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Efficacy of bio-agents and plant extracts against Alternarial leaf blight of mustard (*Brassica juncea* L.)

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Abstract

Field experiment was conducted at the research plot of the Department of Plant Pathology, SHIATS, Allahabad, U. P. during the *rabi* season of 2015-16 to test, "Efficacy of bio-agents and plant extracts against alternarial blight of mustard (*Brassica juncea* L.)" alternaria blight is one of the most common and devastating disease of mustard plant which is caused by the fungus *Alternaria brassicicola*. The antifungal activity of three plant extract and bioagents. Per cent disease intensity on leaves at 45, 60 and 75 DAS were recorded. Results showed *Trichoderma viride* @ 2%, was the most effective bio-agents in managing the disease intensity of leaf blight on mustard caused by *Alternaria brassicicola*. *Trichoderma harzianum* 2% (fs) significantly reduced Alternaria blight, followed by Neem leaf and *Trichoderma viride* (fs) 2%, Neem leaf extract(fs) 10%, Dhatura leaf extract(fs)10%, *Allium sativum* 10%. All the tested botanicals significantly inhibited the fungal growth. The minimum growth was recorded in *Allium sativum* However *Trichoderma harzianum* the most effective bio-agents in managing the disease intensity of leaf blight on mustard caused by *Alternaria brassicicola*.

Keywords: Alternaria blight, *Trichoderma* spp., fungicides, *Allium sativum*

Introduction

Rapeseed mustard is the major rabi oil seed crop of Chambal and Gwalior divisions of Madhya Pradesh. Alternaria blight are the most important diseases causing heavy losses throughout the country attacking all Brassica species. Four species of Alternaria viz., *A. brassicae* (Berk.) Sacc., *A. brassicicola* (Schw.) Wiltsh., *A. raphani* Groves and Skolka and *A. alternata* (Fr.) Keissler have been reported for the cause of Alternaria blight. Out of which *A. brassicae* is most widely prevalent in India. Biological screening of plant extracts was carried out throughout the world for the determination of their antifungal activity. Synthetic chemicals used to control plant diseases not only pollute the environment, but are also harmful to human health. Because of environmental and economic considerations, plant scientists are involved to find the cheaper and more environmental friendly biocompounds for the control of plant diseases using different forms of botanicals.

Alternaria blight of mustard is both soil and seed borne disease. The conidia and mycelium may become attached with seeds and penetrate there upon, or they come into soil via diseased plants debris and survive there in. They serve as the source of primary infection in next growing season. With the growing awareness of harmful effects of pesticides integrated use of bioagent (*Trichoderma viride*, *Trichoderma harzianum*) + phytoextract (*Allium sativum*, *Datura stramonium*, *Azadirachta indica*) + Chemical [mancozeb] are used in this study. The concept of integrated disease management seeks to minimize the advantages in the use of fungicide. In present study different bioagents, plant extracts and fungicides are used as seed treatments and foliar spray against Alternaria blight in India mustard to find out effective and economical control (Chattopadhyay, 2008).

Material and Methods

Application of bulb extract from garlic (*Allium sativum*)

For preparation of bulb extract from garlic, the cloves of garlic was washed in running tap water followed by washing in distilled water dried. The tissues were homogenized in distilled water(1:1w/v) using a blender. The mixture, air was filtered through a four layer of moistened

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muslin cloth and washed the filter and centrifuged. The supernatant thus obtained was designated as concentrated bulb extract. (Rathi, 2009).

Application of neem leaf extract (*Azadirachta indica*)

Neem leaf extract was prepared according to Paul and Sharma (2002)^[7]. 400g (fresh wt) mature leaves were homogenized in a pre-chilled pestle and mortar using chilled, sterilized distilled water. The extract was filtered through four layers of moisture muslin cloth. The final volume was adjusted to 1000 ml with distilled water. The filtrate was centrifuged at 2000g, 4 degree c for 15 min. Dilution of 1:2 was made from this concentrated extract. (Sanjay and Ashok, 2006)^[10]

Application of Datura leaf extract (*Datura stramonium*)

Plant materials (50g each) were extracted with 200 ml of absolute ethanol (99% Merck) using a soxhlet extractor at room temperature for 2 days. The extraction was completed in 3 cycles. The solvent was removed with a rotary evaporator at 55 °C and 200 mm Hg. The extract obtained was a solid composition of Datura seed leaf extract (Sharma *et al.*, 2013)^[11].

Application of *Trichoderma viride*

Seed treatment @ 10g/kg of *Trichoderma viride* was used. Foliar spray of *Trichoderma viride* was at 50 DAS @ 10g/l of water and the subsequent spray was given at 15 days interval as suggested by Rathi and Singh (2009).

Application of *Trichoderma harzianum*

Seed treatment @ 10g/kg of *Trichoderma harzianum* was used. Foliar spray of *Trichoderma harzianum* was at 50 DAS @ 10g/l of water and the subsequent spray was given at 15 days interval as suggested by Rathi and Singh (2009).

