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Screening of Brassica Germplasm and Breeding Material against *Altenaria brassicae* Causing *Alternaria* Blight under Artificial Condition

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***Alternaria* blight incited by *Altenaria brassicae* is one of the most important disease of rapeseed-mustard crop. Forty two cultivars /genotypes of rapeseed-mustard group (*Brassica juncea, Brassica campestris, Brassica carinata, Brassica napus, Eruca sativa and B. rapa*) were carried out during the rabi 2011-12 under artificial conditions. UDN 11-05(13.0% leaves, 15%pod) genotype was found resistant against alternaria blight. The Present study indicates that *B. napus, B. juncea and B. carinata* were found better source of resistance in comparison to *Brassica campestris*. UDN-11-05(13.0% leaves, 15.0% pod) genotype was found resistant against the disease. Whereas UDN-11-29 (16.9% leaves,14.3% pod), UDN-11-36 (20.5% leaves, 18.0 % pod) and UDN-11-10 (20.8% leaves, 20.2% pod) were rated as moderately resistant to the disease.**

Key words: *Alternaria brassicae*, Screening. Indian mustard germplasm, Inoculation.

Alternaria leaf spot or blight is a destructive disease of crucifers (Brassicae) throughout the world and appears each year in crop fields (Ansari *et al*., 1988; Khan *et al*., 1998). The leaf blight may cause yield loss of 46 - 47 % in yellow sarson and 35-38% in mustard (Kolte. 1985; Kolte *et a*l., 1987). A yield loss of over 70% may occur in highly susceptible cultivars of rapeseed and mustard. In addition to quantitative loss, seed quality in terms of seed size, seed colour and oil contents are also reduced due to the fungus infection (Kaushik *et al.*, 1984; Kumar, 1997). Research on identification of resistance in mustard germplasm to *Alternaria* blight has got increasing attention over past decades and have been studied adequately (Verma and Saharan, 1994). However, screening of cultivars is a process that should be continued with the breeding of new cultivars. *Altenaria brassicae is* important disease as it causes yield losses ranging from 10-70 per cent. Mustard (*Brassica juncea*) forms an important part of the total oilseed production in India. As far as the statistical figures are concerned, out of 75.55 million tonnes of estimated rapeseed (*Brassica napus*) and mustard production over 30.51 m ha across the Globe, India produces 7.36 m tonnes from 6.18 m ha with 1190 kg/ha productivity (GOI, 2009; Meena *et al.*, 2010). As far as the Indian perspective of the disease is concerned, the losses caused by the disease is estimated to be 47% of the yield loss (Kolte, 1985) with no established source of transferable resistance in any of the hosts. Average yield losses in the range of 32-57% due to *Alternaria* blight have been reported by several workers (Conn and Tewari, 1990). Species

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of the genus are cosmopolitan and can survive as saprophytes as well as weak parasites. The genus is characterized by the formation of polymorphous conidia either singly or in short or longer chains and provided with cross, longitudinal as well as oblique septa and having longer or short beaks. The spores of these polyphagus fungi occur commonly in the atmosphere and also in the soil. The telomorphs (sexual stage) are known in a very few species and placed in the genus *Pleospora* of Loculoascomycetes (under Sub-division: Ascomycotina), in which sleeper-shaped, muriform ascospores are produced in bitunicate asci (Verma and Verma, 2010). A great number of species were recorded for the genus *Alternaria* infecting different crops causing world-wide economic loss (Kirk, 2008). Works pertaining to the collection, isolation and characterization of other *Alternaria* species are also being carried out for its elaborate studies. *Alternaria alternate* caused early blight of potato, leaf spot disease in *Withania somnifera* (Pati *et al.*, 2008) and can infest many other plants. In a previous study, we found that over expression of tobacco chitinase conferred resistance to *Alternaria* leaf spot in transgenic Brassica as demonstrated by inhibitory effect of the transgenics on hyphal growth of *Alternaria brassicae* (Mondal et al. *2003* This is one of the most widespread and destructive diseases of mustard under normal conditions. *Alternaria blight* was first reported by Dey (1948) at Kanpur in U.P. which caused severe losses in yield.

