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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Prevalence of Fungi in Mustard Seeds Grown and Stored at Different Locations of Dhaka Region, Bangladesh and Their Control

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Abstract: Seven fungal genera namely *Alternaria*, *Fusarium*, *Aspergillus*, *Penicillium*, *Rhizopus*, *Chaetomium* and *Curvularia*, were found to be associated with seeds of 4 districts (Narsingdi, Munshiganj, Manikganj and Mymensingh) of Dhaka Division. Percent incidence of different fungi varied with locations and duration of storage period. The highest seed-borne infection of *Alternaria* was detected at Narshigdi (10.32%), followed by Munshiganj (10.06%), Manikganj (8.66%) and Mymensingh (6.03%). The frequency of *Alternaria* decreased with the increasing of storage period but *Fusarium* and *Aspergillus* increased with the increasing of storage period. Germination of mustard seeds ranged from 57.29 to 77.75% in respect of locations and duration of storage period. Percent germination decreased with increasing of the duration of storage period. Five selected fungicides were tested against *Alternaria*. Among the fungicides Rovral was found to be the best followed by Panoptine, Lirotect, Topsin M and Cupravit. All the fungicides at the @ 0.25 and 0.50% seed weight increased germination significantly from 5 to 13% over control treatment. But only Rovral increased germination from 11 to 13% at both concentrations.

Key words: Mustard, seed-borne fungi, stored and control

Introduction

Mustard (*Brassica campestris* L.) is the principal oilseed crop of Bangladesh. It is a widely grown oilseed crop. Although it is an important crop of Bangladesh, disease of this crop has received very little attention. In Bangladesh, farmers store their seeds in traditional methods, where heavy infestation of different fungi occurs. Fakir (1976) reported the association of *Alternaria brassicae* on mustard seeds. Mustard and rapeseed suffers from as many as eleven different diseases (Rangaswami, 1979). In Bangladesh Talukder (1974) has reported only two diseases. At present there occurs at least 8 diseases of mustard in the country. Of all, *Alternaria blight* (grey spot). Sacc., has been recognized at home and abroad as the most devastating disease. The disease causes leaf blight, pod blight and seed abnormalities (Meah, 1986). Crop loss between 30-100% due to this disease has been reported (Meah *et al.*, 1988). The disease has been reported to cause heavy loss to the crop reducing crop yield to an extent of 30-40% (Rai *et al.*, 1976 and Fakir, 1980). Though the crop is so important but little work has been done in Bangladesh on the association of fungi with seeds and their suitable control measure.

Now the present investigations have been under taken to survey and identify the associated fungi with seeds of mustard in mustard grown area of Dhaka region (Narsingdi, Munshiganj, Manikganj and Mymensingh) stored in indigenous containers under farmers condition

and to find out the effective chemical fungicides for the control of seed-borne pathogens of mustard.

Materials and Methods

Two experiments were carried out during 1991-92 at Seed Pathology and Photographic Laboratory of the Department of Plant Pathology, Bangladesh Agricultural University, Mymensingh, Bangladesh.

Experiment 1. Prevalence of fungi in mustard seeds grown and stored at different locations of Dhaka region, Bangladesh selection of areas:

Widely mustard grown area of Dhaka region, Bangladesh namely, Manikganj, Munshiganj, Narsingdi and Mymensingh districts were selected for the survey to identify the association of fungal pathogens of farmers stored seed. Seeds were stored in 'Dool' (Bamboo made container).

Methods of survey: Seed samples were collected directly from the farmers house at different location of Manikganj, Munshiganj, Narsingdi and Mymensingh districts at the three storage period i.e., 1 month, 3 months and 6 months storage. Twelve seed samples were collected from 12 selected farmers of each location at each storage period i.e. total 144 seed samples were collected from 4 locations for observation.

Survey and collection period of seed sample: Survey and collection of seed sample was done during December 1991

to July 1992. Collected seed samples were preserved in Refrigerator at 4°C. Two hundred seeds from each sample were taken randomly and were plated following the standard blotter method (ISTA, 1976). In this method 200 seeds were placed on the moist filter paper in eight petri dishes at the rate of 25 seeds per plate and incubated at room temperature for 7 days.

Fungi grown on each sample were identified by sterio and compound microscope. Percent incidence of different fungi and germination in each sample were recorded.

Experiment 2. Efficacy of Five chemicals in controlling seed-borne *Alternaria* sp. of mustard:

Seed samples were collected from the farmers from four locations (Manikganj, Munshiganj, Narsingdi and Mymensingh) during December, 1991 to July, 1992. Five fungicides namely Cupravit, Lirotect, Panoctine, Rovral, Topsin-M were used at the rate of 0.25 and 0.50% of seed weight, respectively. Requisite amount of fungicides at each dose and seeds were taken in a conical flask and were shaken mechanically for 30 min for proper coating of the fungicides.

