.

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The relative contribution of each of the 4 seedling characters, viz. girth, height, number of leaves and total leaf area, to the dry weight of the shoot was estimated adopting the path-coefficient analysis (Dewey and Lu, 1959).

RESULTS AND DISCUSSION

A multiple linear regression equation, based on different seedling characters, was worked out for estimating the dry weight of shoot according to the equation: $y = -112.4464 + 12.5885 x_1 + 0.2295 x_2 - 5.6338 x_3 + 0.0143 x_4$, where y is the shoot dry weight, x_1 the girth at collar, x_2 the height of seedling, x_3 the number of leaves and x_4 the total leaf area.

The multiple correlation coefficient was 0.9693, which was highly significant.

The correlation coefficient estimates between different seedling characters were worked out (Table 1). The dry weight of the shoot had significant correlation with the other seedling characters. Though the height of the seedling and the number of leaves had high coefficient of correlations with the dry weight of the shoot (Table 1), their direct bearing on the dry weight of the shoot was negligible (Table 2). But the leaf area and girth at collar showed high direct effects. The leaf area and girth at collar contributed indirectly also for the high correlations

Table 1. Correlation coefficient between different seedling characters in coconut

	Girth at collar	Height	No. of leaves	Total leaf area	Total shoot dry weight
Girth at collar	1.0000	0.8178	0.7895	0.9140	0.9490
Height		1.0000	0.6373	0.8767	0.8822
No. of leaves			1.0000	0.7705	0.7439
Total leaf area				1.0000	0.9695
Total shoot dry weight					1.0000

Table 2. Relative contribution of seedling characters to shoot dry weight in coconut

	Shoot dry weight vs girth	Shoot dry weight vs height	Shoot dry weight vs No. of leaves	Shoot dry weight vs leaf area
Correlation coefficient (r)	0.9490	0.8822	0.7439	0.9695
Direct effect	0.4171	0.0953	-0.0862	0.5711
Indirect effect via height	0.0780	—	0.0607	0.0836
Indirect effect via girth at collar	—	0.3411	0.3293	0.3812
Indirect effect via No. of leaves	-0.0681	-0.0549	—	-0.0664
Indirect effect via leaf area	0.5220	0.5007	0.4400	—
Residual effect = 0.0306				

between height and dry weight of the shoot, and number of leaves and shoot dry weight.

The present study revealed that the more important contributing factors for the vigour of the seedlings as indicated by the dry weight of the shoot are the leaf area and the girth at collar. The contribution of seedling height and number of leaves was negligible. The number of leaves, with minimum variability among the population studied, showed even a negative effect. Therefore, of the characters presently employed for selection, the girth at collar alone was found to be significant. Along with leaf area it would be the most important parameter to be considered in

the studies on selection and breeding.

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REFERENCES

- DEWEY, D. R. and LU, K. H. 1959. A correlation and path-coefficient analysis of components of crested wheat grass seed production. *Agron. J.* **51** : 515-8.
- LIYANAGE, D. V. 1953. Selection of coconut seednuts and seedlings. *Ceylon Coconut Q.* **4** : 127-9.
- MENON, K. P. V. and PANDALAI, K. M. 1958. *The Coconut Palms : a Monograph*, pp. 134-5. Indian Central Coconut Committee, Ernakulam, Kerala.