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Relationship of the Carbohydrate Reserve in the Trunk With Commencement of Flowering in Young West Coast Tall Coconut Palms

In fruit trees, a high carbohydrate reserve has been reported as an essential prerequisite for early initiation of flowering (Ogaki, Fuzita, and Ito, 1963). In several forest trees, 'girdling' has been shown to stimulate flowering (Mathews, 1963; Faulkner, 1966). Kramer and Kozlowski (1960) suggested this as due to increased availability of carbohydrates while Pharis (1970) observed this as due to increased C/N ratio.

Under normal conditions of growth, the West Coast Tall (WCT) coconut palms commence flowering by 6-9 years after transplanting under average management. However, the inflorescence primordium has been observed to initiate at the 10th leaf axil in one year old seedling raised under continuous light (Pillai et al., 1973).

A batch of 18 eight-year-old WCT palms growing under normal and identical cultivation regimes in the Institute farm was used in the study. Eight of them (G-I) had just commenced flowering at the time of collection of samples for the study, while the rest (G-II) had not commenced flowering. Tissue samples were collected from the trunk and leaves for estimating total carbohydrate and nitrogen contents. Stem tissues were collected from the junction of the outermost whorl of the leaves with the trunk using an augur from a depth of 5 cm from the surface. The leaf tissue samples were collected from the middle portion of youngest fully opened frond in the crown. The total carbohydrate content was estimated by the method of Somogyi (1952) and total nitrogen content was estimated by the microkjeldal method. The total number of leaves produced so far, and the leaves present on the crown were also recorded (Table I).

Table I. *Total carbohydrate (%) and nitrogen content (%) in trunk and leaves*

Characters studied	G–I	G–II	Difference
Number of leaves produced	72.0 +3.2	60.0±2.0	12.0**
Number of leaves present	21.0 +0.9	17.5±0.7	3.5**
Total carbohydrate content in the leaf tissue (per cent dry wt.)	6.3±0.6	7.0±0.4	0.7
Total carbohydrate content in the trunk (per cent dry weight)	13.1±0.5	9.6±0.6	3.5**
Total nitrogen content in the trunk (per cent dry weight)	12.6±0.7	15.1±0.7	2.5**
Carbohydrate nitrogen ratio in the trunk	1.0±0.1	0.6±0	0.4**

*Significant at P=0.01

Significant increases in the carbohydrate reserve and C/N ratio are noted in palms that have commenced bearing over that in palms that have not commenced bearing. The number of leaves present in these palms is also significantly higher. These results suggest that in coconut palms a high carbohydrate reserve and a C/N ratio of about 1.0 or above in the trunk are perhaps necessary for initiation of flowering and fruiting. Bunning (1952) had proposed that one means of controlling flowering was through stimulation of leaf growth so that it could enable the plants to attain rapidly the minimum number of leaves required for initiation of flowering.. In the present study also, it was seen that in palms that had commenced bearing, the rate of leaf production was more than that in palms that had not commenced flowering, as indicated by the number of leaves produced so far. Needless to mention that, only a rapid rate of leaf production, and consequently, the presence of larger number of leaves on the crown resulting in the greater leaf area duration very early during development, can possibly ensure adequate carbohydrate reserve in the trunk required for commencement of flowering. That, light also plays an important role in this, has already been reported (Pillai et al., 1973).

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