Biological Forum – An International Journal **15(10): 1639-1642(2023)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Management of Alternaria Leaf spot of Sesame (*Sesamum indicum* L.) in *in vitro* using different Biocontrol Agents

Arun A.T.[1]* and Mahabeer Singh[2]
[1]Research scholar, Department of Plant Pathology,
Sri Karan Narendra Agriculture University, Jobner, Jaipur (Rajasthan), India.
[2]Assistant Professor, Department of Plant Pathology,
Sri Karan Narendra Agriculture University, Jobner, Jaipur (Rajasthan), India.

(Corresponding author: Arun A.T.)*
(Received: 22 August 2023; Revised: 28 September 2023; Accepted: 09 October 2023; Published: 15 October 2023)
(Published by Research Trend)

ABSTRACT: Sesame is an ancient oilseed crop, with the long history of cultivation. Sesame production (about 8Lakh MT) and acreage are both ranked first in the world by India. *Alternaria sesami*, which causes the sesame leaf spot disease, occur primarily on leaf blades as tiny, brown, uneven or rounded dots. Biological control, using microbes to prevent and/or suppress plant diseases, offers an alternative to the use of fungicides. In this study used different fungal biocontrol agents includes *Trichoderma harzianum*, *Trichoderma asperellum*, *Trichoderma virens*, *Trichoderma hamatum* and Bacterial biocontrol agent *Pseudomonas fluorescence* against the management of *Alternaria sesami*. Maximum mycelial growth inhibition (87.40%) of the pathogen was recorded with *Trichoderma harzianum* followed by *Trichoderma asperellum* (84.67%). Minimum mycelial growth inhibition was recorded in *Pseudomonas fluorescens* (64.20%).

Keywords: Leaf spot, Sesame, biocontrol, Sesame, *Trichoderma* spp., *Pseudomonas* spp.

INTRODUCTION

One of the first oilseed crops to be grown in tropical and subtropical areas of Asia, Africa, and South America is sesame (*Sesamum indicum* L.), a member of the pedaliaceae family. Sesame production (about 8Lakh MT) and acreage are both ranked first in the world by India. The seed is also a rich source of linoleic acid, vitamin E, A, B_1 and B_2 and minerals including calcium and phosphorus (Pathak *et al.*, 2014). The total estimated production of sesame crop in Rajasthan was 73,548 MT with an average yield of 270 kg/ha (Anonmouys, 2017).

Alternaria leaf spot, one of the most significant sesame diseases, is widespread throughout the worlds's sesame growing regions and also been documented in India, Kenya, Ethiopia, El Salvador, Nigeria and the United States (Verma *et al*., 2005; Ojiambo *et al*., 2003).

MATERIALS AND METHODS

The present investigation was carried out in the Plant Pathology laboratory of Department of Plant Pathology, SKNAU, Jobner during 2018-19. The effect of biocontrol agents against the pathogen will be studied by the dual culture technique.

In dual culture, for fungal bio-agents, fifteen ml of PDA medium was poured into sterilized Petri dishes and allowed for solidification. Nine mm diameter discs from actively growing colony ofs pathogen was cut with a sterile cork borer and placed near the periphery of PDA plate. Similarly, bio-agents were placed on the other side i.e., at an angle of 180°. Petri dishes with no antagonist served as control for the pathogen. The plates were incubated at 25±1°C for seven days. For each treatment, four replications were maintained. The extent antagonistic activity by bio-agents were recorded after incubation period of 7 days by measuring the growth of the test pathogen in dual culture and in control plates. In case of bacterial bio-agents nutrient agar medium used in place of PDA. Per cent inhibition over control was worked out according to formula given by Vincent (1947).

$$I = \frac{C-T}{C} \times 100$$

Where,
I = Per cent inhibition of mycelial growth
C = Mycelial growth of pathogen in control (mm.)
T = Mycelial growth of pathogen in treatment (mm.)

RESULT AND DISCUSSION

Efficacy of the following bio-agents were tested against *Alternaria sesami in-vitro* conditions.

