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PATHOPHYSIOLOGY OF THANJAVUR WILT AFFECTED COCONUT PALMS

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ABSTRACT

The sugar - phenol relationship of Thanjavur wilt - affected coconut palms was studied in detail. In the diseased palms, there was an increase of total and reducting sugars in tissues of root, bark and cortex of bleeding area. In leaf, no marked difference could be seen in total sugars but there was reduction in reducing sugars. The bark and cortex above the bleeding area also showed high concentrations of both total and reducing sugars. Non-reducing sugars also accumulated in root, leaf, bark and cortex of severaly affected palms. Total phenol content also increased in leaf, bark and cortex while in root, there was no significant difference. The content of **Ortho dihydroxy** phenols was also high in bark and cortex while there was no marked difference in leaf and root. The bark and cortex above the bleeding area of wilt affected palms also showed more total and **ortho dihydroxy** phenols than apparently healthy palms.

The coconut palm (*Cocos nucifera* L.) is affected by many diseases some of which are lethal while others gradually reduce the vigour of the palm causing severe loss in yield. Thanjavur wilt is a lethal disease which derives its name from the place of its first occurrence *viz.*, Thanjavur district of Tamil Nadu during 1952 and 1955 after cyclones (Gunasekaran *et al.*, 1986). The characteristic symptoms of the disease include discolouration, decay and death of roots, oozing of reddish brown fluid from the base of the trunk, drooping of leaves and premature death of palms in advanced stages of the disease (Bhaskaran *et al.*, 1982). Bhaskaran and Ramanathan (1983) considered the bracket fungus *Ganoderma lucidum* (Leys) Karst as the main causal agent of the disease. However the etiology of the disease is uncertain. Ramadoss *et al.* (1986) reported that the vascular region was completely disintegrated in the adult palm while necrotic areas were observed in the young palms. Eventhough the disease was recorded as early as 1952, the perusal of literature revealed that no systematic study has been made to understand the pathophysiology of Thanjavur wilt disease. Hence, attempts were made to study the sugar - phenol relationship in diseased palms and the results are discussed.

MATERIALS AND METHODS

Four palms in each category showing mild, moderate and severe infection were selected based on the disease index computed by the method reported by Vijayan and Natarajan (1975).

Samples were collected from leaf, root, bark and cortex of bleeding area and above the bleeding area (healthy portion) of wilt affected palms and also from healthy palms and analysed for penolic substances and sugars.

Ethanol extract was prepared by the method of Jayapal and Mahadevan (1968). The reducing sugars were estimated by Nelson's (1944) method, while the total sugars were estimated after hydrolizing the non-reducing sugars into reducing sugars (Inman, 1965). Content of the nonreducing sugars was calculated by substracting the quantity of the reducing sugars from total sugars of the corresponding tissus. Total Phenolics and *Ortho dihydroxy* phenols were estimated following the methods of Bray and Thorpa (1954) and Johnson and Schaal (1957) respectively.

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able 1. Content of sugar fractions in Thanjavur wilt affected and apparently healthy palms (mg/g of fresh tissue)

amples	Reducing sugars				Non - Reducing sugars				Total sugars			
	1	2	3	4	1	2	3	4	1	2	3	4
af	19.5	20.0	21.3	25.0	4.4	5.4	4.4	0.6	23.9	25.9	25.7	25.6
oot	22.8	17.3	12.5	13.8	1.2	4.6	11.0	8.1	24.0	26.4	23.5	21.9
ark from bleeding area	23.5	34.8	17.4	7.4	8.5	6.9	30.7	15.2	32.0	41.7	48.1	23.0
ark above the bleeding area	17.3	17.4	11.0	-	7.7	8.0	23.5	-	25.0	25.4	34.5	-
ortex from the bleeding area	25.1	33.8	28.4	13.8	22.3	19.8	41.5	33.3	47.4	53.6	69.9	47.1
ortex above the bleeding area	14.6	17.3	12.0	-	22.1	27.6	39.0	-	36.7	44.9	51.3	-

- Mild, 2 - Moderate, 3 - Severely wilt affected and 4 - Apparently healthy palms.

ble 2. Phenolic constitutent of Thanjavur wilt affected and apparently healthy palms (mg/g of fresh tissue)

mples	Total phenols				Ortho dihydroxy phenol			
	1	2	3	4	1	2	3	4
af	17.0	16.0	18.8	11.0	6.6	6.6	4.2	6.6
ot	16.5	14.0	17.5	16.5	12.0	11.0	11.0	11.0
rk from bleeding area	26.0	31.8	35.0	17.0	13.1	17.0	24.1	5.9
rk above the bleeding area	19.0	25.0	22.0	-	8.9	9.6	7.0	-
rtex from the bleeding area	35.0	36.0	42.0	20.0	29.3	23.1	32.0	5.3
rtex above the bleeding area	23.0	24.0	24.0		13.2	12.6	6.4	-

Mild, 2 - Moderate, 3 - Severely wilt affected and 4 - Apparently healthy palms.

