

## Seed mycoflora of mung bean and their role in plant health

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The seed mycoflora of mung bean, a total of 15 fungal species belonging to 11 genera were isolated, maximum from Kanpur dehat and minimum from Auraiya. Incidence of *Alternaria alternata*, *Aspergillus flavus*, *A. niger*, *A. fumigatus*, *Colletotrichum capsici* and *Rhizopus stolonifer* was higher. The seed fungi reduced germinability of mung bean seeds and also affected seedling health with mortality percentage 8.6 to 37.6%.

**Key words** : Mung bean, pathogenicity, mycoflora

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### INTRODUCTION

Seeds are regarded as highly effective means for transporting plant pathogens over long distances. Seed borne diseases have been found to affect the growth and productivity of crop plants. A seed borne pathogen present externally or internally, may cause seed abortion, seed rot, seed necrosis, reduction in germination capacity as well as seedling damage resulting in development of disease at later stages. Mung bean (*Phaseolus aureus* Roxb.) is an important wide-spreading, herbaceous, self-pollinating legume crop under the family Leguminosae. It is excellent source of protein and minerals. Seed borne mycoflora associated with Mung bean reported recently include *Macrophomina phaseolina*, *Aspergillus flavus*, *Colletotrichum* spp., *Drechslera* spp., *Myrothecium* spp. These fungi affect the germination and vigour of seeds.

Healthy seed is the foundation of healthy plant, a necessary condition for good yield. Among various factors which affect seed health, the most important are seed mycoflora that causes loss in seed germination and seed quality. Seed mycoflora reduces yield upto 15-90% if untreated seeds are grown in the field. Sarita *et.al.* (2014.). The main objective of the present study to see reduced

germinability of mung bean seeds and also affected seedling health with mortality.

### MATERIALS AND METHODS

#### *Isolation of mycoflora*

Six seed samples of mung bean were collected from different locations of three Mung bean growing districts of Uttar Pradesh, namely Kanpur dehat, Auraiya and Fatehpur. The seed samples were properly labelled. Seed mycoflora associated with the seeds were isolated by standard Agar Plate method (ISTA, 1985). The seeds were incubated at 30±10C for 7 days. Internal mycoflora of seeds were isolated after sterilization of seeds with 0.1% Sodium hypochlorite. Individual fungi growing on the seeds were purified and maintained on PDA medium.

#### *Pathogenicity*

Pathogenicity test was performed with seven test seed fungi viz. *Alternaria alternata*, *Aspergillus flavus*, *A. fumigatus*, *Cladosporium herbarum*, *Colletotrichum capsici*, *Fusarium oxysporum* and *Rhizopus stolonifer*. Healthy sterilized seeds of mung bean var. MGG-207 were mixed with test fungi for 4 hours after which the seeds were placed in moist chamber (in sterilized Petridish) and incubated for 7 days at 30±1°C to study germinability of seeds. Treated seeds were sown

in autoclaved garden soil in earthen pots. Observations were recorded on seed germination and seedling rot. One month old mung bean seedlings were sprayed with spore suspension of seed fungi. Seedling mortality was recorded after 15 days. Seedling vigour in terms of plumule and radicle lengths were measured after 10 days of sowing.

## RESULTS AND DISCUSSION

Mung bean crop is attacked by a large number of fungal pathogens which are carried by seeds. The mycoflora may be associated with the seeds as surface fungi or a contaminants with seed lot. Therefore knowledge of fungi associated with seed is essential for a proper understanding of the problems relating to seed health analysis. Present investigation has been undertaken on seed fungi of mung bean and their role in seed and plant health.

### Mycoflora

A total of 15 fungal species belonging to 11 genera of fungi were isolated from mung bean seeds collected from different places. Maximum number of fungal species were isolated from seed lots of Kanpur dehat in which 15 species were recorded followed by Fatehpur (12 species) and least from Auraiya (11 species). The percent incidence of the seed fungi ranged 2-25% in all the three locations (Table 1). At Kanpur dehat it ranged 2-25%, at Auraiya 4-22% and at Fatehpur 2-24%. At Kanpur dehat, it ranged from 2-25%, at Auraiya 4-22% and Fatehpur 2-24%. At Kanpur dehat maximum infestation in seeds was found by *Alternaria alternata* (25%) and minimum 2% by *Stachybotrys atra*. At Auraiya maximum incidence of 22% was by *Aspergillus fumigatus* and minimum 4% by *Humicola grisea* and at Fatehpur maximum incidence of 24% by *A. fumigatus* and minimum 2% by *Humicola grisea*. *A. alternata*, *A. flavus*, *A. niger*, *A. fumigatus*, *C. habarum*, *C. lunata*, *C. capsici*, *H. grisea*, *F. oxysporum* and *R. stolonifer* were detected from the seeds of all three locations. *A. tenuissima*, *A. oryzae*, *Nigrospora spherica* and *Penicillium rubrum* were not detected from Auraiya and *A. tenuissima*, *A. oryzae* and *Stachybotrys atra* were not detected in Fatehpur seed lot.

Incidence of *A. alternata*, *A. flavus*, *A. niger*, *A. fumigatus*, *C. capsici* and *R. stolonifer* were

comparatively high from seed lots of all the three locations. *F. oxysporum* was isolated from seed lots of all the three locations but its incidence percent being maximum in seed lot of Kanpur dehat (21%). Incidence percent of *A. oryzae*, *H. grisea*, *N. spherica* and *S. atra* were comparatively lowest (2-9%) in all the three locations.

