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## Organic Compounds in the Root Zone Soils of Coconut Based Cropping Systems\*

The organic compounds in the soils are released from the decomposition of animal and plant residues by micro-organisms and from plant root exudates. The substances include sugars, aminoacids, organic acids, phenols, vitamins, nucleotides and many other organic compounds (Kononova, 1961; Gupta 1966; Chandramohan, Purushothaman and Kothandaraman, 1973; Manikandan and Biddappa, 1986; Nagaraja, 1988). The occurrence of various compounds in the root zone soils of different coconut based cropping systems are reported.

Soils from the root zone were collected by core sampling using soil auger (0-25 cm depth) from (a) coconut based mixed farming with pepper and napier grass, (b) coconut based multi-storeyed cropping with pepper, cocoa and pineapple and (c) coconut monocropping systems. The soil samples were oven dried ( $103 \pm 2^\circ\text{C}$ ) for 16 hrs. The soils (10 g) were extracted with 80% ethanol and the extract after concentration was fractionated into sugars, aminoacids, organic acid-phenol by ion exchange chromatography using Dowex-1 and Dowex-50<sup>+</sup> resin

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(Nagaraja, 1988). Aminoacids (Yemm and Cocking, 1955), total sugars (Dubois et al, 1967), reducing sugars (Nelson, 1944) and total phenols (Swain and Hillis, 1959) were estimated. The amino acids, sugars and organic acids in the different fractions were separated for identification by descending paper chromatography (Lederer and Lederer, 1957). The total sugars were significantly higher in the root zone soils of coconut mixed farming and coconut multistoreyed cropping systems (Table I). The aminoacids and phenol were slightly higher in the soils of multistoreyed cropping system compared to the other cropping systems.

Raffinose, lactose, maltose, glucose and fructose were the sugars identified in all the systems. In addition to these

sucrose was also detected in the monocropping system. Among the aminoacids serine/glycine, glutamic acid, alanine, phenylalanine, valine and isoleucine/leucine were present in all the cropping systems. Succinic acid was the only acid detected in the organic acid fraction. Polysaccharides of microbial origin are present in soil to the extent of 0.1% and the sugars reported were galactose, glucose, mannose and arabinose (Lynch, Wright and Olney, 1957; Gupta and Sowden, 1963). The presence of these compounds in soil may directly or indirectly influence the microflora in the root zone of the crop plant. The occurrence of these compounds may have some role in altering the soil pH and microclimate in the root region.

Table I. *Sugars, aminoacids and phenols in the root region soils of coconut based cropping systems*

Cropping system	Total sugars	Reducing sugars	Total amino acids	Total phenols
Coconut multistoreyed cropping	27.59±2.39	4.19±0.38	1.47±0.38	0.24±0.08
Coconut mixed farming	27.32±3.27	4.32±0.78	1.18±0.10	0.12±0.05
Coconut monocropping	20.08±1.89	4.65±0.58	1.24±0.18	0.12±0.04
CD at p=0.05%	7.57	1.66	0.90	0.19

Average six values ± SEM All values are in  $\mu\text{g.g}^{-1}$  dry weight of soil

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## 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

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