

Screening of coconut cultivars against root (wilt) disease

(Manuscript Received 16-12-2002; Revised : 18-8-2003; Accepted : 12-12-2003)

Key words: Coconut cultivars, root (wilt) disease

Coconut root (wilt) is a serious disease, adversely affecting the coconut yield in Kerala and certain districts of Tamil Nadu (Srinivasan *et al.*, 2000). Investigations carried out at CPCRI (RS) Kayangulam on the etiology of the disease revealed the association of Phytoplasma (Solomon *et al.*, 1999) transmitted through lace bug (*Stephanitis typica*) (Mathen *et al.*, 1987) and a plant hopper *Proutista moesta* (CPCRI, 1991).

As the disease cannot be controlled by conventional plant protection measures, development of resistant/ tolerant variety is the most ideal and practical solution for the management of the disease. West Coast Tall (WCT) cultivar, which is the only extensively cultivated variety in the root (wilt) prevalent tracts, is highly susceptible to the root (wilt) disease. Nearly 63 cultivars and 32 hybrid combinations from the coconut germplasm bank, maintained at CPCRI, Kasaragod were evaluated under field conditions and none of them was found to have the desired level of resistance to root (wilt) disease (Solomon *et al.*, 1999).

One of the most important constraints for coconut production in the disease prevalent tracts is the non-availability of a variety resistant / tolerant to root (wilt) disease. A field experiment was conducted with ten varieties collected from distinct geographical areas, with a view to identifying the source of resistance to root (wilt) disease, for their subsequent exploitation through breeding.

A screening trial was carried out to evaluate field resistance of ten cultivars of coconut that included seven exotic viz., Federated Malay States (FMS), Fiji Rotuma, Karkar, King Coconut, Philippines Lono, Zanzibar, SS Apricot and three indigenous types viz. Chowghat Green Dwarf (CGD), Kappadam and West Coast Tall (WCT).

The experiment was laid out during 1988 in a randomized block design with four replications comprising six seedlings per replication. Out of the four, two replications consisted of the *inter-se* mated nuts of each variety, while the other two replications consisted of the selfed nuts of each variety produced by artificial pollination at CPCRI, Kasaragod. In the absence of an artificial screening technique, the experimental palms were evaluated under field conditions by under-planting them in heavily root (wilt) affected (more than 80% disease incidence) coconut gardens at CPCRI (RS) Kayangulam. One year old seedlings were under planted at the normal spacing of 7.5m x 7.5m. Heavily diseased old palms were retained in the experimental fields to ensure adequate availability of natural inoculum. Experimental palms were properly managed by following the recommended cultural practices and various plant protection measures.

Observations on the incidence of root (wilt) disease were recorded at six monthly intervals and the data on disease incidence recorded six years after planting was analysed using analysis of variance technique (Panse and Sukhatme, 1985). The experiment was continued till 1994.

There was heavy incidence of the disease under natural conditions and the cultivars showed considerable variation with regard to their field resistance to root (wilt) disease.

Data collected during 1994 on the incidence of root (wilt) disease are given in Table-1. From this table, it can be seen that the cultivar King Coconut was the most susceptible as indicated by the percentage incidence of the disease (92%), followed by Kappadam (66.7%), Karkar (58.3%) and SS Apricot (58.3%). CGD had the

lowest percentage of diseased seedlings (25%) followed by Zanzibar and Philippines Lono (29.2%). West Coast Tall had 37.5% diseased seedlings. There were no significant differences between selfed and *inter se* progenies of the test cultivars as both of them contracted the root (wilt) disease to similar extent.

Table-1. Screening of coconut cultivars for resistance / tolerance to root (wilt) disease

Cultivars	Disease incidence (%) in		
	Selfed	Inter-se	Average
CGD	25.0(4.93)	25.0(4.93)	25.0 ^a (4.93)
Philippines Lono	25.0(4.93)	33.3(5.58)	29.2 ^{ab} (5.25)
Zanzibar	83.3(5.58)	25.0(4.93)	29.2 ^{bc} (5.25)
FMS	25.0(4.93)	41.7(6.42)	33.3 ^{ab} (5.68)
WCT	41.7(6.42)	33.3(5.77)	37.5 ^{abc} (6.10)
Fiji Rotuma	58.3(7.62)	41.7(6.42)	50.0 ^{bc} (7.02)
SS Apricot	58.3(7.62)	58.3(7.45)	58.3 ^{bc} (7.53)
Karkar	50.0(6.97)	66.7(8.17)	58.3 ^{bc} (7.57)
Kappadam	58.3(7.45)	75.0(8.65)	66.7 ^{bcd} (8.05)
King Coconut	100.0(10)	83.3(9.08)	91.7 ^d (9.54)
General Mean		6.69	
C.V		19.06	
F Value		5.51	
C.D (P= 0.05)		1.85	

- Values in parentheses indicate square root transformed data
- Mean values followed by the same letter are not significantly different by ANOVA ($p=0.05$)
- Differences between selfed and *inter-se* progenies are non significant

Even though all the varieties have succumbed to the disease in varying proportions, CGD was the most tolerant followed by Zanzibar, Philippines Lono and F.M.S. This is the first report from a field experiment identifying the higher level of resistance of Chowghat Green Dwarf (CGD) to root (wilt) disease of coconut. This finding is important since none of the cultivars tested earlier had the desired level of resistance to root (wilt) disease (Jacob *et al.*, 1998).

From a survey of natural population in farmer's fields, it was earlier reported that CGD had less disease incidence when compared to WCT, COD, DxT and TxT (CPCRI, 1973). Ninan (1978) had advocated the study of hybrids of CGD with WCT for yield and disease resistance.

Indian Green Dwarf had also shown 89% resistance to lethal yellowing disease of coconut in Jamaica (Coconut Industry Board, Jamaica, 1983; 1984). Schuiling *et al.* (1992) reported that both Indian Green Dwarf and Malayan Dwarf had equal level of resistance to lethal yellowing in Tanzania.

It is hence suggested that CGD should be used as a parent for hybridization with cultivars having good yield and desirable nut characters along with considerable level of field tolerance to root (wilt) disease in order to build up a gene pool of elite, high yielding, tolerant hybrids of coconut.

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