Results and Discussion

Effect of treatments on Disease intensity at different days interval

Disease intensity (%) at 45 DAS

The maximum disease intensity (27.81) was recorded at 45 DAS in T₂ *Trichoderma harzianum* (fs), followed by T₁ *Trichoderma viride* (fs) (28.79), T₃ *Allium sativum* (fs) (30.65), T₆ Neem extract (fs) (31.64), T₄ Datura leaf extract (fs) (32.41), as compared to treated (26.21%) T₀ untreated check (36.14).

Disease intensity (%) at 60 DAS

The maximum disease intensity (44.46%) was recorded at 60 DAS in T₂ *Trichoderma harzianum* (fs), followed by T₁ *Trichoderma viride* (fs) (45.15), T₃ *Allium sativum* (fs) (46.71), T₆ Neem leaf extract (fs) (49.14), T₄ Datura leaf extract (fs) (50.92), as compared to treated (40.14%) and T₀ untreated check (52.89).

Disease intensity (%) at 75 DAS

The maximum disease intensity (54.52%) was recorded at 90 DAS in T₂ *Trichoderma harzianum* (fs) (54.52), followed by T₁ *Trichoderma viride* (fs) (56.23), T₃ *Allium sativum* (fs) (58.18), T₆ Neem extract (fs) (59.19), T₄ Datura leaf extract (fs) (60.62), as compared to treated (53.05%) and T₀ untreated check (62.03).

Table 1: Effect of bio-agents and plant extracts on disease intensity of mustard

Treatments		45 DAS	60 DAS	75 DAS
T ₀	Untreated control	36.14	52.89	62.03
T ₁	<i>Trichoderma viride</i>	28.79	45.15	56.23
T ₂	<i>Trichoderma harzianum</i>	27.81	44.46	54.52
T ₃	<i>Allium sativum</i>	30.65	46.71	58.18
T ₄	Datura leaf extract	32.41	50.92	60.62
T ₅	Treated control (Mancozeb)	26.21	40.14	53.05
T ₆	Neem leaf extract	31.64	49.10	59.19
Overall Mean		30.52	47.05	57.64
F- test		S	S	S
S. Ed. (±)		1.78	1.58	1.18
C. D. (P = 0.05)		3.89	3.44	2.58

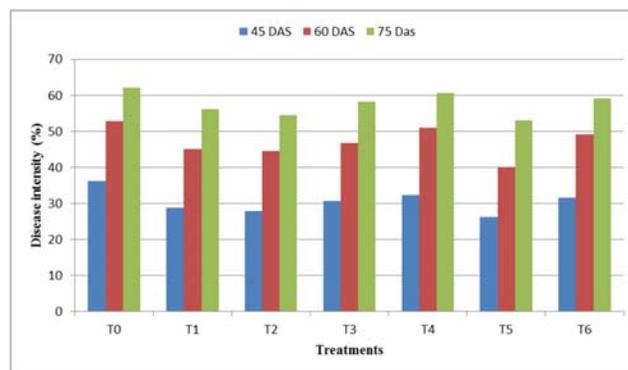


Fig 1: Effect of bio-agents and plant extracts on disease intensity of mustard

Discussion

The extracts of *Allium sativum*, *Datura stramonium* completely inhibited the spore germination of *Alternaria brassicicola* isolates (Sheikh and Agnihotri, 1972) Results from the present study could be correlated with the studies made by Mughal *et al.* (1996) with leaf extracts from *Allium sativum*, *Datura alba* against *Alternaria alternata*, *A. brassicicola*; Shinde and Dhale (2011)^[12].

Whereas this experiment contradicts it that Neem leaf extract was best followed by Garlic bulb extract in reducing the Alternarial leaf blight of mustard in leaf, siliqua and also confirmed the results of Chattopadhyay *et al.* (2005)^[3]

The antagonists *Trichoderma harzianum*, *Trichoderma viride*, effectively controlled seed borne pathogen *Alternaria brassicicola* (Vananacci and Harman, 1987)

Effective inhibition of mycelia growth of *Alternaria* spp. Causing leaf blight by *Trichoderma viride* has been reported (Babu *et al.*2000)^[1]

Use of antagonists, particularly *Trichoderma* species has been reported quite effective against different pathogens (Chattopadhyay *et al.*, 2002)

Conclusion

In the present investigation, *Trichoderma harzianum* followed by *Trichoderma viride* significantly reduced the *Alternaria* blight and *Trichoderma harzianum* was found most effective in reducing *Alternaria* blight, recorded maximum disease incidence (%), This present study confirms the *in vitro* antagonistic activity of *Trichoderma harzianum* and *Trichoderma viride* towards *Alternaria brassicicola*. Among, T. *harzianum* has shown strong inhibitory effect on the development of *Alternaria brassicicola* compared to T. *viride*.

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