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Short Communication

In-Vitro Chemical Control of *Aspergillus flavus* Causing Seed Rot of Crops of Family Brassicaceae

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Abstract. *Aspergillus flavus* was frequently isolated from seeds of four crops of family Brassicaceae at different frequencies: mustard (40%), rape (37%), turnip (18%) and radish (16%). Five fungicides namely, Dithane M-45, Derosal 60 WP, Trimiltox Forte, Baytan 10 DS and Vitavax 200 were tested to evaluate the efficacy of these fungicides for the control of *A. flavus*. Amongst the five fungicides tested, Baytan 10 DS completely controlled the colony growth of the fungus at the dose 100 mg/100 ml potato dextrose agar medium (PDA). This was followed by Vitavax 200 at the dose 25 mg, Derosal 60 WP at the dose of 150 mg, Trimiltox Forte at the dose100 mg, and Dithane M-45 at the dose 250 mg per 100 ml PDA.

Keywords: *Aspergillus flavus*, family Brassicaceae, seed rot, fungicides

Crops of the family Brassicaceae are economically important, as they are the major source of edible oil. The seeds of these plants are attacked by different fungi (Qasim and Ahmed, 1998). Among these fungi, *Aspergillus flavus, A. wentii*, *Fusarium*, spp. and *Penecillium* spp. are very important, causing serious levels of high infection (Nasreen, 2003). Seed rots in these crops are mostly caused by *A. flavus* (Hafiz, 1986). The seed quality parameters, such as oil content, erucic acid and protein content are severely damaged by the fungus (Geeta and Reddy, 1990).

Healthy seeds play an important role in yielding good quality oil, protein and glucosinolate for challengeable markets (Podder and Purohit, 1994). It is, therefore, necessary to produce healthy seeds without serious levels of fungal infestations with the application of fungicides (Ahmed *et al*., 1993). No specific fungicides are available for the control of seed mycoflora. Different scientists have used various fungicides for the control of seed rots (Siddique *et al.*, 2001; Nan, 1995; Rani and Agarwal, 1995; Kumar and Singh, 1986; Rana and Tripathi, 1983). Keeping in view the importance of crops of the family Brassicaceae and the economic losses due to the attack of *A. flavus*,studies were conducted to evaluate proper doses and specific fungicides for the control of this fungus.

Seeds of mustard, rape, turnip and radish were collected from the local market. One hundred seeds from each variety were randomly separated from seed lots for the isolation and identification of *Aspergillus flavus*.

One hundred seeds of each seed category were thoroughly washed under running tap water for about 20 min, and then surface sterilized with 0.01% $HgCl_2$ for 1-2 min. Twenty five seeds from each crop were inoculated in each petri plate, already containing sterilized potato dextrose agar (PDA) medium. The petri plates were incubated at 20 ± 2 °C for 7 days (Barnett and Hunter, 1987). *Aspergillus flavus* was identified by observing the growth under microscope using the relevant identification keys (Hosne and Momin, 2000). The infection percentage was calculated as described by Siddique *et al*., (2001) as below:

$$\text{Infection (\%)} = \frac{\text{number of infected seed with fungus}}{\text{total number of plates} \times 25}$$

Table 1. Doses of fungicides used for the control of *Aspergillus flavus*

Fungicide	Dose (mg /100 ml PDA)
Derosal 60 WP	50
	100
	150
Dithane M-45	50
	150
	250
Vitavax 200	15
	20
	25
Trimiltox Forte	25
	50
	100
Baytan 10 DS	40
	70
	100

PDA = potato dextrose agar

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Five different fungicides namely, Dithane M-45, Baytan 10 DS, Vitavax 200, Trimiltox Forte and Derosal 60 WP were used to evaluate their effect on the colony growth of *A. flavus*. These fungicides were added to the PDA medium at different concentrations (Table 1) and a petri plate containing only PDA was kept as the control (Kumar and Singh, 1986).Uniform sized discs of 5 mm diameter (coded with an identification number; A-F: 325) of *A. flavus* as the inoculum were placed in the center of each petri plate containing the fungicide added PDA culture medium. All plates were incubated at 20 ± 2 °C for 10 days. The experiment was replicated three times. The growth was recorded after 1st day, 3rd day, 5th day, 8th day and 10th day (Rani and Agarwal, 1995). The data were analyzed statistically for analysis of variance in respect of doses of the fungicides at 0.05% (Steel and Torrie, 1984).

Aspergillus flavus was frequently isolated from all the four crops of family Brassicaceae alongwith some other fungi. The results were comparable to the observations reported by Qasim and Ahmed (1998). *A. flavus* was predominantly isolated from the seeds of mustard (40%), followed by rape (37%), turnip (18%) and radish (16%), as shown in Table 2.

The colony growth of *A. flavus* was significantly checked by Baytan 10 DS, followed by Vitavax 200, Derosal 60 WP, Trimiltox Forte and Dithane M-45. However, Baytan 10 DS completely controlled the colony growth of the fugus at the dose of 100 mg /100 ml PD A. Overall, all fungicides controlled the colony growth of the fungus.

The results show that Baytan 10 DS and Vitavax 200 are the selective fungicides for the control of *A. flavus* (Table 3).

Table 2. Frequency of infestation of *Aspergillus flavus* in four members of family *Brassicaceae*

Crop	Number of seeds infested per 25 seeds				Total number of seeds infested per 100 seeds
	1	2	3	4	
Mustard	8	9	11	12	40
Rape	10	9	10	8	37
Turnip	3	6	5	4	18
Radish	6	5	2	3	16

Table 3. Effect of different fungicides on the colony growth of *Aspergillus flavus*

Fungicide	Dose (mg/100 ml PDA)	Colony growth (cm)					Avrage colony growth	Growth (% as compared to control)
		1st day	3rd day	5th day	8th day	10th day		
Vitavax 200	15	0.4	0.5	0.5	0.5	0.5	0.48	019.5
	20	0.2	0.2	0.2	0.3	0.4	0.26	010.57
	25	0.1	0.1	0.1	0.2	0.2	0.16	06.50
Derosal 60 WP	50	0.5	0.8	0.9	0.9	0.8	0.78	031.71
	100	0.2	0.3	0.2	0.3	0.3	0.26	010.57
	150	0.1	0.1	0.2	0.1	0.2	0.14	005.69
Trimiltox Forte	25	0.3	0.5	0.8	1.0	1.3	0.78	031.71
	50	0.3	0.3	0.4	0.6	0.6	0.44	017.89
	100	0.0	0.1	0.2	0.1	0.2	0.12	004.88
Baytan 10 DS	40	0.0	0.2	0.1	0.3	0.2	0.16	006.50
	70	0.1	0.0	0.1	0.0	0.0	0.04	001.63
	100	0.0	0.0	0.0	0.0	0.0	0.00	000.00
Dithane M-45	50	0.5	0.7	0.9	1.0	1.1	0.84	034.15
	150	0.5	0.4	0.6	0.7	0.7	0.58	023.58
	250	0.4	0.3	0.5	0.4	0.5	0.42	017.07
Control only PDA		1.2	2.8	3.1	3.8	1.4	2.46	100.00

LSD (P=0.05) =0.32; PDA=potato dextrose agar

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