38

BIOCHEMICAL CHANGES AND LEAF WATER STATUS OF COCONUT GENOTYPES DIFFERING IN DROUGHT TOLERANCE

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The coconut palm possesses certain physiological features which makes it particularly susceptible to drought. Depending on the intensity and duration of drought the adverse effects can persist for up to two and a half years (Murray, 1977) leading to yield reductions. Among the commonly cultivated varieties and hybrids of coconut, variations appear to exist in their ability to withstand drought as evidenced by the differences in yield of palms between normal (non-drought) and drought years (Jacob Mathew *et al.*, 1988). The biochemical changes occurring as a result of the development of stress have been compared between the tolerant and susceptible genotypes in the present investigation.

The study was conducted on 20-year old palms of West Coast Tall (WCT), West Coast Tall × Chowghat Orange Dwarf (WCT × COD) and Chowghat Orange Dwarf × West Coast Tall (COD × WCT) maintained in the Institute farm under irrigated and rainfed conditions. The palms were grown in a strip plot design and supplied with 500 g N, 500 g P_2O_5 and 1000 g K_2O/palm/year. During the rainless period, the irrigated palms received 20 mm water at weekly intervals.

The depletion of soil moisture during the summer months associated with a concomitant rise in air temperature resulted in the development of drought stress. Under such conditions, the leaf water status of coconut varieties showed a gradual reduction. The WCT variety maintained the highest relative water content (RWC) under drought.

Changes in leaf water status of varieties was reflected in changes in the levels of chlorophylls, free amino nitrogen, epicuticular wax and total soluble sugars. In general, the irrigated palms had higher chlorophyll a and b than the rainfed palms while the levels of free amino acids, epicuticular wax and total

soluble sugars were higher in rainfed palms as compared to irrigated palms (Table 38.1).

Table 38.1: Changes in relative water content and related factors during stress

Variety	*R W C (%)*		*Chlorophyll a* ($mg \cdot g^{-1} f.wt.$)		*Chlorophyll b* ($mg \cdot g^{-1} f.wt.$)		*Epicuticular wax* ($\mu g \cdot dm^{-2}$)	
	Pre-stress	*Stress*	*Pre-stress*	*Stress*	*Pre-stress*	*Stress*	*Pre-stress*	*Stress*
WCT	93.8	88.0	6.51	4.84	2.75	1.95	9.18	13.15
WCT × COD	94.4	87.0	5.69	4.50	2.33	1.80	9.06	12.29
COD × WCT	94.4	86.1	5.71	4.41	2.44	1.80	9.45	11.50

The rainfed palms of COD × WCT recorded significantly higher levels of free amino acids than WCT and WCT × COD during the peak stress period. Significant differences in epicuticular wax and total soluble sugars were also found.

The studies clearly showed that the biochemical changes occurring during water stress are directly related to the leaf water status. The data presented show that WCT is able to conserve leaf water under drought better than the two hybrids and therefore, the biochemical changes during stress development could be used as sensitive indicators of water stress.

REFERENCES

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