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Standardization of time for growth/infection and search for resistance source in mustard cultivars against *Alternaria brassicae*

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Abstracts

*Mustard (*Brassica juncia *(L.) Czern and Coss) is the important oilseed crop in India. The oil of the rapeseed mustard is mainly used in human diet. The crop also has important place in industrial uses such as for manufacturing soap, paints, varnishes, hair oil, lubricants, textile auxiliaries and various other products. An attempt was made to standardization the time taken for maximum conidial production and infection, and search for resistance source in mustard cultivars against* Alternaria brassicae. *The trials were conducted at the JNKVV Research Farm at College of Agriculture, Tikamgarh (M.P.). The rate of conidial production and mycelial growth highest was recorded between 6 and 8 days (3.9/ml and 17.2 mm). The injured leaf the time taken for initiation of infection was less as compared to uninjured leaf. The screening of mustard cultivars under natural condition indicated that cultivar JM-2, Kranti, RVM-2, Rohani and Seg-2 showed moderately resistant. These cultivars can be used for cultivation in* Alternaria *blight prone areas with a good agronomic base and effectively help in the management of the disease.*

Keywords: *Time, Infection, Conidia, Alternaria brassicae, Disease intensity*

Introduction

Mustard is one of the important oilseed crops in India. The oil of the rapeseed mustard is mainly used in human diet. The crop also has important place in industrial uses such as for manufacturing soap, paints, varnishes, hair oil, lubricants, textile auxiliaries and various other products. Alternaria blight is an important disease of mustard caused by *Alternaria brassicae* (Berk) Sacc., all the continents of the world, in India it causes up to 47% yield losses. It is the major disease in mustard growing region of Madhya Pradesh and causing heavy losses. The disease attacks all areal parts of the plants including pods resulting in severe defoliation and blighted appearance of the plant.

Utilization of host plant resistance remains the most viable, environmentally safe, ecologically sound and also less expensive technique for the management of diseases. Sharma et al., (2002) and Yadav et al., (2001) have indicated the availability of resistance in mustard against, *Alternaria brassicae*. Attempts were there for, made to Standardized of time for growth/ infection and identify the source of resistance to *Alternaria* blight by screening mustard cultivars.

Materials and Methods

Standardization of time required for maximum conidial production

The experiment was conducted in the laboratory for the Standardization of duration required for maximum conidial production by the *Alternaria brassicae*. The fungi were cultured on PDA in Petri plats for 4,6,8,10,12 and 14 days at ambient temperature 20-25^{0}C. The inoculation of Petri plate was done by transferring a 5 mm disc of the inoculums. After completion of the incubation period, the observations on conidial production of different intervals were recorded. For this purpose a 5 mm disc of containing 10 ml of sterile water. The suspension was prepared by shaking the tube gently. The number of conidia / ml of suspension were determined with the help of haemocytometer.

Effect of injury on infection

An experiment was conducted to assess the effect of inciting injury in host plant tissue on the infection by *A. brassicae*. Plants of susceptible cultivars were raised in pots. The pots were previously sterilized by washing with 5 percent $CuSo_4$ solution

and then filled with sterilized soil. Two seeds surface sterilized with mercuric chloride were sown in each pot. When the plants were one month old, the foliage was inoculated by two methods: inciting injury by pin pricks followed by spray with spore suspension and by spraying the spore suspension without injury. The conidial suspension (1 X 10^6 / ml) was sprayed with the help of a atomizer. The pots were covered with polythene bags for 24 hours and placed in green house and watered. Observations were recorded on per cent leaves infected, time taken for initiation of symptoms.

Screening

An attempt was made to screen ten mustard cultivars against Alternaria blight of mustard. The trials were conducted at the JNKVV Research Farm at College of Agriculture, Tikamgarh (M.P.). All the test cultivars were sown in two rows (five meters each) alternated by susceptible check (BS 2) to facilitate mass multiplication of the pathogen in the field. The trials comprised of three replications. The plants were scored for disease intensity after 90 days of the crop growth using the 0-5 scale devised by Conn *et al*., (1990). A score less than 1.0 was considered as resistant and from 1.1 to 2.0 as tolerant.

