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Fungal Decomposition of *Desmostachya* and *Chenopodium* Litter

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Individual role of thirteen species of fungi in decomposition was studied by inoculating them on the autoclaved *Desmostachya bipinnata* and *Chenopodium album* litter. The maximum decomposing ability of *D. bipinnata* litter was shown by *Chaetomium erectum*, followed by *Fusarium semitectum*, *Aspergillus flavus*, *Acrophialophora fusispora*, *Alternaria alternata* and *Aspergillus terreus*, while the maximum decomposers of *C. album* litters were *Aspergillus flavus*, *A terreus* and *F. semitectum*. *Chaetomium erectum* was not able to colonize *Chenopodium* litter while *Colletotrichum dematium* was not able to colonize the two types of litters singly or in combination with other species. *Trichoderma harzianum* a known cellulolytic fungus was a poor decomposer of both the litters.

Key Words: **Fungi decomposition, Litter inoculation, Colonization, Cellulolytic ability**

Introduction

There are numerous reports of colonization of living plants as well as their dead remains by micro-organisms from different parts of the globe (Preece & Dickinson 1971, Dickinson & Preece 1976, Dickinson & Pugh 1974, Mehrotra & Aneja 1979). Most of these studies are, however, centered on dipicting the role of group of microorganisms which colonize the substrate successively. There are very few reports on the role of individual fungi in decomposition (Ivarson 1974, Frankland 1969, Minchevich 1969, Hering 1967, Chastukin 1967a, b, Prakash & Saksena 1952, Lindeberg 1944, 1947). The frequency of isolation is a poor guide to the importance of a fungus in decomposition but the culture decomposition studies could be designed to assess the potential decomposing abilities of the more abundant species.

Materials and Methods

Two grammes of air-dried litters of *Chenopodium album* Linn. and *Desmostachya bipinnata* (Linn.) Staff. collected after senescence stage were taken in 250 ml conical flasks and autoclaved at 1 kg/cm^2 (15 lbs/inch^2) pressure for 30 min, then again after

24 hr, at two successive occasions and inoculated by 13 species of fungi individually and also a mixed inoculum.

For inoculum, surface growth of fungi growing on Czapek-Dox agar medium, was transferred to test tubes containing 10 ml sterile water. The contents were thoroughly hand-mixed to yield a spore and mycelial suspension. For the mixed culture inoculum, 1 ml. suspension of each fungus was mixed. Inoculum (2 ml. suspension) was added centrally in the flask aseptically and was shaken well. Three replicates were maintained for each fungus and a similar set of three uninoculated flasks served as control for the two litters separately. These were incubated at 28±1°C in the dark for 4 months. External mycelium was removed (Frankland 1969) by rubbing and brushing-off gently the litter pieces and the latter then dried for 48 hr at 60 °C. The loss in dry weight was taken as an index of decomposition. The error due to presence of mycelium inside the sample is usually small (Cowling 1960). The viability and purity of the fungus was tested by direct plating of the litter pieces on Czapek-Dox agar.

Results and Discussion

The changes in dry weight reflected considerable differences in the activity of test fungi. Maximum decomposition of *Desmostachya bipinnata* litter was shown by *Chaetomium erectum* Skolko· and Groves (13%), followed by *Fusarium semitectum* Berk. & Race. (10.26%), *Aspergillus flavus* Link strain I (9.26%), *Acrophialophora fusispora* (Saksena) Samsen (9.2%), *Alternaria alternata* (Fr.) keissler (8.43%), *Aspergillus terreus* Thom (7.93%) and *Aspergillus flavus* Link strain II (5.99%). Poor decomposition was shown by *Penicillium oxalicum* Currie & Thom (3.77%), *Sporothrix cyanescens* de Hoog de Vries (3.55%), *Aspergillus niveus* Blochwitz (3.5%), *Curvularia clavata* Jain (2.88%), *Trichoderma harzianum* Rifai (2.1%) and *Achaetomium strumarium* Rai et al. (1.33%). The maximum decomposers of *Chenopodium album* litter were *Aspergillus flavus* Link strain I (11.65%), followed by *A. terreus* (8.98%), *Fusarium semitectum* (8.19%), *Aspergillus flavus* strain II (6.07%), *Alternaria alternata* (5.05%). Rate of decomposition was poor in *Penicillium oxalicum* (4.87%), *Aspergillus niveus* (4.19%), *Trichoderma harzianum* (3.8%), *Curvularia clavata* (2.97%) and *Acrophialophora fusispora* (0.97%). Two strains of *Aspergillus flavus* tested on two types of litters brought about different loss in weight during the same period of incubation.

Ivarson (1974) has reported unidentified species of *Rhizoctonia* when alone in pure culture systems and in association with three other fungi namely *Mucor spinescens*, *Chrysosporium pannorum* and *Penicillium* sp., failed to survive and brought about no decomposition of organic matter. During the present investigation also, it was observed that *Achaetomium strumarium*, *Chaetomium erectum* were not able to survive on the litter of *Chenopodium album* while *Colletotrichum dematium* was not able to colonize the two types of litters when added individually or in mixed inoculum and brought no loss in weight. It would appear that the disappearance of these fungi is due to their inability to colonize and decompose a complex substrate. But, *Chaetomium erectum*, a maximum decomposer of *D. bipinnata* litter, was also unable to colonize the *Chenopodium* litter; this might be due to the several factors i.e., host specificity, age of litter, or the presence of some inhibitory substances in the litter.

Trichoderma viride, which is known to be a strong cellulose decomposer (Siu 1951), was unable to attack some natural forms of cellulose, as in alfalfa (Waksman & Hutchings 1937) and Oak litter. Frankland (1969) has found that *T. viride* was a poor

decomposer of bracken (*Pteridium quilinium* (L.) Kuhn petioles; In this investigation, *Trichoderma harzianum* was a poor decomposer of both *Desmostachya* and *Chenopodium* litters, although it has shown a very good cellulolytic ability (Aneja & Mehrotra 1980).

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