After shaking of 200 seeds from each treatment as well as from control (No chemical) were plated on blotter in the petridish (90 mm dia). Each petridish contained 25 treated seeds and total eight petri dishes were needed for each treatment.

Observation on incidence of *Alternaria* sp. and % of germination of seed was made after 7 days of incubation at room temperature.

Results and Discussion

Expt. No. 1. Prevalence of fungi in mustard seeds grown and stored at different locations of Dhaka region, Bangladesh:

Seven fungal genera namely *Alternaria*, *Fusarium*, *Aspergillus*, *Penicillium*, *Rhizopus*, *Chaetomium* and *Curvularia* were found to be associated with seeds. The frequency of each fungus varied with location and durations of storage (Table 1). The total number of colonies of *Fusarium* sp. (12.77%),

Aspergillus sp. (11.31%) and *Alternaria* sp. (8.77%) were higher compare to *Penicillium* sp. (2.01%), *Rhizopus* sp. (0.54%), *Chaetomium* sp.(0.33%), *Curvularia* sp.(0.17%) respectively. The highest infection of *Alternaria* sp. was detected in seeds of Narsingdi (10.32%) followed by Munshiganj (10.06%), Manikganj (8.66%) and Mymensingh (6.03%).

The frequency of *Alternaria* sp. was higher than that of *Penicillium* sp., *Rhizopus* sp., *Chaetomium* sp. and *Curvularia* sp.. In case of *Alternaria* sp., there was negative linear relationship between % incidence and storage period (r = - 0.9811). It was observed that percent incidence of this fungus was decreased with the increasing of storage period i.e. number of fungal colonies in 6 months stored seeds was the lowest which followed by 3 months and 1 month stored seeds (Fig. 1). The incidence of *Fusarium* sp. and *Aspergillus* sp. were increased with increasing of storage period. This results corroborate with the results of Anonymous (1982).

The percent germination of mustard seeds was decreased at each location with increasing the duration of storage period (Table 2). There was negative relationship (r= -0.9742) between % germination and storage period (Fig. 1). Germination percentage of seed was the highest in one month stored seed (67.84%) followed by the seeds stored for 3 months (66.67%) and 6 months (61.71%). Germination percentage was lower at Manikganj (60.81%) Munshiganj (62.00%) and Narsingdi (64.21%) compared to Mymensingh (74.60%) districts due to high incidence of *Alternaria* sp.

The percentage of total number of Fungal colonies was the highest at each 6 months stored seeds of four locations followed by each 3 months and 1 month stored seed (Table 3).

Expt. No. 2. Efficacy of Five chemicals in controlling seed-borne *Alternaria* sp. of mustard:

Data expressing the efficacy of five selected fungicides against *Alternaria* sp. of mustard seeds was presented in the Table 4. All the five fungicides at both doses were effective in controlling

Table 1: Incidence of different fungi on seeds collected from 4 locations of Bangladesh

| Name of pathogen (fungi) | Percent incidence of different fungi from 4 locations | | | | | | | | | | | | | | | |
|--------------------------|---|--------------------------|------------------------|-------|------------------------|--------------------------|------------------------|-------|------------------------|--------------------------|------------------------|-------|------------------------|--------------------------|------------------------|-------|
| | Narsingdi | | | | Munshiganj | | | | Manikganj | | | | Mymensingh | | | |
| | One month stored seeds | Three month stored seeds | Six month stored seeds | Mean | One month stored seeds | Three month stored seeds | Six month stored seeds | Mean | One month stored seeds | Three month stored seeds | Six month stored seeds | Mean | One month stored seeds | Three month stored seeds | Six month stored seeds | Mean |
| <i>Alternaria</i> sp. | 11.25 | 9.54 | 4.17 | 10.32 | 10.71 | 9.21 | 4.25 | 10.06 | 8.33 | 7.83 | 3.83 | 8.66 | 5.17 | 4.29 | 2.63 | 6.03 |
| <i>Fusarium</i> sp. | 7.42 | 9.25 | 13.17 | 11.95 | 9.71 | 12.67 | 17.17 | 15.18 | 8.13 | 11.42 | 15.63 | 13.73 | 6.83 | 8.29 | 9.50 | 10.21 |
| <i>Aspergillus</i> sp. | 7.04 | 8.46 | 12.42 | 11.31 | 5.46 | 6.29 | 10.04 | 9.26 | 6.17 | 8.04 | 10.63 | 10.28 | 9.08 | 12.25 | 15.79 | 14.37 |
| <i>Penicillium</i> sp. | 1.46 | 1.70 | 1.29 | 1.48 | 3.29 | 3.50 | 2.33 | 3.04 | 2.21 | 2.63 | 2.66 | 2.50 | 1.13 | 0.92 | 1.00 | 1.02 |
| <i>Rhizopus</i> sp. | 0.96 | 1.63 | 1.33 | 1.31 | 0.38 | 0.42 | 0.29 | 0.36 | 0.25 | 0.50 | 0.29 | 0.35 | 0.13 | 0.08 | 0.21 | 0.14 |
| <i>Chaetomium</i> sp. | 0.21 | 0.29 | 0.29 | 0.26 | 0.38 | 0.71 | 0.63 | 0.57 | 0.54 | 0.46 | 0.21 | 0.40 | 0.13 | 0.00 | 0.16 | 0.10 |
| <i>Chaetomium</i> sp. | 0.17 | 0.13 | 0.25 | 0.18 | 0.21 | 0.21 | - | 0.28 | 0.13 | 0.17 | 0.29 | 0.10 | 0.04 | 0.33 | 0.00 | 0.12 |

