it indicated that spraying of mancozeb (0.25%) was found most effective in reducing disease intensity 22.0 and 28.0%, respectively in 2 years followed by *D. stramonium*, *E. globosus*, *A. indica*, *O. sanctum*, *C. roseus*, *C. sativa*, *N. indicum* and *A. cepa*. Kumar and Singh (2003) and Kumar and Sharma (2006) also reported that mancozeb gave the highest reduction in severity of *Alternaria* blight and its economics was worked out by Singh and Chandra (2005) in linseed . Antifungal activities of extracts of *A. indica*, *A. cepa* and *A. sativum* were also reported by Sinha and Sinha (2006). The analysed pooled data of two years revealed that significantly highest seed yield (41.25 g/plant) was recorded with mancozeb followed by *D. stramonium* (39.25 g/plant), *E. globosus* (38.35 g/plant), *A. indica* (38.05 g/plant) and *O. sanctum* (37.13 g plant). Treatment with plant extracts increased seed yield from 30.05 g/plant to 39.25 g/plant over control. All the tested extracts were significantly superior to the control. Patni and Kolte (2006) reported significantly minimum disease index, maximum seed yield in *Eucalyptus* spray plots than control. The higher seed yield in mancozeb sprayed plants might be due to disease control and senescence process of plant and increase in the persistence of assimilatory surface followed by increase of the productive period of the plant.It was also observed by Prasad and Lallu, (2006) that 5% leaf extract of *Datura*, *Eucalyptus*, *Azadirachta* and *Ocimum* could be an ecofriendly, economical and effective substitute for the fungicide against *Alternaria* blight of mustard .

References

Kumar, P. and D.V. Singh (2003). Management of *Alternaria* blight of radish by foliar application of fungicides. *Ann.Pl. Protec. Sci.* **11**: 175-176.

Patni, C.S. and S.J. Kolte (2006). Effect of some botanicals in management of *Alternaria* blight of rapeseed-mustard . *Ann. Pl. Protec. Sci.* **14**: 151-156.

Prasad, Rajendra and Lallu (2006). Management of *Alternaria* blight of mustard in combination of chemicals and botanicals. *Ann. Pl. Protec. Sci.* **14**: 400-403.

Singh, J. and Ram Chandra (2005). Relative efficacy and economics of iprodione and mancozeb for control of *Alternaria* blight of linseed. *Ann. Pl. Protec.Sci.* **13**: 503-504.

Sinha, B.B.P. and R.K.P.Sinha (2006).Effect of bio pesticides, botanicals and fungicides against *Rhizoctonia solani* in rice. *Ann.Pl. Protec. Sci.* **14**: 254-255.

Screening of Mungbean Accessions against *Alternaria* leaf spot under Kashmir Conditions

S.K. Maheshwari*, N.A. Bhat, S. Ahmad, A.K. Shukla* and D. Singh*

Faculty of Agriculture Regional Research Station (SKUAST-K), Wadura, Sopore-193 201, India.
Present Address: Central Institute For Arid Horticulture, Beechwal, Bikaner- 334 006, India
<maheshwariskciah@gmail.com>

Date of Receipt: 14.12.2010; Accepted: 02.02.2011

Mung bean [*Vigna radiata* (L.) Wilczek] is cultivated as an important pulse crop during *kharif* and summer season. This crop is affected by many fungal diseases, of which *Alternaria* leaf spot is one of the most important diseases. The efforts were made to screen mungbean accessions against *Alternaria* leaf spot

The field trials were conducted during *kharif* seasons of 2005 and 2006 at Regional Research Station, Wadura, Sopore (J&K). Nineteen accessions were sown during both the seasons R.B.D. on 4th June at a spacing of 30 x 20 cm in sub plots of size 4.5 x 3.0 m with three replications. Disease incidence and intensity were recorded on the basis of number of plants infected and leaf area affected, respectively. Data on disease incidence and intensity were recorded at flowering stage of the plants during both the years. The reaction due to *Alternaria* leaf spot was categorized by using 0- 4 scale (Maheshwari *et al.*, 1997): immune (I) = 0%, resistant (R) = 0.1 to 10%, moderately resistant (MR) = 10.1 to 20%, susceptible (S) = 20.1 to 30% and highly susceptible (HS) = 30.1% and above.

The range of mean disease incidence and disease intensity was 11.2 to 61.2 and 6.5 to 57.9%, respectively. Accession SKUA-M-102 showed least disease incidence (11.2%), disease intensity (6.5%) and highest grain yield (9.85 q/ha) followed by accession SKUA-M-358 (20.3%, 11.5% & 8.5 q/ha) which statistically differed with each other. Next best accessions were SKUA-M-94-32 and SKUA-M-94-10 exhibiting disease incidence of 28.5 and 33.1%, disease intensity of 16.2 and 18.5% and grain yield of 8.03 and 7.35 q/ha, respectively and were statistically on par with each other (Table 1).

