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Effect of different storage periods on seed mycoflora, seed germination and seedling emergence of *Solanum xanthocarpum* seeds treated with leaf powder of *Azadirachta indica*

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ABSTRACT

During the present studies total thirteen fungi were found to be associated with the seeds of *Solanum xanthocarpum*. The seeds of *Solanum xanthocarpum* showed maximum seed mycoflora with maximum per cent incidence. *Aspergillus niger, Rhizopus nigricans, Aspergillus flavus, Fusarium moniliforme, Curvularia lunata* and *Rhizopus stolonifer* were the common and dominant seed borne fungi of *Solanum xanthocarpum.* 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 *Solanum xanthocarpum*. 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 *Solanum xanthocarpum* 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 vigour, Seedling emergence

INTRODUCTION

Bhuiringani (*Solanum xanthocarpum)* is an important herbal medicinal plant for the people of the Marathwada region. It is a common prickly herb. The roots are used in cough, asthma and leaves for rheumatism.

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

MATERIALS AND METHODS

Collection of seed samples:

The methods described by Neergaard (1973) have been adopted for the collection of seed samples. Accordingly, seed samples of *Solanum xanthocarpum* (50 g each) were collected from ripe dried fruits from field, storehouses, market places and research centers. A composite seed sample 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 *Solanum xanthocarpum* were detected by moist blotter (B) and agar plate (A) 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 at 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 *Solanum xanthocarpum* were dusted with five gram of leaf powder (*i.e.* at the rate of 10 g / kg) of *Azadirachta indica.* These treated seeds were stored for different periods *viz.*, 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 *Solanum xanthocarpum* 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 plant powder served as control.

Results and Discussion

Seeds of *Solanum xanthocarpum* were screened for incidence of fungi for seven days by agar plate and blotter test methods.

Results presented in Table 1 revealed that in all fourteen fungi were recorded from seeds of *Solanum xanthocarpum.* More incidence of mycoflora was recorded on seeds placed on agar plates than the blotters.

Table 1 : Incidence of mycoflora on seeds of *Solanum xanthocarpum* by agar plate (A) and blotter test (B) methods (after 7 days of incubation)

Sr. No.	Seed mycoflora	% Incidence of seed mycoflora of *Solanum xanthocarpum*	
		A	B
1.	*Alternaria alternata*	32	20
2.	*Alternaria solani*	30	28
3.	*Aspergillus niger*	62	38
4.	*Aspergillus flavus*	48	46
5.	*Aspergillus fumigatus*	-	10
6.	*Rhizopus stolonifer*	38	28
7.	*Rhizopus nigricans*	52	40
8.	*Fusarium solani*	10	05
9.	*Fusarium moniliforme*	40	33
10.	*Rhizoctonia solani*	15	-
11.	*Penicillium digitatum*	05	-
12.	*Curvularia lunata*	40	20
13.	*Pythium debaryanum*	10	05

The common and dominant fungi recorded were *Aspergillus niger, Aspergillus flavus,Rhizopus nigricans, Rhizopus stolonifer, Fusarium moniliforme,* and *Curvularia lunata.*

Culture filtrates of some common and dominant seed borne fungi were studied for 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. Similar studies were carried out by different workers like Basandrai *et al.* (1990), Gupta and Basuchoudhary (1995) and Amer Habib *et al.* (2007)

Results presented in Table 2, show that there was maximum inhibition of seed germination in culture filtrate of *Aspergillus flavus* (seed germination 8%) followed by *Curvularia lunata* (10 %), *Alternaria alternata* (14 %), *Fusarium moniliforme* (19%) and over the control (57 %).

From the results it is also clear that, the seeds treated with culture filtrate of *Aspergillus flavus* showed maximum reduction in root length (3.1 mm, control 38.0 mm), shoot length (2.4 mm, control 43.2 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 (14.9 mm, control 38.0 mm), shoot length (19.3 mm, control 43.2 mm) and minimum root rot and shoot rot.

It is also clear from the results that there was maximum inhibition of seedling emergence in culture filtrate of *Aspergillus flavus* (12%) followed by *Alternaria alternata* (14%), *Curvularia lunata* (24%) and *Fusarium moniliforme* (29 %) over the control (46%).

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 *Solanum xanthocarpum* 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). Similar studies were carried out by Bodke (2000).

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

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 *Solanum xanthocarpum* (after ten days of incubation)

Sr. No.	CF of common and dominant seed borne fungi	*Solanum xanthocarpum*					
		Seed germination (%)	Root length (mm)	Root rot	Shoot length (mm)	Shoot rot	Seedling emergence (%)
1.	*Alternaria alternata*	14	03.4	+++	03.5	+++	14
2.	*Aspergillus flavus*	08	03.1	+++	02.4	+++	12
3.	*Curvularia lunata*	10	14.9	+	19.3	+	24
4.	*Fusarium moniliforme*	19	06.7	++	17.0	+	29
5.	Control (Sterile GN-medium)	57	38.0	_	43.2	-	46

+++ = 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 *Solanum xanthocarpum* 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	98	00	00	00	00	00	00	00	00
2.	03	100	18	10	18	10.6	12.6	10.6	11.4	08	16
3.	06	100	14	16	38	12.6	14.6	12.4	13.2	10	34
4.	09	100	00	18	78	13.6	16.3	14.3	12.6	14	70
5.	12	93	00	27	92	14	15.3	1.9	14.2	21	80
6.	15	90	00	14	40	12	10	08	10	08	10

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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