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Effect of different storage periods on seed mycoflora, seed germination and seedling emergence of chilli var. LOCAL SEEDS treated with leaf powder of *Azadirachta indica*

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ABSTRACT

Total seventeen fungi were found to be associated with the seeds of chilli varieties during the present studies. The seeds of chilli var. local showed maximum seed mycoflora with maximum per cent incidence. *Aspergillus flavus, Aspergillus niger, Rhizopus nigricans, Alternaria alternata, Rhizopus stolonifer* and *Curvularia lunata* were the common and dominant seed borne fungi of chilli varieties. The common and dominant seed borne fungi were found to be inhibitory for seed germination and caused great loss in seedling vigour, seed and seedling rots of the chilli var. local. The effect of seed treatment with leaf powder of *Azadirachta indica* and different seed storage periods (0-15 months) on seed mycoflora, seed germination and seedling emergence of chilli variety local was studied. Fungal mycoflora was found to be significantly reduced on seeds treated with leaf powder of *Azadirachta indica* and stored for different periods and there was an increase in percentage of seed germination and seedling emergence up to twelve months.

Key words : Seed mycoflora, Seed germination, Seedling vigor, *Capsicum annuum*, Seedling emergence

INTRODUCTION

Chilli (*Capsicum annuum*) is grown throughout Marathwada region. It is consumed by every Indian. There is hardly a vegetable where chilli is not used as a condiment while cooking. Chillies are used green as well as dry in the powder form. It is rich source of vitamin A and vitamin C among the vegetables. The chillies are pungent due to the presence of the chemical capsaicin and the bright red colour at the ripening stage is due to the pigment capsanthin.

It has been found that due to hot and humid conditions in the region, the fruits and seeds of chilli may be covered with fungal mycelial mats, which are black orange or white in colour depending upon the specific fungus present. These fungal infections are known to cause heavy damage and impair the quality of fruits and seeds.

MATERIALS AND METHODS

Collection of seed samples:

The method described by Neergaard (1973) has been adopted for the collection of seed samples. Accordingly, seed samples of different var. of chilli (50 g each) were collected from ripe dried fruits from field, storehouses, market places and research centers. A composite seed sample for each of the varieties was prepared by mixing the individual seed samples together and preserved in gunny bags at room temperature during the studies.

Detection of seed mycoflora:

The seed-borne fungi of different varieties of seeds of chilli were detected by moist blotter (B) and agar (A) plate methods as recommended by ISTA (1966), De Tempe (1970), Neergaard (1973) and Agarwal *et al.* (1976).

Identification of seed-borne fungi:

The seed-borne fungi were preliminary identified on the basis of sporulation characters like asexual or sexual spores or fruiting structures. Detailed examination of fungal characters was done under compound microscope and their identification was confirmed with the help of related manuals (Subramanian, 1971; Neergaard and Mathur, 1980 and Jha, 1993). Pure cultures of the identified fungi were prepared and maintained on PDA (Potato dextrose agar) slants for further experiments.

Effect of culture filtrates on per cent seed germination, root length, shoot length and seedling emergence

Production of toxin was studied by growing some common and dominant seed-borne fungi of plants like *Alternaria alternata, Aspergillus flavus, Curvularia lunata* and *Fusarium moniliforme* on liquid GN medium of pH 5.6 for ten days.

Twenty five ml of the medium was poured in 100 ml Borosil glass conical flasks, autoclaved and inoculated separately with 2 ml spore suspension of the test seed-borne fungus that was maintained on PDA slants for seven days. The flasks were incubated at room temperature for ten days. After incubation, the culture filtrates were collected in pre-sterilized culture bottles

from the flasks by filtering the contents through Whatman filter paper No.1 and treated it as crude toxin preparation.

Effect of different storage periods on seed germination, seed mycoflora, root and shoot length and seedling emergence:

During the present studies, half-kilogram seeds of chilli were dusted with five gram of leaf powder (*i.e.* at the rate of 10 gm / kg) of *Azadirachta indica.* These treated seeds were stored for different periods like, 00, 03, 06, 09, 12 and 15 months in gunny bag at room temperature. After storage for respective periods, the seeds were incubated on moist blotters for ten days at room temperature. On tenth day seed health in terms of seed mycoflora, seed germination, root and shoot length was studied.

For seedling emergence, seeds of chilli were treated as mentioned above. The seeds were sown in earthen pots containing sterilized soil and grown for ten days. On tenth day per cent seedling emergence was recorded. Seeds without dusting of powder served as control.

Results and Discussion

Screening of seed mycoflora of four different varieties of chilli was carried out for seven days by Agar plate and Blotter test methods.

It is clear from the results presented in Table 1 that in all seventeen fungi were recorded from seeds of different verities of chilli. Out of the total seventeen fungi, more or less same fungi were recorded on seeds of different varieties.

Of the seeds of chilli varieties screened for incidence of fungi, chilli var. local showed maximum incidence of fungi followed by varieties Pusa Jwala, Phule Jyoti and Guntoor-4.

More incidence of mycoflora was recorded on agar plates than on blotters.

The common and dominant fungi recorded were *Aspergillus flavus, Aspergillus niger, Rhizopus nigricans, Alternaria alternata, Rhizopus stolonifer* and *Curvularia lunata.*. Similar studies were carried out by different workers like Basandrai *et al.* (1990), Gupta and Basuchaudhary (1995) Amer Habib *et al.* (2007).

Effect of mycotoxins (culture filtrates) of some common and dominant seed borne fungi was studied on seed germination, seedling emergence and seedling health. Ten day old culture filtrates obtained from seed borne fungi grown on GN medium were used in experiments to see their effects on seed germination, seedling emergence and seedling health after ten days.

