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Changes in the Carbohydrate Fractions in Relation to Female Flower Production in Coconut*

Flowering in coconut is a continuous process and is influenced by the short term and long term changes in the environment. Bai and Ramadasan (1976) reported that the changes in carbohydrate fractions in the leaf follow a definite pattern year after year under rainfed conditions. In young palms they found a sharp increase in the soluble fractions beyond July which in turn was found related to the commencement of flowering which was visible mostly in the months of October in the experimental palms under study. Patel (1938) reported that the initiation of the female flowers takes place about 12 months before the opening of the spathe and ovary differentiation takes place about 6–7 months before the opening of the spathe. Control of flowering and fruiting in trees as influenced by the changes in the carbohydrate fractions have been reported. (Ogaki, Fuzita and Ito, 1963; Crane, Catlin and Al-Shalan, 1976; Bodson, 1977). Ramadasan and Mathew (1977) reported that the commencement of first flowering in coconut is preceded by a high carbohydrate/nitrogen ratio. The present investigation was hence conducted to study the relationship between the changes in carbohydrate with the female flower production in the adult palms.

The total starch and total sugar content were estimated in the stem and leaf tissues of five adult palms every month for a period of two years. The stem samples were collected by scooping the tissue from a depth of 7.5 cm of the stem just beneath the crown and leaf samples from the middle leaflets of the fully unfolded leaf. The total starch and sugar content were extracted according to the method of Highkin and Frankel (1962) and estimated by the method of Somogyi (1952). The data on the female flowers produced in these palms were collected every month. Excepting for the months of June–August when the rainfall was very high and the sunshine ranged from 2 – 4 hr per day, at all other periods the total sunshine hours averaged about 6 – 9 per day. Earlier work had shown that commencement of flowering is more related to rainfall and sunshine hours than to relative humidity and temperature. (Bai and Ramadasan, 1978).

The trend of changes in the carbohydrate fractions in the leaf and stem and the number of female flower produced were the same for the two years of study (Fig. 1 A & B). The number of female flowers produced was maximum during March to April. The starch content in the stem and the leaf also was

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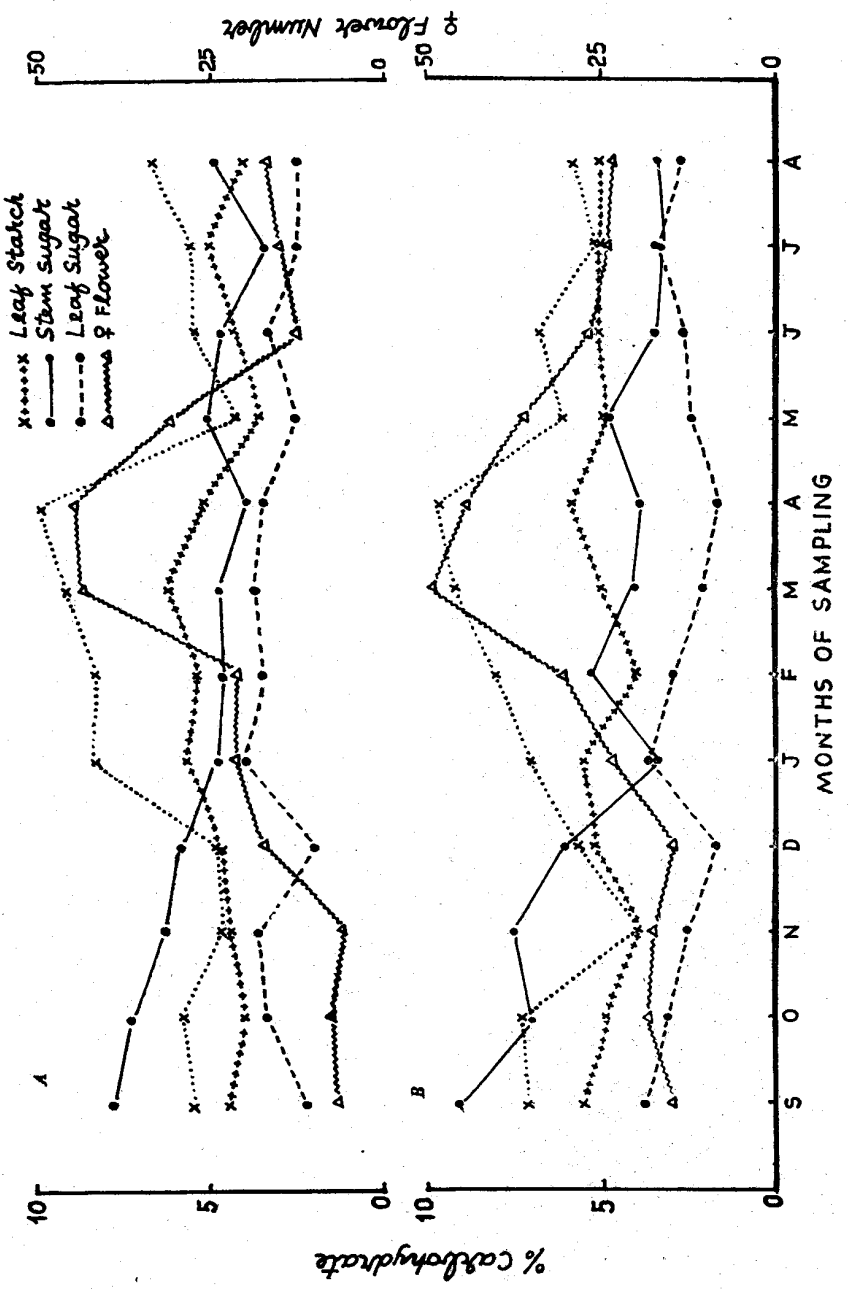

FIG. 1A & B. CHANGES IN THE CARBOHYDRATE FRACTIONS AND FEMALE FLOWER PRODUCTION

maximum during these months. The soluble carbohydrate in the stem and leaf was, on the contrary, minimum during this period. The starch and sugar content in the stem varied from 3 to 10 per cent and in the leaf it was 3–6 per cent and 2–4 per cent respectively. The starch content in the stem was found, significantly and positively correlated with the female flower production ($r = 0.4082$) while the sugar content was negatively correlated ($r = -0.5281$).

The result indicated that the changes in the female flower production closely follow the changes in the soluble and insoluble fractions of the carbohydrate during the initiation stages. The peak female flower production occurred in the summer months when the starch content in the stem and leaf were also at the maximum with correspondingly low levels of sugar content in the stem as well as in the leaves. The depletion of the sugars may be due to the heavy demand of the soluble fraction towards the female flower production. This necessitates the increased synthesis also as shown by the increased insoluble fraction. It was also noted that, when the female flower production was low such marked differences in the soluble and insoluble fraction was not seen.

The above result suggest the possibility of the operation of a steady pool of carbohydrate from the source (stem) to the sink (inflorescence) for attaining higher productivity levels which in turn is controlled by the environmental variables.

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Central Plantation Crops Research Institute
Kasaragod 670 124, Kerala, India

K.V. KASTURI BAI
A. RAMADASAN

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