Table 1. Response of accessions of mung bean against *Alternaria* leaf spot (pooled data of 2005 & 2006)

Accessions	Disease incidence (%)	Disease intensity (%)	Grain yield (Qt/ha)
SKUA-M-102	11.2 (19.60)*	6.5 (14.76)	9.85
SKUA-M-358	20.3 (26.80)	11.5 (19.86)	8.50
SKUA-M-94-32	28.5 (32.26)	16.2 (23.76)	8.03
SKUA-M-94-10	33.1 (35.15)	18.5 (24.49)	7.35
SKUA-M-353	25.1 (30.08)	20.8 (27.15)	6.65
Shalimar Mung-1	30.5 (33.55)	21.3 (27.48)	6.45
SKUA-M-107	37.1 (37.52)	22.4 (28.26)	5.88
SKUA-M- 86	32.1 (34.51)	25.1 (30.10)	5.04
PS- 16	38.7 (38.48)	25.5 (30.33)	5.60
SKUA-M-354	35.1 (36.36)	27.2 (31.43)	5.40
SKUA-M-351	36.5 (37.17)	28.6 (32.33)	4.95
SKUA-M-300	34.7 (36.09)	28.2 (32.10)	4.70
SKUA-M-302	39.40 (38.55)	29.70 (33.02)	5.20
SKUA-M-359	41.6 (40.16)	33.3 (35.27)	4.50
SKUA-M-350	44.8 (42.05)	38.2 (38.17)	4.45
SKUA-M-301	52.2 (46.27)	42.5 (40.69)	4.60
SKUA-M- 303	54.2 (47.44)	45.1 (42.19)	4.30
SKUA-M-104	59.8 (50.65)	52.4 (46.37)	4.15
Mung local	61.2 (51.47)	57.9 (49.58)	4.00
CD (P=0.05)	1.24	1.30	1.32

* Figures in parenthesis are arcsine transformed values.

Analysis of data revealed that disease intensity was negatively correlated with the grain yield having coefficient of correlation $r = -0.874$. Highest grain yield of 9.85 q/ha was recorded in accession SKUA-M-102, which exhibited least disease intensity of 6.5%, whereas lowest grain yield of 4.0 q/ha was recorded in accession Mung local recording highest disease intensity of 57.9%.

Out of 19 mungbean accessions, none was found immune while one accession SKUA-M-102 was resistant against the pathogen. Three accessions (SKUA-M-358, SKUA-M-94-32 and SKUA-M-94-10) were moderately resistant to the disease. Maheshwari *et al.* (1997) found that out of 99 dolichos bean (*Lablab purpureus*) germplasms, four were resistant and nine moderately resistant against *Alternaria* leaf spot. However, Dutta *et al.* (2008) attributed to the susceptibility of genotypes in mungbean to stomatal frequency.

References

Dutta, S., P.K. Garain and S.K. Roy (2008). Morphology of mungbean in relation to *Cercospora* leaf spot disease. *Ann. Pl. Protec. Sci.* **16**: 131-134.

Maheshwari, S. K., D. V. Singh and V. S. Gautam (1997). Screening of dolichos bean germplasms against *Alternaria* leaf spot. *Ann. Pl. Protec. Sci.* **5** : 204-205.

Influence of water potential on *Trichoderma* species

O.P. Singh, Amit K. Jain*, Sudhir Kumar and P. Sinha**

Division of Plant Pathology, I.A.R.I., New Delhi- 110 012
Department of Microbiology and Botany**, Janta Vedic College, Baghpat (U.P.), India*

Date of Receipt: 02.01.2011; Accepted: 15.02.2011

One of the most important limitations of the use of *Trichoderma* spp. as biofungicides is their low osmo-tolerance levels. Water conditions have been shown to strongly affect *Trichoderma* activities, particularly on spore germination and germ tube growth. Information about the influence of water conditions on metabolic activities of *Trichoderma* strains is essential for planning their application in biocontrol strategies.

The water potential of different media was adjusted with the electrolyte sodium chloride (NaCl). Different quantities of NaCl were added to media to give required water potentials in the range of -0.9 to -9.0 Mpa. For each range, five replications were kept and 20 ml of media was added to each plate (9 cm). The solidified plates were inoculated with pure culture of *Trichoderma* species with agar discs (5 mm dia.) taken from the edge of actively growing culture with a sterile cork borer. All the inoculated plates were kept in an incubator at 25°C and the mycelial growth (cm/day) was recorded.

All the eight spp. grew well (linear dia. 52-90 mm) at -0.9 Mpa and - 2.3 Mpa, followed by -3.7 (linear dia. 42-71 mm) the least at -4.6 Mpa (linear dia. 21- 58 mm) across the colonies of *Trichoderma* species. No growth was observed in -6.0 Mpa.

The best growth (linear dia. 90 mm) was recorded when the water potential was adjusted at -0.9 Mpa to 2.3 Mpa for *T. koningii* and *T longibrachiatum* followed by *T. flavofuscum* (linear growth 78 mm at -0.9Mpa and 57 mm at -2.3 Mpa), *T. viride* (linear growth 75 mm at -0.9 Mpa and 66 mm at -2.3 Mpa), *T. virens* (linear growth 73 mm at -0.9 Mpa and 70 mm at -2.3 Mpa) and least in *T. hamatum* (linear growth 53 mm at -0.9 Mpa and 52 mm at -2.3 Mpa) (Table 1).

All eight *Trichoderma* spp. grew poorly (linear growth 31 to 58 mm at water potential 4.6 Mpa. Therefore, it is concluded that when water potential was decreased, the *Trichoderma* grew well and when increased, the growth of *Trichoderma* species started declining. However, optimum moisture level enhanced biomass production of *T. viride* as reported by Singh and Gupta (2008).

Table 1. Rate of growth of eight *Trichoderma* species on different water potential (Mpa)

***Trichoderma* spp.**	**-0.9 Ma (mm)**	**-2.3 Ma (mm)**	**-3.7 Ma (mm)**	**-4.6 Ma (mm)**
T. citrinoviride	60.5	55.4	43.1	31.5
T. flavofuscum	78.2	57.6	57.4	43.6
T. hamatum	53.6	52.2	48.6	21.7
T. harzianum	62.3	60.5	53.2	35.4
T. koningii	90.4	90.3	70.3	58.1
T. virens	73.6	70.1	42.1	39.3
T. viride	75.1	66.8	60.5	45.8
T. longibrachiatum	90.4	90.3	71.3	35.7