

Alternaria alternata* as a mycoparasite of *Rhizopus nigricans

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Interaction between *Alternaria alternata* and *Rhizopus nigricans* was studied in vitro in dual cultures to examine their antagonistic behaviour. *A. alternata* parasitised *R. nigricans* by direct penetration of hyphae, sporangiophores and sporangia. *R. nigricans* is described here as a new host record for the mycoparasite *A. alternata*.

Alternaria alternata (Fr.) Keissl. is a common inhabitant of seed, soil, air and phylloplane. It has been reported to parasitise a number of angiospermic plants causing conspicuous and destructive diseases. Colony interactions and hyphal interference between *A. alternata* and other phylloplane fungi were studied by Skidmore and Dickinson (1976). Inferfungal antagonism is a common phenomenon in dual culture studies on phylloplane and also on root surface (Barnett, Binder 1973; Boosalis 1964; Dennis, Webster 1971; Gupta, Tandon 1976; Gupta et al. 1979; Gupta et al. 1983; Pandey, Gupta 1984). Interactions include different kinds of changes in the involved organisms such as penetration, trophic stimulation, morphological alterations, lysis and growth inhibition. Mycoparasitic studies appear to be significant in the analysis of the colonization of substrates, competition and biological control of plant pathogens (Dennis, Webster 1971; Garrett 1970; Ikediugwu, Webster 1970a, b). Earlier, a few fungal species were recorded to parasitise *Rhizopus nigricans* (Gupta and Tandon 1976; Rai et al. 1977; Gupta et al. 1983). The present paper reveals antagonistic activity of a new mycoparasite *Alternaria alternata* against *Rhizopus nigricans*.

During the course of study on seed mycoflora of *Eleusine coracana*, a number of fungi were isolated. The dominance of *Alternaria alternata* on the seeds stimulated the authors to investigate its antagonistic behaviour against other seed inhabiting fungi. The interaction between *A. alternata* and *R. nigricans* was studied in dual cultures by the methods of Skidmore,

Dickinson (1976). Small agar blocks of the test fungal colonies cut from the margin of actively growing young cultures were inoculated opposing each other about two cm apart onto potato dextrose agar covered with cellophane. The plates were incubated at $25 \pm 1^\circ\text{C}$ under the alternating cycles of light and darkness. After the colonies met each other, they were examined directly under the microscope. Later, for detailed study a small square of cellophane was cut from the area of intermingling growth, stained and mounted in a mixture of cotton-blue and lacto-phenol.

In vitro dual culture studies revealed that the colony of *Alternaria alternata* overgrew and attacked the colony of *R. nigricans*. Such type of colony interaction was categorised under group B₁ by Skidmore and Dickinson (1976) in their colony interaction model system.

The hyphae from the intermingling growth region of the test fungi showed mycoparasitic behaviour of *A. alternata* against *R. nigricans*. It appears that the antagonist *A. alternata* started its parasitic activity by direct hyphal contact with that of the host *R. nigricans*. The parasite was observed to run along the host hyphae, coiling (Fig. 1) and penetrating (Fig. 2) the latter. This also indicates that the narrower hyphae possessed an upperhand in penetration, as evidenced by other workers (Dennis, Webster 1971; Durrell 1966; Upadhyay et al. 1979). Frequent penetration of the sporangio-phores was also recorded (Fig. 6). The antagonist after penetration formed some thick-walled structures like chlamydo-spores (Fig. 4). Formation of conidiophores and conidia of the mycoparasite on the hyphae as well as on the sporangia of the host (Figs 5, 7, 8) demonstrated a strong mycoparasitic activity against *R. nigricans*. The susceptible hyphae were lysed to a considerable extent (Fig. 3). In addition, the attacked sporangium showed infestation with the hyphae and the conidia of the antagonist. In Figure 7 the chain of conidia of the parasite is clearly visible on the host sporangium. It appears that because of infestation and enzymatic activity of the antagonist the sporangiospores of the host were distorted and remained adhered even after the sporangium was ruptured.

The present work gives evidence that the mycoparasitic activity of *A. alternata* is an additional tool for the antagonist to maintain its inoculum potential in soil as well as in seed storage. Therefore, this ability seems to be of considerable importance for the mycoparasite in perennation and disease development.

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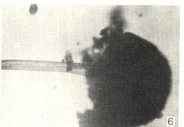
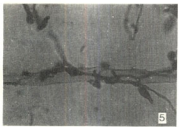
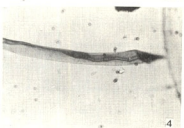
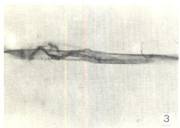
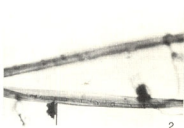
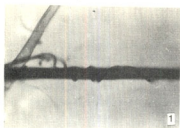


Fig. 1. *Alternaria alternata* coiling around the hyphae of *Rhizopus nigricans*

Fig. 2, 3. Penetration by *A. alternata* (Aa) hyphae inside the hyphae of *R. nigricans* (Rn)

Fig. 4. *A. alternata* forming chlamydospore (Ch) in the lumen of *R. nigricans* hypha

Fig. 5. Formation of conidiophores (Cp) and conidia (C) by *A. alternata* on the host hypha

Fig. 6. Penetration of sporangiophores of *R. nigricans* by *A. alternata*

Fig. 7, 8. Production of conidia (C) in chains by *A. alternata* on the sporangium of *R. nigricans*

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