

Fungi Associated with Ridge Gourd Seeds and their Phyto- pathological Effects

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Abstract: Total 108 seeds samples of ridge gourd collected from 10 districts of Rajasthan and subjected to dry seed examination. Symptomatic seeds showed various kinds of disorders like sclerotial seeds, spotted seeds, white crusted seeds, distorted seeds, cracked seeds, shrivelled seeds and insect damaged seeds.

On incubation, *Alternaria alternata*, *Arthrobotrys superba*, *Aspergillus fumigatus*, *A. niger*, *Cladosporium*, *Chaetomium* spp., *Fusarium* spp., *Rhizoctonia bataticola* were found to be the dominant fungi severely affecting seed germination and cause many seed abnormalities like seed germination failure, stunted seedlings and seedling mortality.

Introduction:

Ridge gourd belongs to an important vegetable family, Cucurbitaceae. Plant is annually growing monoecious climber. In India it is grown throughout the country. Luffa is a long duration crop and is grown for its fruits, rich in Ca, P, Oxalic acid, Vit. A, and Vit. C. It is cathartic, expectorant, diuretic and nutritive, anthelmintic, antipyretic and also has various uses. Ridge gourd crop suffers from a number of phytopathogenic fungi causing severe losses. Seed borne infection of these fungi reduces plant value of seeds. Since the crop is grown through seeds and seeds are planting material therefore present study has been undertaken to measure seed disorders, fungi associated with seeds and their phyto-pathological effects.

Material and Methods:

108 seed samples of *Luffa acutangula* were collected from ten districts of Rajasthan to study the disorders of seed and incidence of mycoflora and their effects on seed viability, seedling germination and seedling mortality. The seeds were subjected to dry seed examination and Standard Blotter Method (Anon 1996).

For dry seed examination 400 seeds drawn at random and examined by naked eyes as well as by Nikon stereo binocular microscope. Occurrence and percent incidence of fungi, seed deformities and discoloration were observed. 100 untreated and 100 pretreated seeds with aqueous NaOCl were subjected to incubation test. Percentage of seed-borne mycoflora, seed germination, seedling abnormalities were recorded on 8th day of incubation. Fungi associated were isolated, identified and percent loss was evaluated.

Result and Discussion:

Dry Seed Examination:

108 seed samples when examined under stereo binocular microscope showed presence of sclerotial seeds 71 (2.25-10.50%), spotted seeds with or without mycelial crust 104 (2.25-20.75%), white crusted seeds 51 (2.25-19.0%), distorted seeds 91 (0.25-10.50%), cracked or insect damaged seeds 70 (0.25- 5.00%).

Table 1

On incubation, sclerotial seeds predominantly yielded *Rhizoctonia bataticola*, spotted seeds with or without mycelial crusts yielded *Alternaria alternata*, *Curvularia* spp. and *Drechslera* spp, white crusted seeds yielded *Fusarium oxysporum*. Distorted seeds yielded *Aspergillus* and *Penicillium* and also affected by bacteria. Cracked or insect damaged seeds were found to be associated with *Rhizoctonia bataticola* and *Chaetomium* spp, shrivelled seeds mainly affected with *Fusarium* spp.

Seed sample possess various degree of deformities and discoloration. Neergaard 1977 has described three basic categories of seed discoloration, necrotic lesion, fungal coating and pigmentation. Seed discoloration due to various associated fungi have also been reported by many workers, reddish brown discoloration in soybean, brown discoloration in cowpea (Verma *et al.* 1992), white crust on Vigna mungo (Singh 1997).

Shakir and Mirza 1995 reported many seed-borne fungi like *Fusarium* spp, *Rhizoctonia bataticola*, *Curvularia lunata*, *Alternaria alternata*, *Aspergillus flavus*, *A.niger*, *Colletotrichum* spp. associated with sponge gourd.

Incubation test:

All 108 seed samples were tested using Standard Blotter Method (SBM). A total of 37 fungal spp were found in SBM and 24 spp were found on PDA. Among them *Alternaria alternata* (1-30%), *Aspergillus flavus*

(1-52 %), *Curvularia lunata* (1-29%), *Penicillium* (1-35 %), *Fusarium oxysporum* (4-61%), *Rhizoctonia bataticola* (1-78%) and *Rhizopus nigricans* (1-34%) were recorded dominantly. Sultana and Gaffar (2007 and 2009) and Avinash and Ravishankar Rai (2013) also reported *Aspergillus* spp., *Fusarium equiseti*, *Macrophomina phaseolina* and *Rhizoctonia solani* like fungi associated with some cucurbit seeds. Chlorine pretreatment with 2% sodium hypochlorite for 2 min. greatly reduce the incidence of saprophytic fungus and enhance seed germination. Fungi that showed reduction in their incidence after chlorine pretreatment were *Alternaria alternata* 1-30 % to 1-21%), *Aspergillus flavus* (1-52% to 1-25%), *Chaetomium globosum* (1-25% to 1-10%), *Drachslera helodes* (1-27 % to 1-19%), *Fusarium oxysporum* (4-61% to 1-51%), *Penicillium* (1-35% to 1-23%), *Rhizoctonia bataticola* (1-78% to 2-68%) and *Rhizopus nigricans* (1-34% to 1-8%). Table 2. Anjorin and Mohammed (2009) observed that moisture content of the seed, its storage period, prevailing temperature and degree of seed invasion influence the development of seed-borne fungi.

