Effect of Fungal Metabolites on Seed Mycoflora and Seed Germination of *Azadirachta indica (*Neem*)*

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Abstract

Fungi are known to produce various extracellular metabolites; they may be enzymes, toxins, organic acids etc. All these play a role in disease development. Fungi growing on stored seeds produce highly toxic metabolites (Mycotoxins), that are poisonous, sometimes fatal to man and animals. These fungi are also known to produce cell wall degrading enzymes like pectolytic and cellulolytic enzymes. Some of them are also known to produce the enzyme amylase which attack the starch content of the seed and deteriorate them and the enzyme lipase that attack on the lipids present in the cell walls. Seeds are used for the medicine. These seeds are found to be frequently contaminated by fungi (Roy *et al*. 1988, Mamatha *et al.*, 2000). Chaurasia (1990) investigated that almost all medicinal seed samples were associated with a large number of fungi.

Key: Fungi, metabolites, seed mycoflora, medicinal seeds.

Introduction

The metabolites affect the seed germination as well as the length of radicle and plumule. Production of the metabolites depends on the species, isolates or strain of the fungus, and on the ecological conditions like temperature humidity etc. and the nature of the substrate. Therefore, experiments were performed to study the effect of extracellular metabolites, produced by 8 the dominant storage fungi, which are represented in the present research paper. Seeds of medicinal plants, like those of agricultural and horticultural crops, carry a wide variety of micro-organisms like fungi, bacteria and even some viruses.

Material and Method

The toxicity of the culture filtrates of fungi on seed germination and seedlings was assessed by the method adopted by Papdiwal and Deshpande (1978). The toxicity was tested by using as follows: The toxic effect of culture filtrates on seed germination was studied by keeping 10 seeds on filter paper in a petridish. The filter paper was soaked in 5 ml of the above solution. Filter paper soaked in 5 ml tapwater served as control. The filter paper was kept moist by adding the cultures filtrate or water in the respective petridishes. The plates were incubated for 72 hours and percentage germination was recorded.

Observations

Seeds of medicinal plant *viz. Azadirachta indica (*Neem*),* was surface sterilized with 0.1 % $HgCl_2$ solution for two minutes and washed repeatedly with sterile distilled water. For the study of fungal metabolites, 8 dominant fungi, occurring on the medicinal seeds under investigation, was selected. They were *Aspergillus carbonarius, A. flavus, A. niger, Cladosporium cladosporioides, Fusarium oxysporum, Penicillium corylophilum, Pythium indigoferae* and *Rhizopus oryzae.* The extracellular metabolites of these fungi were collected, as per the method described earlier.

Effect on Seed Germination

The effect of these metabolites of respective fungi on seed germination was studied as per the method described earlier (Papdiwal and Deshpande, 1978). Suitable controls were maintained with sterile distilled water. The seed germination of *Azadirachta indica* plant under investigation was noted, and expressed as percent germination. The length of radicle of every germinated seed was recorded, and its mean was calculated. The results were compared with control and percent inhibition of seed germination, and average radicle length were calculated. The results are presented in table 1, fig. 1 and 2.

Table 1: Effect of culture filtrates on seed germination and length of radicle of *Azadirachta indica* (Neem)

SN	Metabolites from the fungus	Seed germination		Average Radicle length	
		⁒germination	⁒ inhibition	Length in cm	⁒ inhibition
1	*Aspergillus carbonarius*	15	62.50	1.5	50.00
2	*A. flavus*	10	75.00	1.6	46.67
3	*A. niger*	20	50.00	2.8	06.67
4	*Cladosporium cladosporioides*	10	75.00	2.1	30.00
5	*Fusarium oxysporum*	20	50.00	1.4	53.34
6	*Penicillium corylophilum*	10	75.00	2.1	30.00
7	*Pythium indigoferae*	20	50.00	2.8	06.67
8	*Rhizopus oryzae*	30	25.00	2.5	16.67
9	Control	40	-	3.0	--
Mean			19.44		2.2
S. D.			10.14		0.608
C. V.			52.14		27.65

