*Indian J. agric. Sci.* 42(8): 747–749, August 1972

# Note on field observations on the reaction of coconut varieties to root wilt

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Received: October 7, 1971

The development of disease-resistant varieties is the ideal way of controlling plant diseases, including those of viral origin. Orton (1900) obtained lines of 'Sea Island' cotton resistant to wilt (*Fusarium oxysporum* Schlecht, ex. Fr. f. *vasinfectum* Atk.) by continued selection. 'Virginia Savoy' spinach (*Spinaceae oleracea* L.) was found to be resistant to spinach blight caused by the tobacco-mosaic virus (Homles, 1954). 'Malayan Dwarf' variety of coconut (*Cocos nucifera* L.) appeared to be resistant to lethal yellowing of Jamaica, whereas the indigenous 'Jamaica Tall' Palms were found highly susceptible (Whitehead, 1966).

Coconut palms in central and southern Kerala (India) are affected by the devastating root (wilt) disease, the cause of which is supposed to be a sap-transmissible virus (Shanta and Menon, 1960). The disease is not known to be amenable to control by any artificial means. Therefore the present experiment was taken up to evolve lines of coconut resistant to this disease. The severity of the disease (i.e. early, middle and advanced stages) and yield of each plam was studied in 1970–71. 'West Coast Tall' palms were used as the control. The palms were classified into 3 age groups, viz. non-bearing seedlings, bearing palms up to 15 years, and those above 15 years, to study the relationship between age and disease incidence.

Among the seedlings observed, 'Dwarf × Tall' (natural cross) and 'Dwarf Green' were completely disease free, whereas 'Tall × Dwarf' and 'Dwarf Orange' recorded 6·3, 16·7 and 24·1 per cent disease incidence respectively (Table 1). Among the young bearing palms (up to 15 years), 'Dwarf × Tall' was found to be the most resistant (incidence 1·9 per cent only), whereas 'Dwarf Green', 'Tall × Dwarf', 'Dwarf Orange' and 'West Coast Tall' were diseased in varying degrees, ranging from 6·3 per cent in 'Dwarf Orange' to 64·8 per cent in 'West Coast Tall'. Among adult palms 'Dwarf Green' and 'Dwarf × Tall' showed better tolerance to disease than others, the percentage of incidence being 8·01 and 12·9 respectively. 'Tall × Dwarf' and 'Dwarf Orange' ranked in succession, whereas 'West Coast Tall' was found to be highly susceptible, the percentage of incidence being 62·7.

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Table 1. Performance of palms in relation to disease incidence and yield

| Variety | Age group | Healthy | | Diseased early | | Diseased middle | | Diseased advanced | | Disease incidence (%) | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. of palms | Average yield | No. of palms | Average yield | No. of palms | Average yield | No. of palms | Average yield | Diseased early | Diseased middle | Diseased advanced | |
| 'Dwarf × Tall (natural cross) | I | 21 | | | | | | | | | | | |
| | II | 155 | 125·0 | 2 | 60·0 | 1 | 30·0 | | | 1·3 | 0·6 | | 1·9 |
| | III | 54 | 72·9 | 3 | 38·3 | 5 | 49·0 | | | 4·8 | 8·1 | | 12·9 |
| 'Tall × Dwarf' | I | 105 | | 3 | | 4 | | | | 2·7 | 3·6 | | 6·3 |
| | II | 111 | 63·9 | 1 | | 3 | 23·3 | 6 | 31·8 | 0·8 | 2·5 | 5·0 | 8·3 |
| | III | 25 | 41·6 | 5 | 20·0 | | | | | 16·7 | 0 | 0 | 16·7 |
| 'Dwarf Orange' | I | 55 | | 5 | | 2 | | 4 | | 7·6 | 3·0 | 6·1 | 16·7 |
| | II | 188 | 43·0 | 14 | 26·4 | 9 | 4·4 | 11 | 15·8 | 6·3 | 4·0 | 5·0 | 15·3 |
| | III | 382 | 45·3 | 35 | 32·0 | 36 | 28·5 | 30 | 20·6 | 7·2 | 7·5 | 6·2 | 20·9 |
| 'Dwarf Green' | I | 2 | | | | | | | | 0 | 0 | 0 | 0 |
| | II | 45 | 36·4 | 2 | 12·5 | | | 1 | 8·0 | 4·2 | | 2·1 | 6·3 |
| | III | 92 | 39·3 | | | 3 | 18·7 | 5 | 7·0 | | 3·0 | 5·0 | 8·0 |
| 'West Coast Tall' | I | 860 | | 154 | | 78 | | 41 | | 13·6 | 6·9 | 3·6 | 24·1 |
| | II | 254 | 25·6 | 134 | 11·2 | 170 | 8·2 | 165 | 1·9 | 18·5 | 23·5 | 22·8 | 64·8 |
| | III | 413 | 26·6 | 168 | 15·0 | 211 | 14·6 | 316 | 5·6 | 15·2 | 19·0 | 28·5 | 62·7 |

Age group: I, Seedlings (non-bearing); II, young bearing palms (below 15 years); and III, adult palms (above 15 years).

The overall performance of the different varieties or hybrids indicates that 'Dwarf×Tall' was the most tolerant to disease (Table 2), followed by 'Dwarf Green' and 'Tall×Dwarf'. 'Dwarf Orange' was partially tolerant, whereas 'West Coast Tall' was highly susceptible.

Table 2. Overall performance of the palms in relation to disease and yield

| Variety | Disease incidence (%) | Average yield of nuts per palm | |
|---|---|---|---|
| | | Healthy | Diseased |
| 'Dwarf × Tall' (natural cross) | 4·6 | 111·6 | 46·4 |
| 'Tall × Dwarf' | 8·4 | 59·8 | 24·1 |
| 'Dwarf Orange' | 18·9 | 44·6 | 24·8 |
| 'Dwarf Green' | 7·3 | 38·4 | 11·3 |
| 'West Coast Tall' | 48·5 | 26·2 | 9·1 |

Among the young bearing plams, both in the healthy and diseased groups, 'Dwarf×Tall' recorded the highest yield, followed by 'Tall×Dwarf'. 'Dwarf Orange' and 'Dwarf Green' were moderate yielders. When compared with hybrids and varieties, 'West Coast Tall' gave a low yield in both healthy and diseased groups.

All the varieties and hybrids were considerably superior to 'West Coast Tall' in disease resistance and yield performance. Usually the disease makes its appearance in the seedlings older than 5 years in 'West Coast Tall', which remarkably reduces yield (Table 1). The percentage of disease incidence in the seedlings and young bearing palms was lower in the hybrids and varieties than in the corresponding age groups of the 'West Coast Tall'. In 'West Coast Tall' the yield decreased sharply with the progress of the disease. In the hybrids and varieties, though there was a considerable reduction in yield due to disease, the loss was not as severe as in 'West Coast Tall', because of their high-yielding nature.

It is essential that the resistant or tolerant lines selected should have all the desirable characters of a good variety (Stakman and Christensen, 1960). The hybrids 'Dwarf×Tall' and 'Tall×Dwarf' possess all the desirable characters of a good variety, whereas the dwarfs ('Dwarf Orange' and 'Dwarf Green') do not. Because of its higher resistance and yield, 'Dwarf×Tall' is suitable for large-scale propagation in the diseased tracts. 'Tall×Dwarf' is the next choice.

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