3.2

ETIOLOGY - BACTERIA

N.P. JAYASANKAR and M. GEORGE

The earliest observation in this regard was the vascular streaming movement of bacteria *Pseudomonas* sp. in the roots of root (wilt) diseased coconut palms (Srivastva *et al.*, 1969). Several attempts were made since then for the isolation of bacteria from the vascular tissue of surface sterilized root bits of diseased and apparently healthy palms. Repeated isolations failed to establish the consistent association of any major group of bacteria in the root (wilt) affected palms. The conditions were altered and stelar portions of freshly collected and surface sterilised root tips were plated in an enriched medium containing 15 per cent (w/v) coconut root extract solidified with agar (George, *et al.*, 1976). An off-white bacterium was isolated that was conspicuously absent in the coconut roots collected from root (wilt) free areas. The bacterium was identified as *Enterobacter cloacae* (Jordan) Hornaeche and Edwards (George *et al.*, 1976). The bacterium does not belong to conventional plant pathogenic genera; however, species of *Enterobacter* have been implicated in plant disease (Rohrbach and Pfeiffer, 1976; Hopkins and Elmstrom, 1977).

The ability of coconut *Enterobacter* isolates to produce polysaccharides was compared with twenty four standard *E. cloacae* cultures obtained from international culture collection centres. The crude toxin extracted from the extracellular polysaccharide like materials from the coconut *Enterobacter* isolates could wilt tomato plant cuttings in 30 min. at a concentration of 2000 ppm. This crude fraction was antigenic showing a serological relation to extracts from diseased materials. Such a relationship was not observed in the standard cultures of *E. cloacae* (George *et al.*, 1976; George, 1983).

The coconut *Enterobacter* isolates were sensitive to streptomycin and oxytetracycline group of compounds. The minimum inhibitory concentration of oxytetracycline and streptomycin as assessed by tube dilution technique showed that oxytetracycline prevented growth at a concentration of 5µg/ml (George, 1983). This observation prompted the initiation of a field experiment with a commercial terramycin tree formulation. Twenty coconut palms (10-20 years) exhibiting the primary symptoms of root (wilt) disease were indexed for intensity by the method of George and Radha (1973). The formulation containing 3 g active ingredient of oxytetracycline in one litre distilled water was injected under pressure to each of the ten experimental palms four times in 1977 (January, March, June and September), followed by a subsequent dose in May, 1979. The remaining ten palms served as controls. The change in disease index of individual palms from 1977 to 1981 is furnished in Table 4. Results indicate the

Table 4. Change in disease index in palms treated with OTC (1977-1981)

OTC treated palms	Control palms
1.2	-6.1
-0.5	-7.4
1.4	-4.4
5.8	-2.3
14.7	-11.0
-3.1	-4.0
1.9	-28.3
2.1	-10.1
6.3	-11.8
	0.0
Mean 3.31	-8.54

't' value 3.81 **

** significant at 1% level OTC - Oxytetracycline

effect of oxytetracycline in ameliorating the disease symptoms (George, 1983).

The exact involvement of the bacterium was assessed by the initiation of a large scale pathogenicity experiment. The bacterium was inoculated alone and in combination with the other biotic agents viz. *Radopholus similis, Fusarium equiseti* and *Cylindrocarpon effusum* to one year old coconut seedlings planted in microplots of size 1.8m x 1.8m x 1.2m containing sandy loam soil fumigated with methyl bromide.

The coconut isolate of *E. cloacae* failed to produce the symptoms characteristic of the disease in the pathogenicity experiment over eight years.

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