In all the three locations, the percent of incidence of most of the pathogenic fungi was highest in Kanpur dehat and relatively low in seeds collected from Auraiya and Fatehpur. The areas having low incidence of pathogenic fungi may be exploited for mung bean production.

**Table 1:** Mycoflora associated with Mung bean seeds collected from different places of Uttar Pradesh

Fungi	Per cent incidence at places		
	Kanpur dehat	Auraiya	Fatehpur
<i>Alternaria alternata</i>	25	20	15
<i>A. tenuissima</i>	18	00	00
<i>Aspergillus flavus</i>	22	14	20
<i>A. niger</i>	20	18	17
<i>A. fumigatus</i>	20	22	24
<i>A. oryzae</i>	09	00	00
<i>Cladosporium herbarum</i>	15	17	14
<i>Curvularia lunata</i>	11	10	10
<i>Colletotrichum capsici</i>	23	19	21
<i>Humicola grisea</i>	03	04	04
<i>Nigrospora spherica</i>	05	00	02
<i>Fusarium oxysporum</i>	21	17	08
<i>Penicillium rubrum</i>	10	00	09
<i>Rhizopus stolonifer</i>	14	20	22
<i>Stachybotrys atra</i>	02	05	00
Total	15	11	12

From sterilized seeds of mung bean, few fungal species including *A. oryzae*, *N. spherica* and *P. rubrum* were not detected. In general, standard agar plate method employed during present investigation has been found most suitable for isolating and testing of seed fungi, since all the isolates formed colonies and sporulated well.

### Pathogenicity

The fungi associated with mung bean seeds invariably reduced germinability of seeds (Table 2). The seeds treated with seed fungi could not germinate or rotten at seedling stage. Maximum

inhibition in seed germination was caused by *A.alternata* (66.54%) followed by *A.flavus* (63.0%), *A.fumigatus* (61.46%), *C.herbarum* (35.34%), *C.capsici* (27.18%), *F.oxysporum* (21.51%) and *Rhizopus stolonifer* (9.45%).

The seed fungi on inoculation to one month old mung bean seedlings affected seedling health to varying extent with mortality percentage ranging from 8.6 to 37.6% (Table 3). The seed fungi were found to cause post emergence rot in the

seedlings. *A.alternata*, *A.flavus* and *A.fumigatus* were found highly pathogenic (mortality 31.7-37.6%), *C.herbarum* and *C.capsici* showed medium virulence (mortality 20-22.4%) whereas *F.oxysporum* and *R.stolonifer* were weakly pathogenic (mortality 8.6-17.0%).

The seed fungi affected seedling vigour of mung bean (Table 3). Plumule length of seedling varied 40.6 to 62.6 mm and radicle length varied 23.06-42.63 mm in test fungi. The length of plumule and

**Table 2:** Seed germination and seedling mortality of Mung bean after inoculation with seed fungi

Fungi	Seed germination (per cent)	Inhibition in seed germination (per cent)	Seedling mortality (per cent)
<i>Alternaria alternata</i>	28.3	66.54	37.6
<i>Aspergillus flavus</i>	31.3	63.00	36.0
<i>A.fumigatus</i>	32.6	61.46	31.7
<i>Cladosporium herbarum</i>	54.7	35.34	20.0
<i>Colletotrichum capsici</i>	61.6	27.18	22.4
<i>Fusarium oxysporum</i>	66.4	21.51	17.0
<i>Rhizopus stolonifer</i>	76.3	9.45	8.6
Control	84.6	-	0.0
SE <sub>m</sub> ±	2.51	-	2.14
CD(P=0.05)	5.27	-	4.49

**Table 3:** Effect of seed-borne fungi on seedling vigour of Mung bean

Mycoflora	Seedling vigour	
	Length of plumule (mm)	Length of radicle (mm)
<i>Alternaria alternata</i>	53.83	35.33
<i>Aspergillus flavus</i>	49.9	32.00
<i>A.fumigatus</i>	55.6	37.83
<i>Cladosporium herbarum</i>	46.23	28.33
<i>Colletotrichum capsici</i>	46.33	23.06
<i>Fusarium oxysporum</i>	40.6	24.93
<i>Rhizopus stolonifer</i>	62.6	42.63
Control	65.76	46.03
SE <sub>m</sub> ±	1.34	1.23
CD(P=0.05)	2.81	1.89

radicle were marked by reduced by seed fungi. The maximum decrease in plumule length was observed in *Fusarium oxysporum* (40.6mm) followed by *C.capsici* (40.25 mm) while maximum reduction in radicle length was also observed in seedling developed with *C.capsici* (23.06 mm) followed by *F.oxysporum* (24.93 mm). *Rhizopus stonifer* did not affect plumule and radicle length. Similar species of *Alternaria*, *Aspergillus*, *Chaetomium*, *Cladosporium*, *Curvularia*, *Drechslera*, *Fusarium*, *Mucor*, *Rhizopus* and *Trichoderma* were reported by Ramesh and Marihal (2002) in association with the soybean crop seeds. Tanuja (2015), Dawar *et.al.* (2007), Parashar *et al.* (2019), Ushamalini and Naik (2008), Ramesh *et al.*, (2013) also reported identical seed mycoflora from the samples collected from MARS and APMC units, Raichur, found the similar findings during their studies on seed mycoflora.

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