research article | International Journal of Plant Sciences, (July, 2010) Vol. 5 Issue 2 : 556-560

Effect of extracts of various plant parts on seed mycoflora and seed germination of brinjal

S.M. TELANG

Accepted : April, 2010

SUMMARY

During the present studies total seventeen fungi were found to be associated with the seeds of brinjal. The seeds of brinjal var. LOCAL showed maximum seed mycoflora with maximum per cent incidence. *Aspergillus flavus, Alternaria alternata, Rhizopus nigricans, Curvularia lunata, Rhizopus stolonifer* and *Fusarium moniliforme* were the common and dominant seed borne fungi of brinjal 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 brinjal var. LOCAL. The root stems, leaf and bark extracts of some common and easily available plants were screened for the bio-control of the seed mycoflora of the brinjal. The extract were found to be inhibitory for the incidence of seed mycoflora while with a few exceptions, they were found to be stimulatory for seed germination

Key words : *Solanum melongena,* Seed mycoflora, Seedling vigour, Seedling emergence, Plant extracts

Solanaceae family includes a large number of annual or perennial herbs, shrubs, small trees and climbers. More than seventy species belonging to twenty-one genera are found in India. Economically the family is fairly important, as it comprises several crops of food value, medicinal value, vegetables and ornamentals. Several plants of this family are cultivated all over the world for their economic importance. Brinjal – egg plant (*Solanum melongena*) is grown commonly in almost all the parts of the country and fruits are liked by both the poor and the rich as vegetables. It is available more or less throughout the year. It also contains many medicinal properties in Ayurvedic medicines. It has been found that due to hot and humid conditions in the region, the fruits and seeds of this crop may be covered with fungal mycelial mats, which are black orange or white in colour depending upon the presence of specific fungal species. These fungal infections are known to cause heavy damages and impair the quality of fruits and seeds.

In the present studies, ten local and easily available plants in the near by area were selected for their root, stem, leaf and bark extracts and the effects of these extracts on seed mycoflora and seed germination was studied.

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 different varieties of brinjal (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 varities was prepared by mixing the individual seed samples together and preserved in gunny bags at room temperature during the studies.

Correspondence to:
S.M. TELANG, Department of Botany, Yeshwant Mahavidyalaya, NANDED (M.S.) INDIA

Detection of seed mycoflora:

The seed-borne fungi of different varieties of seeds of brinjal 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). The procedure of moist blotter (B) and agar (A) plate methods are described as below.

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 relevant literature (Subramanian, 1971, Neergaard and Mathur, 1980, Jha, 1993) and Mukadam *et al.*, 2006). 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 and shoot length and seedling emergence:

Production of toxin was studied by growing some

common and dominant seed-borne fungi *viz., 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 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.

Collection of plant material for extracts:

During the present studies, ten common and easily available plants in the vicinity like *Acacia nilotica, Adhatoda zeylanica, Annona squamosa, Azadirachta indica, Curcuma longa, Lawsonia inermis, Murraya koenigii, Ocimum sanctum, Terminalia bellerica* and *Terminalia chebula* were selected. Their identification was confirmed consulting the 'Flora of Marathwada' (Naik, 1998). The roots, stems, leaves and barks of the selected plants were collected separately, surface sterilized with 0.1 % $HgCl_2$ and washed repeatedly with sterile distilled water for several times and kept for drying in hot air oven (Metalab) at 60^0C temperature for 48 hours. After drying, the roots, stems, leaves and barks were preserved separately in polythene bags at room temperature (27± 1^0C) during the studies.

The dried roots, stems leaves and bark of selected plants were crushed separately into fine powder with the help of blender (Remi). 5 gm powder each of the plant parts was dissolved separately in 100 ml sterilized hot distilled water in 250 ml Borosil glass conical flasks. The flasks were kept in oven (Metalab) for 24 hours at 60^0C and the content was filtered through Whatman filter paper No.1. The filtrates were used as 5% aqueous plant extracts.

Effect of plant extracts of seed mycoflora and seed germination:

During the present studies, the seeds of different varieties of brinjal were placed on blotters in petriplates as described earlier and irrigated just enough to keep blotters moist separately with the root, stem and leaf extracts (5%) of the selected plants. Per cent seed germination and associated seed mycoflora were recorded on seventh day. Seed plates irrigated with sterile distilled water served as control.

RESULTS AND DISCUSSION

Seeds of four different varieties of brinjal were screened for incidence of fungi for seven days by agar plate and blotter test methods.

