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# FUNGI ASSOCIATED WITH THE ROOTS OF HEALTHY AND YELLOW LEAF DISEASE AFFECTED ARECA PALM (*ARECA CATECHU* L.)

Yellow leaf disease is a serious malady in all parts of Kerala, coastal regions of Bombay, parts of Karnataka and Tamil Nadu. Yellowing of the leaves, reduction in size of the crown, reduction in size of the fruit, premature fruit fall and rotting of the tips and absorbing portion of the young roots are the major symptoms of the malady (Menon, 1963; Nambiar and Sreenivasan, 1951; Dastagir, 1963; Yadava *et al.*, 1973; Rawther, 1976 and Chandra Mohanan, 1979). Rotting of the root system of palms in the advanced stages of disease has been reported to be greater when compared with that of healthy palms and it increases with disease intensity (Rawther, 1976). Little is known about the fungi associated with the roots of healthy palms and of those in early stages of the disease. To study the fungi associated with roots, 50 areca palms, each 20 year old, were selected from Central Plantation Crops Research Institute, Regional Station, Vittal, a healthy tract, and CPCRI Research Centre, Kannara where the palms are in the early stage of disease. The disease intensity was recorded in September immediately after the south-west monsoon. The disease incidence was determined by using the formula for calculating disease index (Chandra Mohanan, 1979). The fungi associated with the roots of healthy and diseased areca palms were isolated during September. For this, the root system of each palm was exposed in one-eighth sector of the bole upto a depth of 90 cm and to a distance of 90 cm from the base of the trunk to include roots upto the tip. Three root samples, each of 30 cm length from the tip, were collected from 0–30 cm, 30–60 cm and 30–60 cm depths, separately from each palm. The root samples were washed thoroughly in tap water and five bits of equal length were cut from each of the root starting from the tip. These root bits were surface sterilized with 0.1% mercuric chloride solution for 1-2 minutes, washed in sterile water aud cultured on potato dextrose agar medium. The fungi associated with the roots were isolated and identified.

The mean disease index of 50 palms was 22.5 and hence they were categorised as diseased early. Out of the 450 root samples studied from healthy palms, 71 samples (15.7%) showed the association of fungi. In yellow leaf disease affected (early stage) palms, out of 450 samples studied, 75 root samples (16. 6%) only showed the association of fungi. Thus there was not much difference between healthy and diseased (early stage) in the percentage of root samples showing the association of fungi. However, it has been reported that the root rotting in diseased palms increases with disease intensity and becomes greater in the advanced stages of the disease (Rawther, 1976). It is also possible that the percentage of root samples showing the association of fungi may also increase with the disease intensity. Since the palms selected for the present investigation were in initial stage of the disease, there was not much difference between healthy and diseased in the percentage of root samples

Table 1

Fungi isolated from the roots of healthy and yellow leaf disease affected (early stage) areca palm *Areca catechu* L.

