Int.J.Curr.Microbiol.App.Sci (2021) *10*(04): 302-306

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 10 Number 04 (2021)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2021.1004.031

Management of Leaf Blight caused by *Alternaria cucumerina* in Bottle Gourd *(Lagenaria siceraria)*

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Keywords

Leaf blight, Bio-agents, Neem oil, T. viride, Pseudomonas

Article Info

Accepted:
12 March 2021
Available Online:
10 April 2021

A B S T R A C T

Bottle gourd (*Lagenaria siceraria*) is one of the most important cucurbitaceous vegetable crops being grown both during warm and rainy season in northern parts of India. It has wide genetic diversity and is grown throughout the tropics and subtropics of the world. But the crop is attacked by a number of diseases such as *Alternaria* leaf blight, *Cercospora* leaf spot, powdery mildew, downy mildew and anthracnose, amongst which *Alternaria* leaf blight caused by *Alternaria cucumerina* is found to cause serious losses throughout Rajasthan and other states. A field trail in *kharif* season in the month of August 2018 the effect of seed treatment with bio-agents and Neem oil were minimize the leaf blight disease intensity of bottle gourd. On the basis of single trail it was observed that seed treatment with Neem oil @2.5% + *T. viride* @2.5% was most in-effectual against leaf blight disease. The highest incremental cost benefit ratio of 1:2.91 was obtained in the treatment of Neem oil @2.5% + *T. viride* @2.5% followed by Neem oil @2.5% + *Pseudomonas* @2.5% (1:2.59).

Introduction

Bottle gourd (*Lagenaria siceraria*) is one of the most important cucurbitaceous vegetable crop being grown both during warm and rainy season in northern parts of India. It has wide genetic diversity and is grown throughout the tropics and subtropics of the world. In India, bottle gourd is cultivated in an area of 158 thousand hactares with production of 2677 thousand metric tones (Anonymous, 2017).

It has originated in Africa (Singh, 2009) and from there by floating on the sea, it travelled to India, where it has evolved into numerous local varieties and has spread to China, Indonesia and far to New Zealand. In India the crop is grown commercially in most of the

states like U.P, Bihar, West Bengal, Assam, Punjab and Gujarat. In Uttar Pradesh, bottle gourd is cultivated during summer and rainy season. Bottle gourd is prone to various fungal, bacterial and viral diseases. Fruits can be used as a vegetable or for making sweets. As a vegetable, it is easily digestible, even by patients (Thamburaj and Singh, 2000).

They are widely distributed in the tropics and warm temperate regions of south, southeast east Asia and Africa including Madagascar, central and south America. The family is represented by about 120 genera and 800 species.

It is gaining importance due to its high yield potential, steady market price throughout the season. The fruits contain 0.2% protein, 2.9% carbohydrates, 0.5% fat and 11 mg of vitamin C per 100 g fresh weight**.** It also has wide medicinal properties such as laxative, digestive and to prevent constipation. The most common uses of cucurbits are as vegetable and fruits. They are valuable sources of vitamins and minerals. Among medicinal uses bottle gourd is traditionally used as a cardio-tonic, aphrodisiac and general tonic, liver tonic, anti-inflammatory, expectorant and diuretic agent. Recently, the antioxidant activity of ethanolic extract of epicarp and fresh juice of bottle gourd has been reported Deshpande *et al.,* (2008). The fruit of bottle gourd is also reported to have good source of Vitamin-B complex and Chlorine along with fair source of vitamin-C and β-carotene (Kirtikar and Basu, 2001).

The crop is attacked by a number of diseases such as *Alternaria* leaf blight, *Cercospora* leaf spot, powdery mildew, downy mildew and anthracnose, amongst which *Alternaria* leaf blight caused by *Alternaria cucumerina* is found to cause serious losses throughout Rajasthan and other states. The incidence and severity of *Alternaria* blight in bottle gourd fields is greatly influenced by temperature, relative humidity, soil condition at the time of planting, splashing rain, wind velocity, leaf wetness and inoculum density available in the soil (Meena *et al.,* 2004).

Materials and Methods

The experiment was conducted in the research field and laboratory of Department of Plant Pathology, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2018-2019.

Preparation of the field

The field was dug up, weeds were cleaned and the soil was pulverized and the total area was divided into 24 plots.