Results presented in Table 2, show that there was maximum inhibition of seed germination in culture filtrate of *Aspergillus flavus* (seed germination 17%) followed by *Alternaria alternata* (18%), *Fusarium moniliforme* (38%) and *Curvularia lunata* (50%) over the control (100%).

Table 1 : Incidence of mycoflora on seeds of different varieties of chilli by agar plate (A) and blotter test (B) methods (after 7 days of incubation)

Sr. No.	Seed mycoflora	% Incidence of seed mycoflora							
		Chilli local		Pusa jwala		Phule jyoti		Guntoor-4	
		A	B	A	B	A	B	A	B
1.	*Alternaria alternata*	50	32	41	27	33	21	27	17
2.	*Alternaria solani*	38	31	30	28	25	20	19	16
3.	*Aspergillus niger*	62	52	57	47	51	42	47	34
4.	*Aspergillus flavus*	64	50	59	43	51	37	43	31
5.	*Aspergillus fumigatus*	-	05	-	04	-	02	-	02
6.	*Rhizopus stolonifer*	42	30	37	26	31	19	29	17
7.	*Rhizopus nigricans*	52	42	47	36	41	32	37	27
8.	*Fusarium solani*	20	08	17	06	15	04	11	03
9.	*Fusarium moniliforme*	32	22	27	19	21	15	17	11
10.	*Rhizoctonia solani*	15	05	11	04	09	03	07	02
11.	*Penicillium digitatum*	-	-	-	-	-	-	-	-
12.	*Chaetomium* sp.	15	-	13	-	11	-	08	-
13.	*Curvularia lunata*	41	32	39	29	31	22	24	17
14.	*Pythium debaryanum*	15	-	11	-	09	-	07	-
15.	*Phytophthora capsici*	14	11	11	09	09	07	07	04
16.	*Cladosporium herbarum*	10	-	09	-	07	-	05	-
17.	*Helminthosporium speciferum*	09	-	08	-	05	-	03	-

Table 2 : Effect of culture filtrates (CF) of some common and dominant seed-borne fungi of Solanaceous seeds grown in glucose nitrate (GN) medium (for ten days) on seed germination, root length, root rot, shoot length, shoot rot (on blotter) and seedling emergence of Chilli Variety- Local (after ten days)

Sr. No.	CF of common and dominant seed borne fungi	Chilli variety-local					
		Seed germination (%)	Root length (mm)	Root rot	Shoot length (mm)	Shoot rot	Seedling emergence (%)
1.	*Alternaria alternata*	18	5.0	+++	20.8	+++	10
2.	*Aspergillus flavus*	17	4.5	+++	16.7	+++	08
3.	*Curvularia lunata*	50	50.5	+	46.2	+	42
4.	*Fusarium moniliforme*	38	30.7	++	49.6	+	15
5.	Control (Sterile GN-medium)	100	120.0	-	99.0	-	50

+++ = Severe rot ++ = Moderate rot + = Low rot

\- = No rot

Table 3 : Effect of different storage periods (0-15 months) on seed mycoflora, seed germination (on blotter) and seedling emergence (after 10 days) of chilli var.local seeds treated with leaf powder of *Azadirachta indica*

Sr. No.	Storage period (Months)	Seed mycoflora (%)		Seed germination (%)		Root length (mm)		Shoot length (mm)		Seedling emergence (%)	
		Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated	Untreated	Treated
1.	00	100	95	25	25	18.4	19.5	16.2	17.3	17	23
2.	03	100	44	57	69	26.3	27.8	24.1	25.3	51	65
3.	06	100	18	69	79	24.6	26.2	22.9	24.5	59	77
4.	09	100	09	78	100	28	31.9	26.9	29.7	71	81
5.	12	85	00	100	100	34.3	35.8	31.2	33.3	82	87
6.	15	80	00	35	37	14	16.2	12.1	14.8	18	20

From the results, it is also clear that, the seeds treated with culture filtrate of *Aspergillus flavus* showed maximum reduction in root length (4.5 mm, control 120.0 mm), shoot length (16.7 mm, control 99.0 mm) and maximum root rot and shoot rot. Where as the seeds treated with culture filtrate of *Curvularia lunata* showed minimum reduction in root length (50.5 mm, control 120.0 mm), shoot length (46.2 mm, control 99.0 mm) and minimum root rot and shoot rot.

The results of Table 2 indicate that there was maximum inhibition of seedling emergence in culture filtrate of *Aspergillus flavus* (08%) followed by *Alternaria alternata* (10%), *Fusarium moniliforme* (15%) and *Curvularia lunata* (42%) over the control (50%). Similar studies were carried out by Bodke (2000).

In order to study the effect of different storage periods on seed mycoflora, seed germination, root and shoot length and seedling emergence, the seeds of chilli var. local were dusted with leaf powder of *Azadirachta indica* (10 g / kg seeds) and subjected to different storage periods (0, 03, 06, 09, 12 and 15 months). After completion of respective storage periods, the treated and untreated seeds were plated separately on moist blotters and incubated for ten days at room temperature. On tenth day the seed mycoflora, seed germination, root and shoot length and seedling emergence of the seeds were recorded. Seeds without dusting with plant powders served as control (untreated seeds).

The results presented in the Table 3 clearly show that, the seeds treated with leaf powder of *Azadirachta indica* showed considerable reduction in seed mycoflora and enhancement in seed germination, root and shoot length and seedling emergence.

Seed mycoflora was reduced slightly over the storage periods from zero to fifteen months in untreated seeds.

There was steady and gradual increase in seed germination from zero to twelve months where as from twelve to fifteen months the seed germination was decreased in both untreated and treated seeds. Similar studies were carried out by different workers like Chandra *et al.* (1981), Grisham and Reddy (1986) and Prasad *et al.* (2000).

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