RESULTS AND DISCUSSION

The results indicated that in the diseased palms there was an increase of total reducing sugars in the bark and cortex of bleeding area and root tissues. In the leaf tissues, no marked difference could be seen in the case of total sugars but there was reduction in reducing sugars (Table 1). The present investigation was in conformity with the earlier report of Anbalagan *et al.*, (1987). Total and reducing sugars are generally less in the region above the bleeding area in bark and cortex as compared to the bleeding area. Non reducing sugars also accumulated more in root, leaf, bark and cortex of severely infected palms than he healthy ones. Mathew (1977), observed a significant increase in the level of sugar fractions in the leaves of root (wilt) affected coconut palms. Sinha and Kumar (1985) reported that total sugars and reducing sugars significantly increased in stem and roots of 'green ear' infected *bajra* plant. High amount of the nonreducing sugars in the diseased root, bark and cortex may be due to the accumulation of these fractions in the infected parts. The accumulation of sugars in infected tissues may be due to the release of amylases in the disorganised host cells (Okasha *et al.*, 1968) or due to the disintegration of vascular tissues (Ramadoss *et al.*, 1986).

Similar trend was observed in total phenols which increased in leaf, bark and cortex of bleeding area while in roots, there was no significant difference between diseased and healthy. The content of *Ortho dihydroxy* phenols was also high in bark and cortex of bleeding area while there was no marked difference in leaf and root. The bark and cortex above the bleeding area of wilt infected palms also showed higher concentrations of both total and *Ortho dihydroxy* phenols than healthy palms (Table 2).

The findings of the present study corraborate with the earlier finding of Anbalagan *et al.* (1987). Accumulation of phenolic compounds in plants following inoculation with pathogens is an ubiquitous phenomenon (Tomiyama, 1963). Increase of phenols due to pathogenesis has been reported by many workers in various crops (Matta *et al.*, 1969; Bhaskaran and Prasad, 1971; Sivaprakasam *et al.* 1974 and Venkataubbiah *et al.*, 1983). Vidhyasekaran *et al.*, (1974) reported that sugars are precursors of phenolics and the accumulation of sugars in the infected tissues would also result in the accumulation of phenolics. In the present study also the diseased tissues contained more sugars than healthy tissues which might have resulted in the accumulation of phenols in diseased tissues.

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DAMAGE LEVEL AND CONTROL OF POTATO TUBER MOTH IN NILGIRIS DISTRICT.

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ABSTRACT

Potato tubermoth damage was more at lower altitude (1000 - 1850 M) than higher altitude (1900 - 2500 M). Application of either quinalphos 0.05% or diffubenzuson 0.05% registered lesser damage by tuber moth and yield was higher in quinalphos treated plots.

Potato tubermoth (PTM), *Phthorimaea operculella* (Zeller) is one of the most damaging pests of potato(Haines, 1977). Control of potato tuber moth by chemical was reported by Lal and Prasad (1986). In Nilgiris district of TamilNadu, studies were made to identify the damage level of PTM at different elevations and to screen chemicals against the potato tuber moth.

MATERIALS AND METHODS

Potato tuber moth damage was assessed during main crop season (April - August) in ten villages of Udhagamandalam block (Table 1). The altitude ranged from 1800 to 2500 meter from MSL. Five fields were selected in each village and hundred tubers were selected at random at the time of harvest and the per cent damage was arrived at.

A randomised replicated trial was conducted at Horticultural farm, Thummanatty during autumn 89 with a plot size $15m^2$. Eight chemicals (Table 2) were evaluated for the control of PTM on cv. Kufri Jyoti. Carbofuran was applied at the time of sowing. In other treatments, chemicals were applied thrice at 20 days interval commencing from forty days of sowing. The PTM damage was assessed at harvest in two hundred tubers and per cent damage was arrived at.