Cleaning and sterilization of glassware

Glasswares to be used during experiment were dipped in the tap water overnight and then washed with detergent powder in running tap water and sun dried. The cleaned glassware's were wrapped with clean paper separately and sterilized in an electric hot air oven at 180°C temperature for 2 hours before further use.

Preparations of media

The culture media used in experiment were prepared according to the standard formula given by For isolating and growing of pathogen *Alternaria* spp. Potato dextrose agar (PDA) medium was used the composition of PDA is as follows

Ingredients

Peeled potato tuber	– 200 g
Dextrose	– 20.0g
Agar	– 20.0g

Distilled water – 1000 ml

P^H – 6.0-6.5

Application of *Trichoderma viride*

Talcum based formulation of *Trichoderma viride* manufactured by Yash Biotech Pvt. Ltd; Prayagraj was used for field experiment. Before applying the talcum based formulation of *Trichoderma viride* in the field the c.f.u was checked in the laboratory. Seed treatment @ 50g/kg of *Trichoderma viride* was used. Rathi and Singh (2009).

Application of *Pseudomonas flourescens*

Powder based formulation of Pseudomonas *flourescens* was used as seed treatment 50g/kg. Application of seed treatment was used before sowing of seed.

Results and Discussion

Effect of treatments on Disease intensity at different days interval

Disease intensity (%) at 60 DAS

The maximum reduction percentage of disease intensity which was recorded in treatment T_1 Neem oil + *T. viride* (15.0) followed by the T_2 Neem oil + *P. fluorescens* (18.7), T_5 Neem oil(19.1), T_4 *T. viride* + *P. fluorescens* + Neem oil (19.3), T_3 *T. viride* + *P. fluorescens* (21.4), T_6 *Trichoderma viride* (21.5), T_7 *Pseudomonas fluorescens* (26.5) and the lowest was recorded in treatment T_0control (31.0).

Disease intensity (%) at 75 DAS

The maximum reduction percentage of disease intensity which was recorded in treatment T_1 Neem oil + *T. viride* (31.8) followed by the T_2 Neem oil + *P. fluorescens* (33.9), T_5 Neem oil (36.1), T_4 *T. viride* + *P. fluorescens* + Neem oil (36.8), T_3 *T. viride* + *P. fluorescens* (38.6), T_6 *Trichoderma viride* (39.2), T_7 *Pseudomonas fluorescens* (40.0) and the lowest was recorded in treatment T_0 control (51.8).

Disease intensity (%) at 90 DAS

The maximum reduction percentage of disease intensity which was recorded in treatment T_1 Neem oil + *T. viride* (34.3) followed by the T_2 Neem oil + *P. fluorescens* (40.0), T_5 Neem oil (41.8), T_4 *T. viride* + *P. fluorescens* + Neem oil (42.3), T_3 *T. viride* + *P. fluorescens* (42.8), T_6 *Trichoderma viride* (47.1), T_7 *Pseudomonas fluorescens* (48.1) and the lowest was recorded in treatment T_0 control (55.6).

From the above studies, it is concluded that *Alternaria* is a destructive pathogen causing a widespread destruction in vegetables. But it becomes easier to control this cosmopolitan fungus.

