Original Research Article

Studies on antimicrobial effect of botanicals on leaf blight of Indian mustard caused by *Alternariabrassicae*

ABSTRACT

The present study was conducted at ANDU&T Kumarganj Ayodhya at student instructional form (SIF). As in the investigation it was observed that foliar spray with Carbendazim (0.1%), Neem oil (5%), followed by Neem leaf extract (5%) found to be more effective on growth parameters like Number of branches/plants, number of leaves/ plants, plant height (cm), number of pods/plants,) and increased the yield (1000-seed weight, per plant yield (g), per hectare yield) and also significantly reduced the Alternaria blight in Indian mustard. Carbendazim (0.1%), *Trichoderma harzianum* (2%)followed by garlic bulb extract (5%) was found most effective in reducing Alternaria blight, recorded maximum disease incidence *i.e.*Per cent Disease intensity, Per cent Leaf area disease (LAD), Per cent leaf infection, number of spots per pods, seed infection per cent respectively.

Keywords: Alternariabrassicae, Leaf blight,Indian mustard and Botanicals

1. INTRODUCTION

India is one of the major producers in the global oilseeds/ vegetable oil economy. India has the largest area in oilseed crops in the world. However, the productivity is low as it is just 50-60 per cent of the world average [1]. Alternaria blight is a most dangerous disease of rapeseed mustard crop and this appears all winter session. Crops throughout the crop growing areas of the world. It occurs in various countries like Canada, England, France, Holland, Poland, Spain, Sweden, Australia, USA, and Asian countries. *A. brassicae*causal organism of Alternaria blight disease of mustard was reported from whole world. It was infected cruciferous crops and its causing yield loses with no proven main diseases of mustard source of movable fight in several of the crops [2]. This disease is a major limiting factor in reducing the yield of Rapeseed-mustard in India. Which is range from 15-71% due to this disease. The disease cause quantitative loss as well as, seed quality in term of seed size seed colour and oil content are reduced due to loss of chlorophyll in infected plant which also reduce the growth and development of plant [3]. *A. brassicae* is a pathogen necrotrophic. The major symptoms are appears as the form of spots on leaves, stem and pods mustard plant [4,5,6].

2. MATERIAL AND METHODS

2.1 Collection of botanicals and preparation of plant extract

Botanicals such as leaf of Neem leaf (*Azadirachitaindica*), and *Ocimumsactum*collected from ANDU&T field and Onion (*Alliumcepa*), Ginger, Neem oil, and clove of Garlic (*Allium sativum*), *Trichoderma harzianum and* Carbendazim were collected from local market. For preparation of extract, collected plant materials were weighed in an electric balance and then washed in water. Plant material are chopped in required quantity of water (1:1. w/v), boiled for 30 min. and then strain through cheese cloth to obtained standard plant extract solution (100%). The extract is centrifuge at 5000 rpm for 5 min. and the clear supernatant was used as stock solution. All the treatments were used as foliar spray as given in table no.1.

Table no.1. Details of different treatments. (Used as foliar spray).

Treatments	Name	Dose
T^1	*Trichoderma harzianum*	2%
T^2	Neem oil	5%
T^3	*Aliumcepa*	5%
T^4	Ginger rhizome extract	5%
T^5	Garlic bulb extract	5%
T^6	*Ocimumsactum*extract	5%
T^7	Neem leaf extract	5%
T^8	Carbendazim	0.05%
T^9	Control	Water Spray

2.2 Application of spray solution

The Botanicals and fungicidal solutions were prepared by mixing with required amount of Botanicals and fungicide with water. seven botanicals and one fungicidal solution, (concentration @ 1:10) and plain water were sprayed with compressed hand sprayer as described in table no.1. Sprays were done at 30, 40, 50, 60 days after sowing. Every time the botanicals and fungicide were freshly prepared prior to application and the spray tank was thoroughly cleaned before filling with new spray solution. Special attention was given to complete coverage of the growing plants with the fungicides. Adequate precaution was taken to avoid drifting of spray materials from one plot to the neighbouring ones.

