
IN VITRO INHIBITION OF *THIELAVIOPSIS PARADOXA* BY MYCOFLORA FROM COCONUT BASIN

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Stem bleeding, an important debilitating disease of coconut is caused by *Thielaviopsis paradoxa* (de Seynes) Von Hohnel, a soil-borne weak pathogen. Soil environment offers scope for manipulation and can be made use of in managing the disease by enriching the mycoflora antagonistic to *T. paradoxa*. The present study was taken up with a view to identifying potential biocontrol agents against *T. paradoxa* in the coconut basin.

Soil samples representing 0 to 25 cm depth were collected separately at 60 days intervals from the root zones of stem bleeding affected West Coast Tall (WCT) coconut palms under various treatments. The soil samples were air dried, sieved and plated (0.5 g) on soil extract agar by soil plate method (Warcup, 1950).

Three replicates were maintained for each sample. The colonies as and when appeared were transferred to fresh potato dextrose agar (PDA) slants. The fungi were identified and used for *in vitro* interaction studies against a virulent isolate of *T. paradoxa*. Discs of 5 mm diameter cut from the periphery of 48-hour old cultures of candidate fungi and *T. paradoxa* were used for interaction studies by the "direct opposition method" of Webber and Hedger (1986). Simultaneous and sequential (A and B) inoculation techniques were followed. In sequence-A, *T. paradoxa* was inoculated 12 hours before the candidate fungus and in sequence-B, candidate fungus was inoculated 12 hours before *T. paradoxa*. In simultaneous type, discs of both candidate fungus and *T. paradoxa* were placed at the same time. In all these cases, a distance of 3.5 cm was maintained between the discs on PDA medium and the petridishes were incubated at $27 \pm 2^\circ\text{C}$ and were examined at 24 hour intervals. Observations included the growth of *T. paradoxa* towards the test fungus and *vice versa* and

also in the opposite direction as check. The measurements were used for finding out the percentage of inhibition of *T. paradoxa* by candidate fungi.

Observations recorded after 24 hours (Table 79.1) of inoculation showed that *Trichoderma viride* — isolate 2 exhibited maximum percentage of inhibition (42.8) in sequence-B type of inoculation compared to simultaneous (20) and sequence-A (10) inoculation. This could be due to the fact that candidate antagonistic fungus obtained additional time to establish itself and to get ready in defence to face the pathogen. Among the species of *Trichoderma* recognised as antagonists against *Ceratocystis* sp. and *T. paradoxa*, *T. viride* is the best (Webber and Hedger, 1986; Gowda, 1987). The present findings also confirm this observation. *Rhizopus stolonifer*, *Thielavia terricola*, *T. koningii*, *T. viride* — isolate 1 and *T. viride* — isolate 2 inhibited *T. paradoxa* population after 15 days of observation. All these types of interactions were included in the 'O' type interaction category. Information in respect of *R. stolonifer*, *T. terricola* and *T. koningii* are being recorded for the first time.

Table 79.1: Percentage inhibition of *T. paradoxa* (24 hours after inoculation) (mean of three replications)

| Fungi tested | Sequence - A inoculation | Simultaneous inoculation | Sequence - B inoculation |
|-------------------------------|--------------------------|--------------------------|--------------------------|
| <i>Trichoderma viride</i> — 2 | 10.0 | 20.0 | 42.8 |
| <i>T. viride</i> — 1 | 10.0 | 19.0 | 33.3 |
| <i>Rhizopus stolonifer</i> | 9.0 | 14.2 | 28.5 |
| <i>Trichoderma koningii</i> | 4.7 | 9.0 | 20.0 |
| <i>Thielavia terricola</i> | * | * | * |

* *Thielavia terricola* showed inhibitory effect only after 48 hours. At this time, *T. paradoxa* growth covered the control (check) side so that the percentage of inhibition could not be measured.

After 15 days of observation, *Aspergillus fumigatus*, *A. terreus* and *Fusarium solani* exhibited mutual inhibition with *T. paradoxa* and were designated as 'MC' type of interaction. The remaining five fungi, namely, *Paecilomyces* sp., *Absidia* sp., *Penicillium pinophilum*, *Gongronella butleri* and *Cunninghamella elegans* freely intermingled with *T. paradoxa* and were included in the 'P' type interaction category.

REFERENCES

- Gowda, P.V. 1987. *In vitro* studies on the interaction of antagonistic mycoflora with *Thielaviopsis paradoxa*, the causal agent of coconut stem bleeding disease. M. Phil. Thesis, Mangalore University, Mangalore, India.
- Warcup, J.H. 1950. The soil plate method for isolation of soil fungi. *Nature* (London) 166: 177-188.
- Webber, J.F. and Hedger, J.N. 1986. Comparison of interactions between *Ceratocystis ulmi* and Elm bark saprobes *in vitro* and *in vivo*. *Trans. Br. Mycol. Soc.* 86: 93-101.