It is clear from the results presented in Table 1 that in all fifteen fungi were recorded from seeds of different varieties of brinjal. Out of the total fifteen fungi, more or less same fungi were recorded on seeds of different varieties. Of the seeds of brinjal varieties screened for incidence of fungi, local variety brinjal var. LOCAL showed maximum incidence of fungi followed by varieties Hirwa Kateri, Vishal and Manjri Gotya. More incidence of mycoflora was recorded on agar plates than the blotters. The common and dominant fungi recorded were *Aspergillus flavus, Aspergillus niger, Rhizopus nigricans, Curvularia lunata, Alternaria alternata,* and *Rhizopus stolonifer.* Similar studies were carried out by different workers like Basandrai *et al. (1990),* Gupta and Basuchoudhary (1995) and Habib *et al.* (2007).

Effect of mycotoxins (culture filtrates) of some common and dominant seed borne fungi were studied on seed germination, seedling emergence and seedling health of Solanaceous plants. 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 13%) followed by *Alternaria alteranta* (15%), *Fusarium moniliforme* (32%) and *Curvularia lunata* (45%) over the control (100%).

From the results it is also clear that the seeds treated with culture filtrate of *Aspergillus flavus* showed maximum reduction in root length (4.0 mm, control 112.0 mm), shoot length (18.6 mm, control 97.5 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 112.0 mm), shoot length (46.2 mm, control 97.5 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 *Alternaria alternata* (08%) followed by *Aspergillus flavus* (17%), *Fusarium moniliforme* (25%) and *Curvularia lunata* (42%) over the control (87%). Similar studies were carried out by Bodke (2000)

During the present studies, the seeds of brinjal var. local were placed on blotters in Petri plates and irrigated with root, stem and leaf extracts of different plants (total

Table 1 : Incidence of mycoflora on seeds of different varieties of brinjal by Agar plate (A) and Blotter test (B) methods (after 7 days of incubation)

Sr. No.	Seed mycoflora	% Incidence of seed mycoflora of							
		Brinjal Local		Hirwa Kateri		Vishal		Manjri Gotya	
		A	B	A	B	A	B	A	B
1.	*Alternaria alternata*	56	38	51	32	47	28	43	21
2.	*Alternaria solani*	40	28	33	23	31	21	29	18
3.	*Aspergillus niger*	72	64	69	61	66	59	61	51
4.	*Aspergillus flavus*	74	54	68	51	63	47	59	43
5.	*Aspergillus fumigatus*	-	-	-	-	-	-	-	-
6.	*Rhizopus stolonifer*	54	32	51	29	49	27	43	21
7.	*Rhizopus nigricans*	62	42	59	38	53	31	41	27
8.	*Fusarium solani*	10	-	07	-	05	-	03	-
9.	*Fusarium moniliforme*	42	33	39	31	31	27	23	21
10.	*Rhizoctonia solani*	10	-	06	-	04	-	02	-
11.	*Penicillium digitatum*	15	-	11	-	09	-	06	-
12.	*Chaetomium* sp.	10	-	07	-	04	-	03	-
13.	*Curvularia lunata*	60	52	51	46	47	41	41	33
14.	*Pythium debaryanum*	10	-	08	-	07	-	05	-
15.	*Phytopthora capsici*	-	-	-	-	-	-	-	-
16.	*Cladosporium herbarum*	-	-	-	-	-	-	-	-
17.	*Helminthosporium speciferum*	05	-	03	-	02	-	02	-

Table 2 : Effect of culture filtrates of some common and dominant seed-borne fungi on seed germination, root length, root rot, shoot length, shoot rot and seedling emergence (after ten days)

Sr. No.	CF of common and dominant seed borne fungi	Brinjal variety LOCAL					
		Seed germination (%)	Root length (mm)	Root rot	Shoot length (mm)	Shoot rot	Seedling emergence (%)
1.	Alternaria *alternata*	15	04.5	+++	18.8	+++	08
2.	*Aspergillus flavus*	13	04.0	+++	18.6	+++	17
3.	*Curvularia lunata*	45	50.5	++	46.2	+	42
4.	*Fusarium moniliforme*	32	20.2	+++	41.2	++	25
5.	Control (Sterile GN medium)	100	112.0	-	97.5	-	86

+++ = Severe rot
++ = Moderate rot
+ = Low rot
- = No rot

ten plants). The plates were incubated for seven days at room temperature and the incidence of seed mycoflora and seed germination were studied. The plates irrigated with sterile distilled water served as control. The results are presented in Table 3.

From the results it is evident that, the root stem and leaf extracts of the entire test plants were found to be inhibitory for the incidence of seed mycoflora while with a few exceptions, they were found to be stimulatory for seed germination.