Sr. No.	Bioagent	Source
1.	*Trichodrma harzianum*	ITCC-IARI, New Delhi
2.	*Trichoderma hamatum*	ITCC-IARI, New Delhi
3.	*Trichoderma virens*	ITCC-IARI, New Delhi
4.	*Trichoderma asperellum*	ITCC-IARI, New Delhi
5.	*Pseudomonas fluorescence*	ITCC-IARI, New Delhi
6.	Control	-

Efficacy of *Trichoderma harzianum*, *Trichoderma asperellum*, *Trichoderma virens*, *Trichoderma hamatum* and *Pseudomonas fluorescens* were tested against *Alternaria sesami* by (Dual Culture Technique).

Results depicted in Table 1, and Plate 1 indicated that the five bio-agents *viz*., *Trichoderma harzianum*, *Trichoderma asperellum*, *Trichoderma virens*, *Trichoderma hamatum*, and *Pseudomonas fluorescens* were antagonistic to the growth of *Alternaria sesami.* Maximum mycelial growth inhibition (87.40%) of the pathogen was recorded with *Trichoderma harzianum* followed by *Trichoderma asperellum* (84.67%), *Trichoderma asperellum* was at par with *Trichoderma harzianum*. *Trichodema virens* (80.19) also at par with *Trichodema hamatum* (76.82%) and minimum mycelial growth inhibition was recorded with *Pseudomonas fluorescens* (64.20%).

Table 1: Evaluation of antagonists in dual culture against *A. sesame.*

Sr. No.	Bio-agents	Per cent inhibition
1.	*Trichoderma harzianum*	87.40
		(69.21)
2.	*Trichoderma asperellum*	84.67
		(66.95)
3.	*Trichoderma virens*	80.19
		(63.57)
4.	*Trichoderma hamatum*	76.82
		(61.22)
5.	*Pseudomonas fluorescence*	64.20
		(53.25)
6.	Control	0.00
		(0.00)
	SEm+	1.70
	CD (P=0.05)	5.32

Average of four replications

Figures given in parentheses are angular transformed values

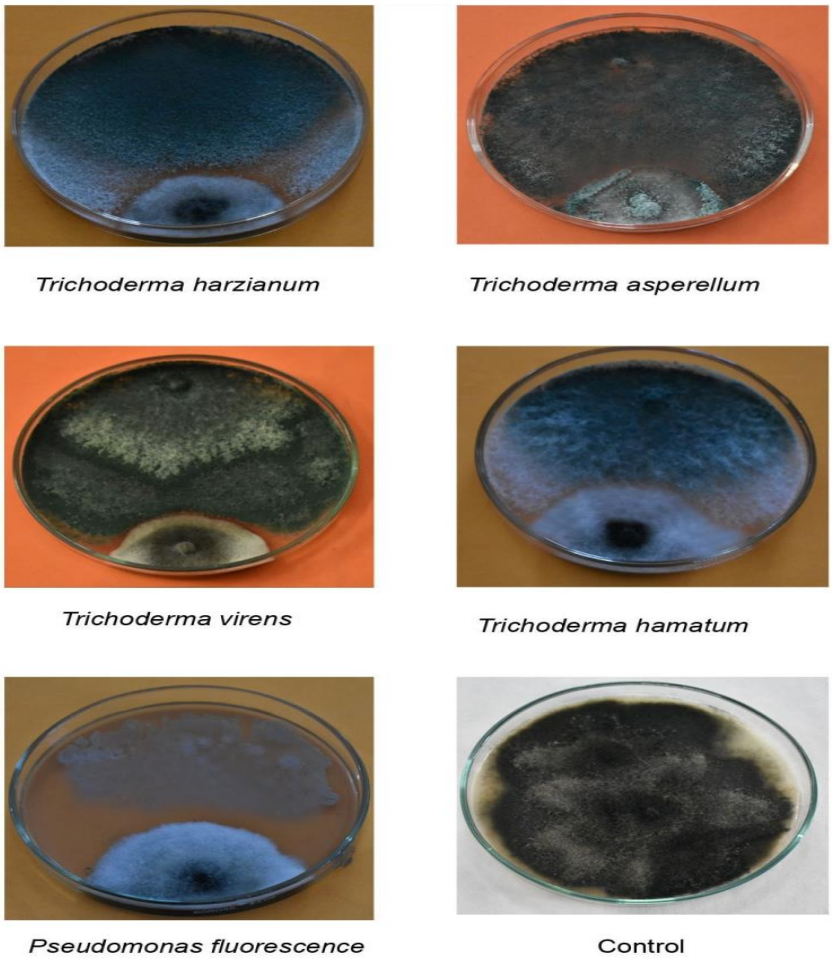

Plate 1. Evaluation of antagonists in dual culture against *Alternaria sesami*.