Source: Fieldwork, 2021

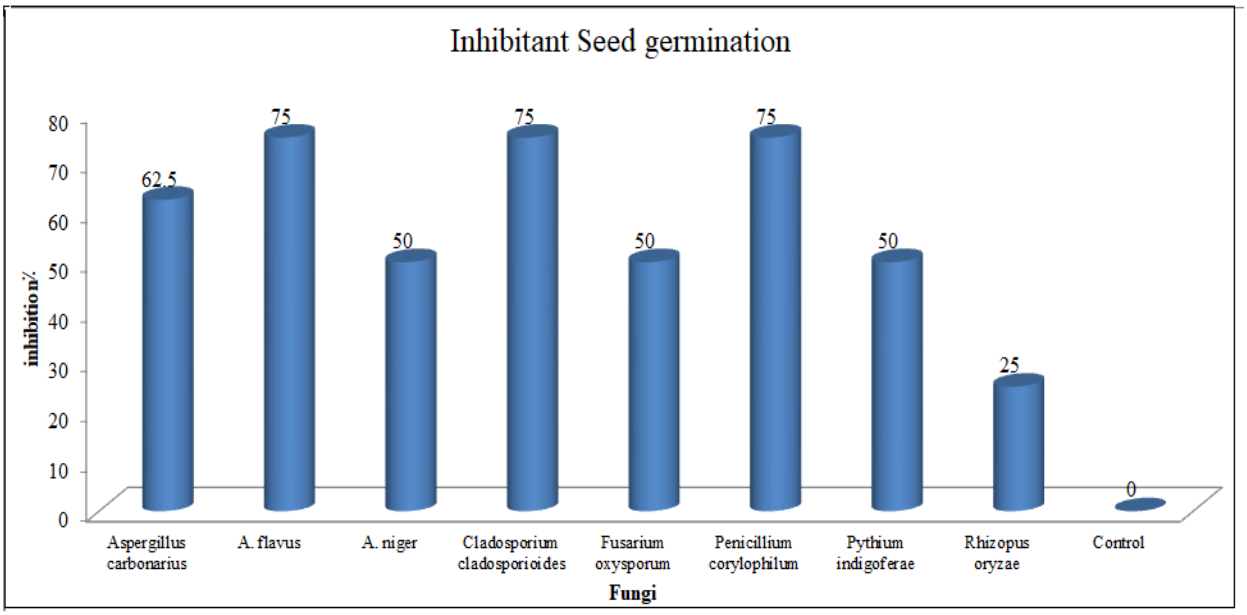

Fig. 1

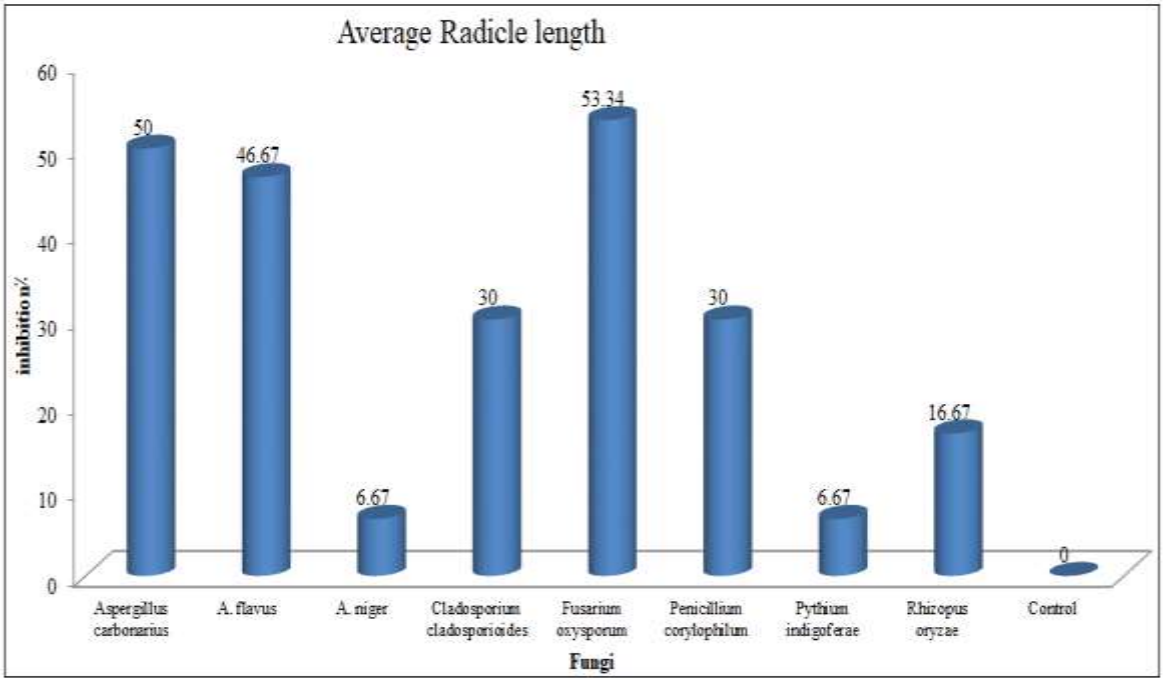

Fig. 2

It is observed from table 1, fig. 1 and 2 that in case of *Azadirachta indica (Neem)* , the culture filtrates of 8 fungi reduced the percentage of seed germination. The maximum inhibition of seed germination was observed in the culture filtrates of *A. flavus, C. cladosporioides* and of *R. oryzae* (inhibition 75%). Minimum inhibition was observed in culture filtrates of *P. corylophilium* (25 %). The adverse effect of culture filtrates was also observed on radicle length. The maximum inhibition of radicle length was observed in case of *Fusarium oxysporum* (inhibition 53.34 %).

Result