The seeds treated with leaf extracts of *Azadirachta indica,* leaf and root extracts of *Ocimum sanctum* and leaf extracts of *Murraya koenigii* showed reduced incidence of seed mycoflora and maximum seed

Table 3 : Effect of extracts of various plant parts on per cent seed mycoflora and percent seed germination of brinjal var. local on blotter paper (after seven days)

Sr. No.	Source plant	Part used for extracts	% seed mycoflora	% seed germination
1.	*Acacia nilotica*	Root	68	34
		Stem	71	28
		Leaf	56	38
		Bark	64	48
2.	*Adhatoda zeylanica*	Root	52	26
		Stem	54	43
		Leaf	44	58
3.	*Annona squamosa*	Root	54	52
		Stem	41	57
		Leaf	28	69
4.	*Azadirachta indica*	Bark	12	89
		Leaf	05	96
		kernel	11	94
5.	*Curcuma longa*	Dried rhizome	24	72
		Leaf	57	27
6.	*Lawsonia inermis*	Root	58	44
		Stem	78	28
		Leaf	42	56
7.	*Murraya koenigii*	Root	16	71
		Stem	18	66
		Leaf	06	84
8.	*Ocimum sanctum*	Root	02	83
		Stem	06	83
		Leaf	02	90
9.	*Terminalia bellerica*	Root	54	31
		Bark	48	43
		Leaf	54	19
10.	*Terminalia chebula*	Root	48	32
		Bark	41	44
		Leaf	38	24
	Control (sterile distilled water)	--	100	23

germination while, the seeds treated with the stem and root extracts of *Lawsonia inermis* and *Acacia nilotica*, leaf extract of *Curcuma longa* showed maximum incidence of seed mycoflora and reduced seed germination. Similar studies were carried out by Khan and Rishi (1990) and Kandhare (2008).

REFERENCES

Agrawal, V.K., Mathur, S.B. and Neergaard P. (1976). Some aspects of health testing with respect to seed-borne fungi of rice, wheat, blackgram, greengram and soybean grown in India. *Indian Phytopath.*, **25** : 91-100.

Amer Habib, Sahi, S.T., Ghazanafar, M.V. and Ali, S. (2007). Locationof seed borne mycoflora of egg plant (*Solanum melongena* L.) in different seed components and impact on seed germinability; *Internat. J. agric. & Biol.*, **9** (3) : 514-516.

Basandrai, A.K., Aulakh, K.S., Randhawa, H.S. (1990). Seed borne mycoflora of Brinjal (*Solanum melongena* L.) *Ann. Boil.*, **6** (2) : 167-170.

Bodke, S. S. (2000). Studies on seed-borne fungi of cereals. Ph.D.Thesis, S.R.T. Marathwada University, Nanded (M.S.) India.

De Tempe, J. (1970). Testing cereal seeds for *Fusarium* infection in the Netherlands. *Proc. Internat. Seed Test*. Ass., **35**:193-206.

Gupta, D.K. and Choudhary, K.C.B. (1995). Seed borne fungi of bhindi, brinjal and chillies grown in Sikkim. *J. Mycol. Pl. Pathol*., **25** (3) : 282-283.

ISTA (1966). International rules of seed testing. *Internat. Seed Test. Ass.*, **31**: 1-152

Jha, D.K. (1993). *A text book on seed pathology*. Vikas publishing house Pvt. Ltd. New Delhi, 132 pp. (Reprint, 1995)

Kandhare, A.S. (2008). Studies on effect of some plant extracts on seed mycoflora and seed health of pulses. Ph.D. Thesis, S.R.T. Marathwada University, Nanded (M.S.) India.

Khan, M.I. and Rishi, Kumar (1990). Antifungal activity of leaf extract of neem on seed mycoflora of wheat. *Indian J. Applied & Pure Biol.*, **5**(1):13-14

Mukadam, D.S., Patil, M.S., Chavan, A.M and Patil, A.R. (2006). *The illustration of fungi*, Sarswati Printing Press, Aurangabad, India.

Naik, V. N. (1998). *Flora of Marathwada*, vol. I and II, by Amrut prakashan, Aurangabad, India. 1182pp

Neergaard, Paul (1973). *Seed Pathology*, Vol. I-II. The Mc Millan Press Ltd., London, 1187 pp.

Neergaard, Paul and Mathur, S.B. (1980). *University teaching of seed pathology*, Published by Prasaranga, University of Mysore, India.

Subramanian, C.V. (1971). *Hypomycetes- an account of Indian species except Cercospora*. ICAR, New Delhi. 930 pp.

****
*****