Phytopathological Effects:

Most of the fungi associated with Ridge gourd seeds caused severe loss in germination and resulted in symptomatic seedling. Seed germination ranged from 1-100 % in 108 seed samples in untreated and 5-100 % in pretreated seeds in SBM. Fungi responsible for impairment of seed germination were Actinomycetes, *Alternaria alternata*, *A. tenuissima*, *Aspergillus flavus*

Chaetomium globosum, *Chaetomium spinosum*, *Cladosporium* spp., *Curvularia* spp., *Drachslera helodes*, *Fusarium moniliforme*, *Fusarium oxysporum*, *Penicillium* spp., *Phoma betae*, *Rhizoctonia bataticola*, *Rhizopus nigricans* and *Trichothecium roseum*. Beside seed germination loss, associated fungi caused various symptoms and abnormalities on seedling like infection of *Alternaria alternata* and *A. tenuissima* caused browning of radicle and hypocotyle, brown necrotic lesions on cotyledonary leaves. *Aspergillus flavus* and *A. niger* produced yellow browning of radicle and rotting of radicle. Similar results in cucurbit seeds infected with *A. flavus* were also observed by Panday and Gupta 1986. *Curvularia lunata* and *Drachslera helodes* caused brown spots on seedling. *Fusarium moniliforme* and *F. oxysporum* brought rotting and damping off, yellowing and stunted growth. Azaz et al. (2001) also observed yellowing and drying (wilting) in some cucurbit seedlings due to *F. oxysporum* and *F. equiseti*. *Macrophomina phaseolina* and *Rhizoctonia bataticola* mostly caused seed rot and radicle rotting. *Trichothecium* hampered seed germination and caused seedling rotting. Fungus showed pinkish spots on cotyledons. Kavitha (2005) and Farrag et al (2012) reported that *F. solani* and *F. oxysporum* survive as conidia, mycelia spores on seed coat or seed surface and invasion of seed surface by pathogen caused slow germination. Vigour and quality of cotton seeds were also affected by invasion of pathogen.

Table 1 : Incidence of various seed disorders in dry seed examination and mycoflora associated with them in SBM

Type of seed discolouration	Occurrence	Incidence RPO	Important microorganism associated with seed
Selerotial Seed	71	2.25~35.25	Actinomycetes, <i>Rhizoctonia bataticola</i> , <i>Chaetomium globosum</i> , <i>C. spinosum</i>
Spotted & discoloured with or without mycelial crust	104	2.25 ~ 20.75	<i>Alternaria alternata</i> , <i>Curvularia</i> spp., <i>Drachslera</i> spp.
White crusted seeds	51	2.25~19.00	<i>Fusarium moniliformae</i> , <i>F. oxysporum</i>
Distorted seeds	91	0.25~10.50	<i>Aspergillus</i> , <i>Penicillium</i> and bacteria
Cracked and insect damaged seeds	70	0.25~5.00	<i>Rhizoctonia</i> and <i>Chaetomium</i> spp.
Shrivelled seed	78	0.25~10.5	<i>Fusarium moniliformae</i> , <i>F. oxysporum</i>

Table 2 :

Fungi	Untreated			Treated			Phytopathological effect
	Occurrence	RPO	% Range	Occurrence	RPO	% Range	
<i>Actinomyces</i>	18	16.66	1~10	10	9.26	1~8	
<i>Alternaria alternata</i>	32	29.63	1~30	28	25.92	1~21	Browning of radicle ,hypocotyle and necrotic lesion on cotyledonary leaves.
<i>Aspergillus flavus</i>	56	51.88	1~52	22	20.37	1~28	Yellow browning of radicle, rotting of seedling
<i>Botrytis cinerea</i>	08	7.40	1~12	2	1.85	1~4	
<i>Chaetomium globosum</i>	20	18.51	1~25	12	11.11	1~10	Seed rotting
<i>Curvularia lunata</i>	22	20.37	1~29	16	14.81	1~22	leaf spot and rotting
<i>Drechslera helodes</i>	21	19.44	1~27	14	12.96	1~19	Brown spots on seedling
<i>Fusarium oxysporum</i>	48	44.44	4~61	42	38.88	1~48	Rotting and damping off, yellowing and stunted seedling
<i>Penicillium sps.</i>	20	18.51	1~35	12	11.11	1~23	
<i>Rhizoctonia bataticola</i>	64	59.26	1~78	60	55.55	1~59	Seed rot and radicle rotting
<i>Rhizopus nigricans</i>	26	24.07	1~34	12	11.11	1~19	Collar rot ,root rot and seed rot

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