| Fungi isolated | Depth of sampling (in cm) | | | | | |
|---|---|---|---|---|---|---|
| | healthy | | | Diseased early | | |
| | 0-30 | 30-60 | 60-90 | 0-30 | 30-60 | 60-90 |
| *ZYGOMYCETES* | | | | | | |
| 1 *Gongronella butleri* | + | — | — | + | + | + |
| *ASCOMYCETES* | | | | | | |
| 2 *Thermoascus aurantiacus* | — | — | — | + | — | — |
| 3 *Chaetomium* spp. | + | + | + | — | — | — |
| 4 *Chaetomium brasiliense* | + | + | + | + | + | + |
| 5 *C. globossum* | — | — | + | — | — | — |
| 6 *C. indicum* | — | — | — | — | + | — |
| 7 *Neocomospora vasinfecta* | — | — | — | — | + | — |
| 8 *Thielavia spirotricha* | — | — | — | — | + | + |
| 9 *T. terricola* | — | — | — | + | — | + |
| *DEUTEROMYCETES* | | | | | | |
| 10 *Colletotrichum* spp. | — | + | — | — | — | — |
| 11 *Aspergillus* spp. of *A. flavus group* | + | + | + | + | — | — |
| 12 *A. sydowii* | — | — | — | + | — | — |
| 13 *A. terreus* | — | + | + | — | + | — |
| 14 *Cylindrocarpon olidum* var. *crassum* | — | + | + | — | — | — |
| 15 *Fusarium fusarioides* | — | — | — | + | + | — |
| 16 *F. oxysporum* | — | + | — | — | — | — |
| 17 *F. solani* | — | — | — | + | — | + |
| 18 *Gliocladiopsis* | — | + | — | — | — | — |
| 19 *Gliocladium roseum* | + | — | — | — | — | — |
| 20 *Penicillium citrinum* | — | — | + | — | — | — |
| 21 *P. ehrdichii* | — | + | — | — | — | — |
| 22 *P. janthinellum* | — | — | — | — | + | + |
| 23 *P. thomii* | — | — | — | — | — | + |
| 24 *P. vinaceum* | — | — | — | + | — | + |
| 25 *Phialocephala* spp. | — | + | — | — | — | — |
| 26 *Trichoderma hamatum* | + | + | + | — | — | — |
| 27 *T. harzianum* | — | — | — | + | + | + |
| 28 *T. koningii* | — | — | — | + | + | + |
| 29 *Sterile form* | — | — | — | — | + | + |

showing the association of fungi. The fungi isolated from root samples occurring in different depths of healthy and diseased palms are given in Table 1.

*Chaetomium brasiliense, Trichoderma hamatum, Aspergillus flavus* and *Chaetomium* sp. were more frequent in healthy whereas *Chaetomium brasiliense, Trichoderma harzianum, Gongronella butleri* and *Trichoderma koningii* were predominant in the root samples of diseased palms. These fungi were found associated with the root samples collected from all the three different depths viz., 0–30, 30–60 and 60–90 cm. *Chaetomium brasiliense, Aspergillus flavus, Aspergillus terreus* and *Gongronella butleri* were present in the roots of both healthy and yellow leaf disease affected palms. It has been reported earlier that *Trichoderma* spp. and *Fusarium* spp. isolated from the roots of yellow leaf disease affected palms could not induce any symptoms on inoculation to healthy palms (Anonymous, 1963). In the present study, among the species of *Fusarium, F. fusarioides* and *F. solani* and among the *Trichoderma* species *T. harzianum* and *T. koningii* were found associated with the roots of diseased palms.

സംഗ്രഹം

കമുകിന്റെ ഓലമഞ്ഞളിപ്പ് രോഗം കൂടുന്നതനുസരിച്ച് വേരുചീയൽ വർദ്ധിച്ചു വരുന്നതായി ഇതിനുമുൻപ് രേഖപ്പെടുത്തിയിട്ടുണ്ട്. രോഗാരംഭത്തിൽ വിവിധ ഇനം കുമിളുകളുടെ സാന്നിദ്ധ്യം കാണിക്കുന്ന വേരുകളുടെ എണ്ണം രോഗബാധയില്ലാത്തവയിൽ നിന്നും വളരെ വ്യത്യസ്തമായി കാണാൻ കഴിഞ്ഞില്ല. എന്നാൽ, മുൻപ് രേഖപ്പെടുത്തിയിട്ടുള്ള പഠനങ്ങളെ ആസ്പദമാക്കി നോക്കുമ്പോൾ രോഗം രൂക്ഷമാകുന്നതോടെ കുമിളുകളുടെ സാന്നിദ്ധ്യം കാണിക്കുന്ന വേരുകളുടെ എണ്ണവും വർദ്ധിക്കാൻ സാദ്ധ്യതയുണ്ടെന്ന് അനുമാനിക്കാം.

ഏതെല്ലാം ഇനം കുമിളുകളാണ് മൺനിരപ്പിൽനിന്നും വിവിധ ആഴത്തിലുള്ള കമുകിൽ വേരുമായി ബന്ധപ്പെട്ടിരിക്കുന്നത് എന്നും ഈ ലേഖനത്തിൽ വിശദീകരിച്ചിരിക്കുന്നു.

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