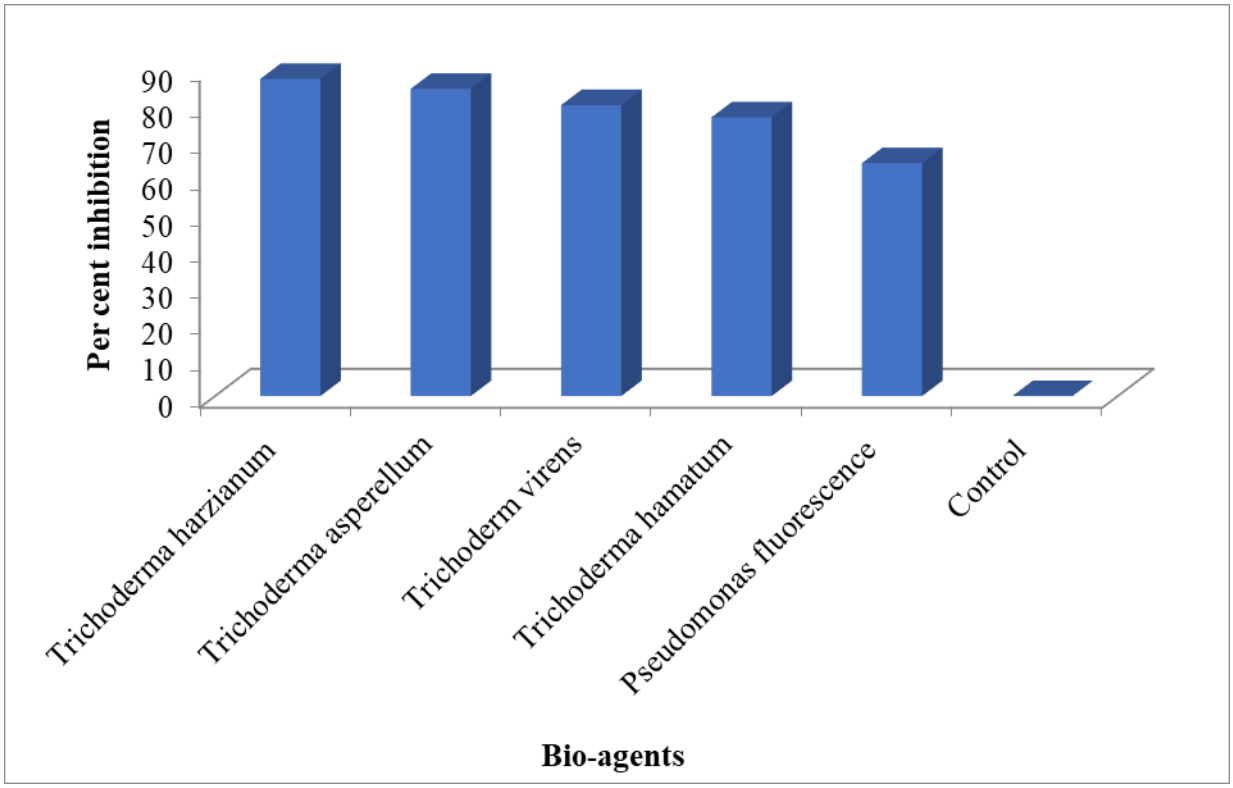

Fig. 1. Evaluation of antagonists in dual culture against *A. sesami.*

In present studies the bio agents *viz., T. harzianum, T. asperellum, T. virens, T. hamatum* and *Pseudomonas fluorescens* were tested *in vitro* against growth of *Alternaria sesami.* Maximum mycelial growth inhibition of the pathogen was recorded with *T. harzianum* followed by *T. asperellum*.

Kumar (2008) also tested six biocontrol agents aginst *Alternaria alternata in vitro* by dual culture technique. Among these *T. harzianum* recorded highest inhibition of radial growth followed by *T. koningii*, *T. viride*, and *T. virens*.

Jadeja and Pipliya (2008) studied antagonistic effect of *Trichodrma harzianum*, *T. viride*, *T. hamatum*, *T. koningii* and *T. virens* against pathogen *A. burnsii*. The maximum inhibition of pathogen (100%) was observed due to *T. harzianum* and *T. viride* which was followed by *T. hamatum* and *T. Koningii*.