The result reveals that the culture filtrate of *Aspergillus flavus* and *P. corylophilum* cause maximum inhibition, of seed germination, among the 8 storage fungi studied. The culture filtrate of the fungus was found to cause maximum inhibition of seed germination of the medicinal plants investigated. The maximum inhibition of seed germination was observed in the culture filtrates of *A. flavus, C. cladosporioides* and of *R. oryzae* (inhibition 75%). Minimum inhibition was observed in culture filtrates of *P. corylophilium* (25 %). The adverse effect of culture filtrates was also observed on radicle length.

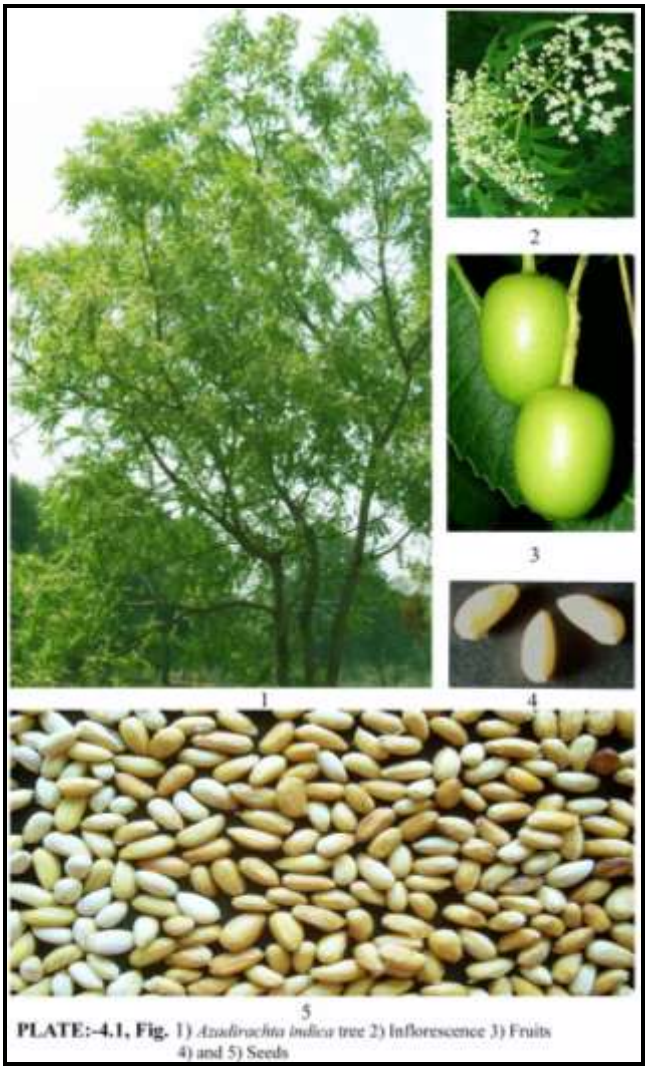

Plate.2: *Azadirachta indica (Neem)*

Reference

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