Results and Discussion

Standardization of time required for maximum conidial production

The result for the standardization of time required for maximum conidial production from Table 1 revealed that the maximum conidial count was recorded after 10 days (9.0/ml) while maximum mycelial colony growth observed after 14 days (85.0 mm) of inoculation. But rate of conidial production and mycelial growth highest was recorded between 6 and 8 days (3.9/ml and 17.2 mm).

Table 1: Influence duration of growth and sporulation of *Alternaria brassicae*

No. of Days	Conidial count	Colony Growth (mm)
4	1.3	25.4
6	2.6	32.0
8	6.5	49.2
10	9.0	60.7
12	8.7	75.2
14	7.5	85.0

The data on the time required for maximum conidial production indicated as the duration of incubation increased, the conidial production also increase but incubation after 10 days showed decline in conidial count. Tomar (1999) repotted that conidial production of *Alternaria cymopsidis* decline when increase in duration of incubation.

Effect of injury on infection

The data from Table 2 clearly reveal that the per cent infection in injured leaves is appreciably higher (80%) as compared to the inoculation by direct spraying of the spore suspension (36%) indicating that the tissue is predisposed to infection by injury. The time taken for initiation of lesion is less in injured leaves (24 hrs) as compared to uninjured leaves (72 hrs). A number of spots of pin head size were observed after 24 hrs in injured leaves.

Table 2: Effect of injury of leaf tissue infection by *Alternaria brassicae* in mustard plant cv Pusa bold

Method of inoculation	No. of leaves Inoculated/ Infected		% infection	Symptom initiation (hrs)
Injured by pin pricks	50	40	80.00	24
Direct spraying of spore suspension	50	18	36.00	72

The present investigation also reveals that the injury readily provides a portal of entry for the pathogen and possible predisposes the tissue to infection. Bourk (1970) found that sand storms produced injury on potato and tomato leaves prior to infection by *Alternaria alternata* and disease development was faster. Tomar (1999) also observed that injury on cluster bean leaves prior to artificial inoculation of *Alternaria cymopsidis*, disease symptoms appeared faster as compared uninjured leaf.

Screening

The data on the field screening of ten mustard cultivars namely Varuna, Maya, JM-2, Kranti, RVM-2, Pusa Bold, Rohani, Seg-2, JM-1 and JM-3 conducted during *Rabi* season 2013-14 are presented through Table 3.

The data from Table 3 clearly reveal only five mustard cultivars viz. JM-2, Kranti, RVM-2, Rohani and Seg-2 were exhibited moderately resistant reaction

and one cultivar Varuna showed moderately susceptible reaction and four cultivars namely Maya, Pusa Bold, JM-1 and JM-3 were found to be susceptible. None of cultivars tested in this category was resistant for *A. brassicae*.

Table 3: Field Screening of *Mustard cultivars* for reaction to *Alternaria brassicae*

S. No.	Name of cultivars	Disease rating	Disease reaction
1.	Varuna	2.5	S
2.	Maya	2.6	S
3	JM-2	1.6	MR
4.	Kranti	1.2	MR
5.	RVM-2	1.8	MR
6.	Pusa Bold	2.8	S
7.	Rohini	1.2	MR
8.	Seg-2	1.2	MR
9.	JM-1	2.2	S
10	JM-3	2.6	S

The present studies have identified five mustard cultivars viz. JM-2, Kranti, RVM-2, Rohani and Seg-2 as moderately resistant. These cultivars can be used for cultivation in *Alternaria* blight prone areas with a good agronomic base and effectively help in the management of the disease. Sundar et al., (2005) also reported that cultivars Krishna and Pusa bold were less Susceptible than Varuna. Similarly Yadav et al., (2002) found that cultivar Varuna was more susceptible than PBR-91.

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