Similar results wherein efficacy of *Trichoderma spp.* against *Alternaria* species have been reported by Deshmukh and Raut (1992), Leifort *et al.*, (1992), Babu *et al.* (2000a), Kota (2003), Mesta (2006), Rao (2006) and Dalpati *et al.* (2010).

CONCLUSIONS

Out of five bio-agents, *Trichoderma harzianum* was found most effective in inhibiting mycelial growth of *Alternaria sesami* followed by *Trichoderma asperellum. Trichoderma virens* and *Trichoderma hamatum* was moderately effective. *Pseudomonas flourescens* was least effective in *in vitro* (Dual culture method) condition.

FUTURE SCOPE

The result derived from this experiment is that the best non chemical alternative method of management of *Alternaria* leaf leaf spot of Sesame (*Sesamum indicum* L.) is through using *Trichoderma harzianum* in *in vitro*.

REFERENCES

Anonymous, (2017). Indian oil seeds and produce export promotion council survey of sesame crops, 1-26.

Babu, S., Seetharaman, K., Nandakumar, R. and Johnson, I. (2000a). Biocontrol efficacy of *Pseudomonas fluorescens* against *Alternaria solani* an tomato leaf blight disease, *Annals of Plant Protection Science*, *8* (2), 252-254.

Dalpati, N. N. S., Parate, R. L. and Ingle, S. T. (2010), Efficacy of some bioagents and botanicals against *Alternaria macrospora* causing leaf spot of cotton. *Journal of Plant Diseases and protection*, *5*(1), 95.

Deshmukh, P. P., and Raut, G. J. (1992). Antagonism by *Trichoderma spp*. on five plant pathogenic fungi. *Journal of Agricutural sciences*, *3*, 127-130.

Jadeja, K. B. and Pipliya, B. H. (2008). *In vitro* evaluation of plant extracts and bioagents against *A. burnsii* causing blight of cumin. *Journal of Spices and Aromatic crops*, *17*(1), 26-28.

Kota, V. (2003). Biological management of post harvest fungal diseases of major fruits. M. Sc. (Agri) Thesis, Univ. Agric. Sci. Dharwad, India. pp. 315.

Kumar, A.G. (2008). Studies on leaf blight of chrysanthemum caused by *Alternaria alternata*. M.Sc. (Agri.) thesis submitted to TNAU, Coimbatore, pp. 239.

Leifort. C., Sigee, D. C., Epton, H. A. S., Stanley, R. and Knight, C. (1992). Isolation of bacterial antagonistic to post harvest fungal disease of cold stored Brassica spp. *Phytopathology*, *20*, 158-163.

Mesta, R. K. (2006). Epidemiology and management of *Alternaria* blight of sunflower caused by *Alternaria helianthi* (Hansf.) Tubaki and Nishihara. Ph. D. Thesis, Univ. Agric. Sci., Dharwad, Karnataka, India.

Pathank, N., Rai, A. K., Kumari, R. and Bhat, K. V. (2014).

Value addition in sesame: A perspective on bioactive components for enhancing utility and profitability. *Pharmacognosy Reviews*, *8*(16), 147.

Rao, M. S. L. (2006). Management of *Alternaria* leaf spot in sunflower. Annual Report 2005-2006. Directorate of Oilseeds Research. pp. 54.

Ojiambo, P. S., R. K. Mibey, R. D. Narla and P. O. Ayiecho (2003). Field transmission efficiency of *Alternaria sesami* in sesame from infected seed. *Crop Protection*, *22*(9), 1107-1115.

Verma, M.L., Naresh Mehta; Sangwan, M. S. (2005). Fungal and bacterial diseases of sesame. In: Diseases of Oilseed Crops (eds.) G. S. Saharan, N. Mehta and M. S. Sangwan. Indus Publishing, New Delhi, India. Pp. 269-303.

Vincent, J. M. (1947). Distortion of fungal hyphae in the presence of certain inhibitors. *Nature*, *159*, 850.

How to cite this article: Arun A.T. and Mahabeer Singh (2023). Management of Alternaria Leaf spot of Sesame (*Sesamum indicum* L.) in in vitro using different Biocontrol agents. *Biological Forum – An International Journal*, *15*(10): 1639-1642.