

FREE AMINO-ACIDS IN COCONUT PALMS AFFECTED BY ROOT (WILT) DISEASE

THE synthesis of virus proteins by plant tissues involves changes in their free amino-acid pool, although such changes may be small and transitory.¹ The probable association of a virus with the root (wilt) disease of the coconut palms had been indicated by Nagaraj and Menon.² A comparative study on the amino-acids in coconut palms in health and disease was therefore taken up. The results are reported in this note.

Five gram samples of fresh tender leaves collected from a healthy palm and palms in different stages of disease were extracted with 75% alcohol and shaken with 3 volumes of chloroform. Upper layers were taken, evaporated to dryness and dissolved in 2 c.c. of water. Aliquots were chromatographed on Whatman No. 3 filter-paper, buffered with KCl-HCl buffer using phenol pH 1, for the first run and butanol: acetic acid: water (4:1:1) for the second direction.³ The amino-acids were detected by spraying with a 0.2% solution of ninhydrin in acetone. The identification of amino-acids was confirmed by running chromatograms after addition of known amounts of amino-acids into the extracts.

Results presented in Table I indicate accumulation of aspartic acid, serine, glycine, glutamic acid, threonine, glutamine, asparagine and arginine in tender leaves as the disease advances to the middle stage when all the typical disease symptoms are fully manifested on the foliage. There does not appear to be any further increase with the progress of the disease. Asparagine is found to be present in comparatively higher levels in the diseased leaves than the other amino-acids and amides. Arginine increases from traces in the healthy and early stages of disease to considerable amounts in the middle and advanced stages of the disease.

This abnormal metabolism of amino-acids and amides noted in infected palms is comparable to similar conditions reported in many virus-infected plants.^{4,5}

TABLE I
Free amino-acids in tender leaves of healthy and diseased palms

Amino-acids	Healthy	Early stage of disease	Middle stage of disease	Advanced stage of disease
Aspartic acid	+	++	++++	+++
Serine ..	+	++	+++	+++
Glycine ..	++	++	+++	+++
Glutamic acid	++	++	+++	+++
Threonine..	+	++	+++	+++
Alanine ..	+++	+++	+++	+++
Tyrosine ..	Trace	Trace	+	Trace
Valine, methionine	+	+	++	+
Leucines ..	+	+	+	+
γ -amino butyric acid	++	+++	++	+++
Proline ..	Trace	Trace	Trace	Trace
Methionine sulphoxide	Trace	Trace	Trace	Trace
Glutamine..	+	++	++++	+++
Asparagine	+++	+++	++++	+++
Cystine ..	Trace	+	Trace	Trace
Lysine ..	+	Trace	Trace	Trace
Histidine ..	Trace	Trace	Trace	Trace
Arginine ..	Trace	Trace	+++	+++

The frequent association of leaf rot with root (wilt) disease in coconut palms may be due to the high content of free amino-acids found in tender leaves of wilt-infected palms since susceptibility to fungal pathogens is known to be increased with increasing quantity of free amino-acids in plant tissues.

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N. G. PILLAI.
P. SHANTA.

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