MATERIALS AND METHODS

Survey and collection of Brassicae germplasm and breeding material

A regular and constant observation of mustard crop grown at Oilseed Farm of the University and other adjoining areas of Kanpur Nagar such as Bhaga, Chaubepur, Sarsaul was made during the month of December to February March during 2011-2012 season. During the survey, the affected leaves of mustard showing characteristics symptoms of *Alternaria* blight were brought into the laboratory of plant pathology Department for detection and isolation of the pathogen responsible for the disease.

Screening of mustard germplasm for disease resistance

Forty two cultivars/genotypes of rapeseed-mustard group (*Brassica juncea, Brassica campestris, Brassica carinata, Brassica napus, Eruca sativa* and *B.rapa*) were carried out during the rabi 2011-12 under artificial conditions. In order to promote a serve up natural epidemic of disease, the planting of single line of highly susceptible varieties Varuna was incorporated after each five rows. The genotypes were sown in two rows each of 3 m length with a spacing of 40 × 10 cm in R.B.D. The recommended agronomic practices were adopted for raising a good crop. To maintain high humidity level in micro climate of the field, time to time irrigation were applied for favoring the development of disease.

The inoculums of *A. brassicae* were prepared by mycelia mat grown on Czapek's nutrient solution for 10 days at 24 ± 1^0C. It was homogenized in warring blender for 3 minutes in sterilized water and sprayed at branching and siliqua formation stages. After 15 days of inoculation the number of affected leaves was counted and the in 0-5 point grade of the recommended by Hussain and Thakur (1963**)** of the varietal infection as follows:

It is clear from the table-2 that's out of tested 42 genotype cultivars none were found free to this disease. Two genotype viz., UDN- 11-

Table 1. Details for different samples of cruciferous plants

S.No.	Name of host	Botanical Name	Locality
1.	Yellow sarson	*Brassicae campestris* var. dichotoma	Oilseed Research Farm, Kalyanpur, C.S.A.U.A.T., Kanpur
2.	Black toria	*B. campestris* var. toria	Students Instrumental Farm, C.S.A.U.A.T., Kanpur
3.	Rai	*B. juncea*	Nawabganj Farm, C.S.A.U.A.T., Kanpur
4.	Cabbage	*B. oleracea* var. capitata	Farmer's field Shobhan, Kanpur
5.	Radish	*Raphanus sativum*	Farmer's field Chaubepur, Kanpur
6.	Taramira	*Eruca sativa*	Farmer's field Sarsaul, Kanpur

05(13.0% leaves, 15%pod) and UDN-11-29(16.9% leaves, 14.3% pod) on leaves and two genotypes viz., UDN-11-12(29.7% leaves, 12.2% pod) and UDN-11-11(64.9%leaves, 13.7%pod) resistant on pod were observed to be moderately resistant to the disease. Remaining genotypes were found as

Table 2. Screening of Brassicae germplasm and breeding material against *Altenaria* blight of mustard under artificial condition. During 2011-2012

