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Seed borne mycoflora of mung bean (*Phaseolus aureus* Roxb.) and its control by fungicides

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ABSTRACT

Seeds of Mung bean cv. P.M. 4 were examined for seed borne mycoflora by Agar plate method and Blotter method. Fourteen fungal species by Agar plate method and nineteen fungal species by blotter method have been isolated. The most common fungi were Aspergillus flavus, Aspergillus niger, Penicillium citrinum, Fusarium oxysporum, Rhizopus stolonifer, Rhizopus cohnii, Macrophomina phaseolina, Alternaria alternata are dominating fungi. Blotter method proved to be better than Agar plate method. The effect of three common fungicides i.e. Bavistin (carbendazim), Dithane M-45 (mancozeb), Thiram at 0.1, 0.2, 0.3% were investigated on the seed borne mycoflora and germination of Mung bean seeds. All the fungicides were effective but Bavistin proved to be most effective in reducing the seed borne mycoflora and enhancing the germination percentage.

Keywords: Seed borne mycoflora and germination of Mung bean seeds, control by fungicide.

INTRODUCTION

Healthy seed is the foundation of healthy plant, a necessary condition for good yield[1]. Among various factors which affect the seed health, the most important is seed borne fungi that causes reduction in seed germination and seed vigour. Seed borne diseases have been found to affect the growth and productivity of crop plants.

Mung bean (*Phaseolus aureus* Roxb.) is one of the 13 food legumes grown in India. It is an important widespreading, herbaceous, annual, legume pulse crop under the family-Leguminoseae. Mung bean is grown principally for its protein content. Seed borne mycoflora associated with Mung bean reported recently include *Macrophomina phaseolina, Aspergillus niger, Aspergillus flavus, Colletotrichum* spp. *Drechslera* spp. *Myrothecium* spp. These fungi affect the germination and vigour of seeds.. Thus, due to seed borne diseases, there is a reduction in the production, resulting in failure of fulfilling the demand of Mung bean seeds. Some control measures may be useful for increasing the supply to meet the demand. Seed borne fungi may easily be controlled as compared to air borne or soil borne fungi[2]. Many workers have used fungicides for controlling seed borne fungi by treating seeds directly with fungicides[3]. A large number of fungicides are being used in the form of dusting, spray and soaking treatment[4].

The main objective of the present study was to see the effect of different fungicides on certain seed borne fungi during storage.

MATERIALS AND METHODS

Harvested seeds of Mung bean cv. P.M.4 were collected from G.B. Pant University of Agriculture & Technology, Pantnagar (Uttarakhand) and stored in glass bottles covered with lid under laboratory conditions upto the year at room temperature.

1. Isolation of seed borne mycoflora :
Seed borne mycoflora were isolated from Mung bean seeds cv. P.M.4 by Agar plate method and Blotter method.

1.1 Agar plate method :
Sterilized potato dextrose agar medium was poured aseptically into petridishes and allowed to cool and settle down. Ten seeds were placed in each petridish with a sterile forcep. All the petridishes were incubated at 25±1^{o}C for a week. Fungi growing on seeds were isolated and identified.

1.2 Blotter method :
Three pieces of sterilized blotting papers in folds, moistened with sterilized distilled water were placed in each petridish. Ten seeds were placed on Blotter in each petridish. The plates were incubated at 25±1^{o}C with alternate cycle of darkness and lightness.

2. Effect of fungicides on seed borne mycoflora :
Three fungicides viz. Bavistin (carbendazim), Dithane M-45 (Mancozeb) and Thiram were used for the study. Seed treatment with three concentrations (0.1, 0.2, 0.3%) of each fungicide was done. Seeds were shoaked in different concentrations of fungicides in flask on a mechanical shaker and kept stationary for 18 min. Seed treated with distilled water served as control. Seeds treated with fungicides were placed in petridishes on Blotter paper. Seeds were examined for the presence of fungi after 7 days and the germination percentage was also recorded at the same time.

RESULTS AND DISCUSSION

It is clear from Table-1 that a total of fourteen fungi namely *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus candidus*, *Aspergillus versicolor*, *Rhizopus stolonifer*, *Rhizopur cohnii*, *Helminthosporium*, *Fusarium oxysporum*, *Fusarium semitectum*, *Alternaria alternata*, *Penicillium javonicum*, *Penicillium citrinum*, *Macrophomina phaseolina* and *Curvularia lunata* were isolated by Agar plate method and Blotter method. Out of these fungi, *Aspergillus candidus*, *Fusarium semitectum*, *Penicillium javonicum* and *Curvularia lunata* were isolated by Blotter method only. Thus, Blotter method proved to be better than Agar plate method. Similar observations have been observed by various scientist[5, 6, 7, 8, 9].

Table-1: Isolation of seed borne mycoflora in the cv. P.M.4 by Agar plate method and Blotter method

Isolated fungi	Agar Plate Method	Blotter Method
Aspergillus niger	+	+
Aspergillus flavus	+	+
Aspergillus candidus	-	+
Aspergillus versicolor	+	+
Rhizopus stolonifer	+	+
Rhizopus cohnii	+	+
Helminthosporium	+	+
Fusarium oxysporum	+	+
Fusarium semitectum	-	+
Alternaria alternata	+	+
Penicillium javonicum	-	+
Penicillium citrinum	+	+
Curvularia lunata	-	+
Macrophomina phaseolina	+	+

+ = Present; - = Absent

Table-2: Effect of fungicides on seed mycoflora of Mung bean seeds cv. PM-4 stored

Selected fungi	Control	Bavistin			Dithane M-45			Thiram		
		0.1%	0.2%	0.3%	0.1%	0.2%	0.3%	0.1%	0.2%	03%
Aspergillus flavus	+	-	-	-	+	+	-	+	-	-
Aspergillus niger	+	-	-	-	+	-	-	+	-	-
Rhizopus spp.	+	-	-	-	+	-	+	-	-	-
Helminthosporium	+	-	-	-	-	+	-	+	-	-
Fusarium spp.	+	+	-	-	+	-	-	+	-	-
Mucor sphaerosporus	+	-	-	-	+	+	-	-	-	-
Alternaria alternata	+	-	-	-	+	-	-	+	-	-
Penicillium spp.	+	-	-	-	-	-	-	-	-	-
Macrophomina phaseolina	+	-	-	-	+	+	-	+	+	-
Curvularia lunata	+	+	-	+	+	+	+	-	+	-

+ = Present, - = Absent

Data presented in Table-2 shows the effect of three fungicides on seed borne mycoflora namely *Aspergillus flavus*, *Aspergillus niger*, *Rhizopus spp.*, *Fusarium spp.*, *Mucor sphaerosporus*, *Penicillium spp.*, *Alternaria alternata*, *Curvularia lunata* and *Helminthosporium*. All the fungicides were effective in reducing the seed borne mycoflora[10, 11, 5]. Bavistin was found most effective in controlling the seed borne mycoflora followed by Thiram and Dithane M-45. Bavistin completely eradicates *Macrophomina phaseolina*[12], *Aspergillus flavus*, *Aspergillus niger*, *Penicillium* spp., *Rhizopus* spp. *Mucor* spp.[13], *Alternaria alternate*[13, 14]. Thiram eliminates *Rhizopus* spp., *Penicillium* spp. and *Mucor* spp. completely. Dithane M-45 eradicates *Penicillium* spp. completely.

Thus, Bavistin @ 0.2% was most effective against various seed borne mycoflora. Similar results have been observed[15, 16, 17, 18, 19, 20].

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