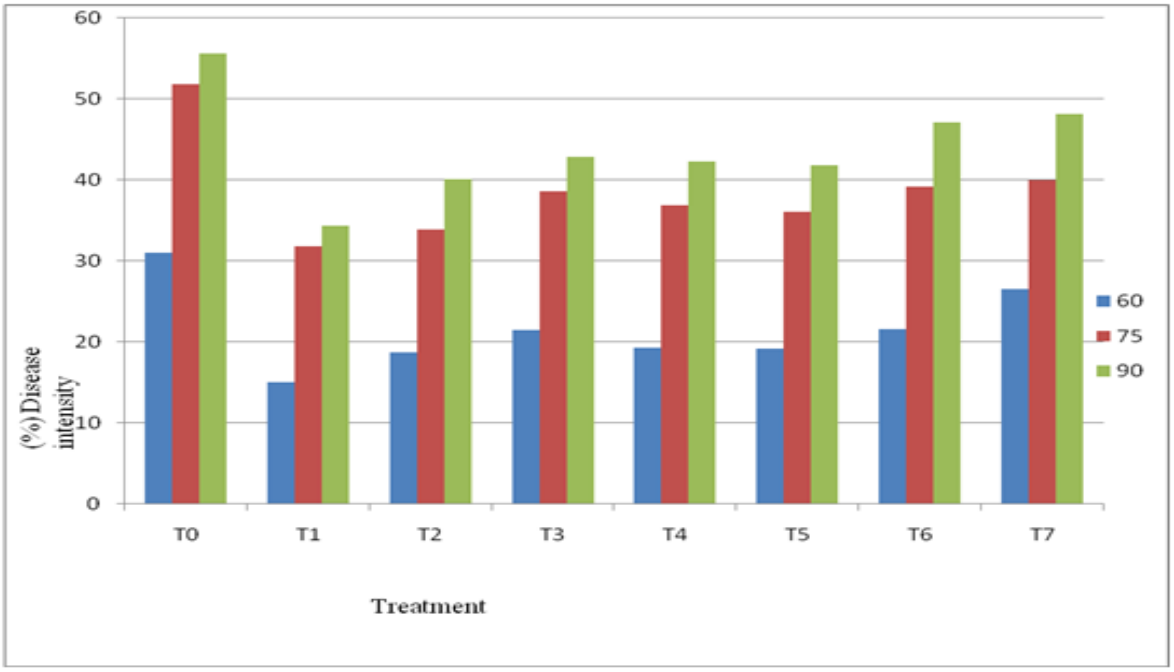
Keeping in mind, it is advisable to the growers to manage *Alternaria* leaf blight disease of bottle gourd by adopting management measures of combine treatments Neem oil + *T. viride* @ (2.5%+2.5%) seed treatment found best among the all treatments giving best control on leaf blight disease intensity followed by Neem oil + *P. fluorescens* (2.5%+2.5%).

This disease may attain an alarming status and may wreak havoc in bottle gourd growing areas if not taken care well in time. Therefore, it is need of the hour to know effective management strategy against this dreaded disease of the crop.

Table.1 Effect of treatments on leaf blight disease intensity at 60, 75 and 90 DAS of bottle gourd (*Lagenaria siceraria*)

S.No	Treatment	60DAS	75DAS	90 DAS
T_0	Untreated	31.01	42.17	55.67
T_1	**Neem oil+*T. viride***	**15.04**	**31.87**	**34.39**
T_2	**Neem oil+*P. fluorescens***	**18.74**	**33.93**	**40.08**
T_3	*T. viride +P. fluorescens*	21.48	38.63	42.86
T_4	*T. viride + P. fluorescens*+Neem oil	19.34	36.86	42.32
T_5	Neem oil	19.18	36.1	41.89
T_6	*Trichoderma viride*	21.56	39.24	47.12
T_7	*Pseudomonas fluorescens*	26.55	40.04	48.12
	OverallMean	**21.61**	**37.36**	**44.05**
S.Ed.(±)		**3.697**	**4.322**	**4.484**
	C.D.(P=0.05)	**7.938**	**9.279**	**9.615**

Fig.1 Effect of treatments on leaf blight disease intensity at 60, 75 and 90 DAS of bottle gourd (*Lagenaria siceraria*)



In the present study, on the basis of observation, it is shown that Treatment Neem oil @2.5% + *Trichoderma*@2.5%was the best effective in comparison to other treatment followed by Neem oil @ 2.5% + *Pseudomonas*@2.5%. Neem oil @ 2.5% + *Trichoderma* @ 2.5% have shown the most effective results on Plant height, No. of branches, minimum disease intensity and good yield. Hence, from the present study it can be concluded that Neem oil @ 2.5%+ *Pseudomonas* @ 2.5% in comparison to Neem oil @ 2.5%+*Trichoderma* @ 2.5% can be used effectively to reduce the disease intensity and get better yield similar to by use of chemicals. As the human population is now heading towards the organically produced and organically managed agriculture products, the above finding will be useful for safe and environment friendly future.

Acknowledgement

The authors are thankful to department of plant pathology, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj for providing laboratory facilities.

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How to cite this article:

Hari Narain Singh, Shashi Tiwari, Prashant Raghuvanshi and Shubham Singh. 2021. Management of Leaf Blight caused by *Alternaria cucumerina* in Bottle Gourd (*Lagenaria siceraria*). *Int.J.Curr.Microbiol.App.Sci.* 10(04): 302-306.
doi: https://doi.org/10.20546/ijcmas.2021.1004.031