Table 2: Germination percentage of mustard seeds collected from four locations at the different time of storage interval

| Name of districts | Percent germination of seeds | | |
|-------------------|------------------------------|--------------------------|------------------------|
| | One month stored seeds | Three month stored seeds | Six month stored seeds |
| Narsingdi | 66.50 | 65.25 | 60.88 |
| Munshiganj | 64.04 | 63.25 | 58.72 |
| Manikganj | 63.08 | 62.08 | 57.29 |
| Mymensingh | 77.75 | 76.08 | 69.96 |
| Average | 67.84 | 66.67 | 61.71 |

Table 3: Percent incidence of fungal population on seed collected from four locations at different storage periods

| Name of districts | % total fungal colonies | | |
|-------------------|-------------------------|--------------------------|------------------------|
| | One month stored seeds | Three month stored seeds | Six month stored seeds |
| Narsingdi | 28.51 | 31.00 | 32.92 |
| Munshiganj | 30.14 | 33.01 | 33.13 |
| Manikganj | 25.76 | 31.05 | 33.54 |
| Mymensingh | 22.51 | 26.16 | 29.29 |
| Average | 26.73 | 30.31 | 32.22 |

Table 4: Efficacy of five chemicals in controlling seed-borne *Alternaria* sp. of Mustard

| Fungicides | Dose (% seed wt.) | Seed infection(%) | Seed germination(%) |
|------------|-------------------|-------------------|---------------------|
| Cupravat | 0.25 | 9.23b | 75de |
| | 0.50 | 4.70e | 77bc |
| Lirotect | 0.25 | 6.47d | 74ef |
| | 0.50 | 3.90f | 76cd |
| Penoctine | 0.25 | 6.20d | 72g |
| | 0.50 | 4.10f | 73fg |
| Rovral | 0.25 | 1.90g | 78b |
| | 0.50 | 1.00h | 80a |
| Topsin M | 0.25 | 7.90c | 76cd |
| | 0.50 | 4.20f | 80a |
| Control | - | 20.90a | 67h |

In a column, means followed by a common letter are not significantly different at the 5% level by DMRT

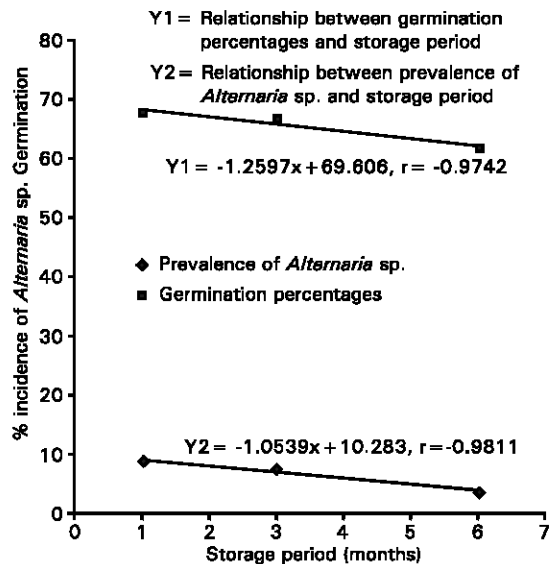


Fig. 1: Relationship between prevalence of *Alternaria* sp. and germination percentages with storage period of mustard seeds

fungi and increased seed germination significantly.

Seed treatment with Cupravat, Lirotect, Panoctine, Rovral and Topsin M at the doses 0.25 and 0.50% of seed weight yielded 9.23, 4.70, 6.47, 3.90, 6.20, 4.10, 1.90, 1.00, 7.90 and 4.20% of fungus respectively in contrast to 20.90% in control (Table 4). Rovral at both doses reduced the incidence of fungi significantly compare to other fungicides. But there was no significant difference between Lirotect and Panoctine. Among the fungicides tested, Rovral was found to be the best in reducing the incidence of *Alternaria* sp. which followed by Panoctine, Lirotect, Topsin M and Cupravat in both the doses. Treatment of seeds with five chemicals at both concentrations increased germination significantly from 5 to 13% over the control treatment. Germination parentage in Rovral treated seed was significantly higher than other fungicides. The higher incidence of *Alternaria* sp. cause low seed germination as observed in the present study is in agreement with the findings of Fakir (1976); Mridha and Shafa (1985).

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