

modification of the main shoot apex into spike. If the main apex is not modifying into a spike it will continue the vegetative growth.

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### Pectin Lyase Activity in the Roots of Root (wilt) Disease Affected Coconut Palm

Of several disease of coconut, the root (wilt) disease of Kerala has been the most serious and baffling to scientific investigators. The association of various biological agents like fungi, virus, bacteria and nematodes has been implicated with the disease in the past and mycoplasma like organisms (MLOs) in tissues of root (wilt) affected palms

were reported recently by Solomon, Govindankutty and Neinhans (1983). Number of physiological and metabolic derangements in the disease affected palms have also been reported. One of them has been the extensive root decay and root damage observed by various workers (Radha and Lal, 1972; Anonymous, 1976). Higher cellulase activity

in root (wilt) affected coconut palms and its possible role in cell wall degradation has been discussed earlier (Padmaja and Amma, 1979).

Pectic enzymes are probably the most important in the earlier stages of tissue breakdown and have been implicated as an important feature of host-pathogen interactions. Their involvement in the degradation of pectic substance of cell walls has been reported for many diverse types of disease caused by fungi, virus, bacteria and nematodes (Arjunen, Vidyasekharan and Kandaswamy, 1975; Bateman and Millar, 1966; Weintraub and Ragetli, 1961). However, no such attempt has been made to ascertain the role of these pectinolytic enzymes in the degradation of root tissues affected by root (wilt) disease. This study was, therefore, aimed to investigate the same.

Investigations were carried out in the root samples collected from 15 apparently healthy and 15 root (wilt) diseased coconut palms of 10 to 15 years of age group, growing in the farm area of Central Plantation Crops Research Institute, Regional Station, Kayangulam. Four types of root samples were analysed for pectin lyase enzyme activity *viz.*, healthy roots from apparently healthy palms, decayed roots from apparently healthy palms, apparently healthy roots from diseased palms and decayed roots from diseased palms. Pectin lyase activity in the root samples was determined according to the method

of Albersheim and Killias (1962) with slight modifications in the extraction procedure. The enzyme activity is expressed as one unit=1 mg of protein hydrolysed/100 mg of protein/minute.

Pectin lyase activity was 3.40 in decayed roots from healthy palm and 20.60 in the decayed roots of root (wilt) diseased palms. Thus, the activity was found to be nearly six times higher in diseased palms as compared to apparently healthy ones. Pectin lyase activity was not detectable in the healthy roots of apparently healthy palms and also in apparently healthy roots of diseased palms as well.

Pectic enzymes are the major factors responsible for tissue maceration. Whether this enzyme is a host specific one or a pathogen specific one could not be demonstrated. There is abundant circumstantial evidence that pectic enzymes are involved in pathogenesis. An understanding of how enzymes alone or in combination degrade cell walls is necessary if their role in the expression of resistance to disease is to be determined. Therefore, the role of pectin lyase in the degradation of root tissues affected by root (wilt) disease, cannot be ruled out.

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## A Prototype Spray Lance for Tall Arecanut Palms

Spraying plant protection chemicals on the crown of tall areca palms with conventional sprayers, has an element of risk to the operator besides causing wastage of chemicals. To obtain maximum efficiency and safety to the operator, an adjustable, telescopic spray-lance which can be operated from ground for palms or tall trees up to the height of 15 meters was designed and a prototype with 4.5 meters was initially fabricated at the Research Testing and Training Centre, Vellayani, Trivandrum. The unit essentially consists of three galvanised iron pipes of 2, 1.7 and 1.8m length having 43.35 and 22 mm diameter respectively. Pipe No. 1 (Fig. 1) fixed on wooden platform can be easily dismantled and fitted with four wheels for easy transportation. The second pipe slide into the first one and third pipe slide into the second one telescopically to adjust heights suitable for spraying at different

heights. This will make the device compact for easy transportation also. The second and third pipes are pulled up with the help of three wooden pulleys, two fixed at the top of pipe No. 1 and the other on top of pipe No. 2, and 8 mm diameter nylon ropes connected to the riders I and II on pipe No. 2 and 3 respectively. In order to lift pipe No. 3 a 10 mm diameter mild steel rod was provided as the rider. Thus when the respective ropes are pulled, pipe No. 2 or 3 as required will be lifted and when the rope is released the pipes are retracted into the first pipe. For convenience, the other ends of the ropes are tied on a hook provided on the platform. There are two locking bolts to fix pipe No. 2 in position before pipe No. 3 is extended. Since the pipes are overlapping into each other, the maximum height available is only 4.5m. A 12 mm diameter hose run through the three pipes and