S. No.	Entry	% (At100days) *Alternaria* blight severity on leaves	%(At100 days) *Alternaria* blight severity on pod
1	UDN-11-01	65.4(54.00)	36.4(37.1)
2	UDN-11-02	54.8(47.8)	24.1(29.3)
3	UDN-11-03	28.3(32.1)	14.9(22.6)
4	UDN-11-04	21.8(27.8)	14.9(22.2)
5	UDN-11-05	13(21.1)	15(22.1)
6	UDN-11-06	64.2(22.4)	26.8(31.1)
7	UDN-11-07	67(54.9)	24.5(29.6)
8	UDN-11-08	69.7(56.6)	29.1(32.6)
9	UDN-11-09	66.3(54.5)	18.2(25.1)
10	UDN-11-10	20.8(27.0)	20.2(26.6)
11	UDN-11-11	64.9(53.7)	13.7(21.6)
12	UDN-11-12	29.7(33.0)	12.2(20.2)
13	UDN-11-13	30.45(33.4)	23.1(28.6)
14	UDN-11-14	27.5(31.5)	24.6(29.7)
15	UDN-11-15	44.3(41.7)	30.7(33.6)
16	UDN-11-16	57.8(49.5)	27.3(31.5)
17	UDN-11-17	30.8(33.6)	26.2(30.2)
18	UDN-11-18	25.4(30.2)	31.4(34.1)
19	UDN-11-19	53.8(47.1)	20.5(26.9)
20	UDN-11-20	63.2(54.7)	14.5(22.2)
21	UDN-11-21	40.4(39.4)	15.8(23.3)
22	UDN-11-22	51.3(45.7)	25.1(30.0)
23	UDN-11-23	66.6(54.7)	25.3(30.1)
24	UDN-11-24	65.7(54.2)	29.6(32.9)
25	UDN-11-25	73.5(59.0)	31.4(34.1)
26	UDN-11-26	61.1(51.5)	29.5(32.8)
27	UDN-11-27	68.7(55.9)	23.1(28.5)
28	UDN-11-28	55.2(48.0)	26.3(30.8)
29	UDN-11-29	16.9(24.2)	14.3(22.1)
30	UDN-11-30	63.8(53.0)	27.3(31.3)
31	UDN-11-31	62.4(52.2)	24.9(29.9)
32	UDN-11-32	57.2(49.1)	26.1(30.6)
33	UDN-11-33	69.8(56.6)	23.9(29.2)
34	UDN-11-34	63.6(52.9)	22.8(28.3)
35	UDN-11-35	65(50.8)	14.8(22.6)
36	UDN-11-36	20.5(26.8)	18.1(25.1)
37	UDN-11-37	51.1(45.6)	26.2(30.6)
38	UDN-11-38	70.2(56.9)	30.4(33.3)
39	UDN-11-39	35.7(36.6)	21.1(27.2)
40	UDN-11-40	23.8(29.1)	19.4(26.1)
41	UDN-11-41	61.4(51.6)	34.6(36.0)
42	UDN-11-42	53.2(46.8)	27.8(31.8)
	CV	8.245	11.19
	CD	7.452	6.499

Angular transformed values are given in parenthesis

moderately susceptible, susceptible and highly susceptible, against the *alternaria* blight *Cause Altenaria brassicae.*

RESULTS AND DISCUSSION

A total number of 42 genotypes/cultivars comprising of *Brassica campestis, B. rapa , B.carinata, B. juncea B.napus* and *Eruca sativa* were screened under artificial conditions and the per cent disease intensity was recorded. UDN 11-05(13.0% leaves, 15%pod) genotype was found resistant against *Alternaria* blight. The present study indicates that *B. napus*, *B. juncea* and *B. carinata* were found better source of resistance in comparison to *Brassica campestris.* Similar result was obtain by Bhander and Maini, 1965; Rai *et al.*, 1977; Degenhardt *et al,* 1974; Kadian and Saharan, 1983; Banga *et al.*, 1984; Anand *et al,* 1985 and Kolte, 1986. Dang.*et al*.,(2000) observed that the out of tested 42genotype, only two genotypes UDN11-05(13.0% leaves, 15.0% pod) and UDN11-29(16.9% leaves,14.3% pod) were consistently showing some level of resistence against *Alternaria* blight thorough evalution of different fungicides, nutrient and bio-agent for the *Altenaria* blight on the disease intensity, seed yield and 1000 seed weight. Forty-two genotypes of *Brassica* were tested for their reaction against the disease under artificial conditions *Brassica napus, Brassica juncea* and *Brassica carinata* were found better source of resistance incomprison to *Brassica campestirs.*UDN-11-05(13.0% leaves, 15.0% pod) genotype was found resistant against the disease. Whereas UDN-11-29 (16.9% leaves,14.3% pod), UDN-11-36 (20.5% leaves, 18.0 % pod) and UDN-11-10 (20.8% leaves, 20.2% pod) were rated as moderately resistant to the disease.

CONCLUSIONS

The study on the UDN 11-05 (13.0% leaves,15% pod) genotype was found resistant against *Alternaria* blight . observed that the out of tested 42genotype, only two genotypes UDN11-05 (13.0% leaves, 15.0% pod) and UDN11-29(16.9% leaves,14.3% pod) were consistently showing some level of resistance against.

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