3. RESULTS AND DISCUSSION

3.1 Plant growth Parameters

The effect of treatments on the germination was recorded and shown in table 1 after the maximum number of seeds were germinated. The maximum germination was recorded in T7 (95.75%) and T5 (95.12%) over the control T9 (92.94%) respectively followed by T3 (95.04%)], T4 (95.0%), T6 (94.8%), T8 (93.88%), T2 (93.63%), T1 (93.60). As all significantly effective (Sharma *et al.* 2003) among the botanical studies that *Azadirachitaindica*is more effective against *Alternariabrassicae*of Indian mustard. (Singh *et al.* 2015) Neem leaf, Onion extract is more effective in germination. After as days after sowing (DAS) the data indicates that all treatments were significantly showing the effect as they were increasing the number of leaf/plant. The (table no.2) is the showing that T8 (25.00) and T2 (21.13)] were showing the best effect of treatment over the control i.e.T9 (14.93) followed by T7 (20.13) T1 (18.93), T6 (18.20), T3, T4 (17.27), T5 (16.33).

All the treatments were significantly showing the effect as they were increasing the number of branches/plant. The (table no.2) is the showing that T8 (7.17) and T2 (7.03) were showing the best effect of treatment over the control i.e.T9 (5.17) followed by T7 (6.77), T1 (6.57), T6 (6.37), T3 (6.30), T4 (6.03), T5 (5.77). (Ferdous *et al.* 2002) use Neem leaf extract and garlic bulb extract were significantly and reduce disease severity and increase yield. The data indicate that all the treatments were significantly best over the T9 as they were increasing the plant hight. It may be seen from the data (table no. 2) that best result found in T8 (79.53 cm), T2 (77.87 cm) and T7 (77.60 cm) followed by T3 (71.67 cm), T4 (68.27 cm), T5 (65.60 cm). Some researchers also used several fungicides and botanicals to manage the alternaria blight which also were increasing the plant growth which is supported by many scientist [7].

All the treatments were significantly showing the effect as they were increasing the number of pod/plant. The table no.2 is the showing that T8 (247.20), T2 (216.27) and T7 (205.93) were showing the best effect of treatment over the control i.e.T9 (156.33) followed by T3 (177.07), T4 (163.20), T5 (159.20). Maximum height found plant from T8 (Carbendazim) plot among the other all treatments. Among the other all treatments best result found from T2 (Neem oil) followed by all botanicals and bio-agent. Similar observation was recorded by some scientists [8,9] as they used botanicals' including Garlic bulb extract which were effective among the botanicals. 1000-seed weight was found to be significant in all the treatments as there were having positive effect. Spraying with T8 (4.50 g) T2

(4.33 g) and T7 (4.17g) were showing the best effect of treatment over the control i.e., T9 (2.77g) followed by T3 (3.80 g), T4 (3.67 g), T5 (3.17 g) respectively the data indicate by (table no.2). Many studieshas shown the same aspect and revealed the similarity of present investigation [12].

Significant variation of different treatments was found on yield per plant (g) and yield quintal per hectare. Maximum yield per plant (5.60 g) and per hectare (8.97 q) was obtained from T8 (Carbendazim) treated plot followed by T2 (neem oil), and T7(Neem leaf extract) in both the cases. The minimum yield per plant (3.07 g) and per hectare (4.70 q) was recorded from T9 (Control) (Table-1). Carbendazim T8 (Carbendazim) was more effective than other treatment respectively and T2 (Neem oil) was more effective among the botanicals. Likewise, mane scientist used Neem leaf extract and garlic bulb extract were significantly and reduce disease severity and increase yield [9,10].

3.2 Disease incidence Parameters

All the treatments were significantly showing the effect as they were increasing the disease intensity per-cent (%). The table no.3 is the showing that T8 (41.93%) T1 (41.93 %) and T5 (42.40 %) were showing the best effect of treatment over the control i.e.T9 (48.07) followed by T2 (43.00 %), T6 (43.00 %), T7 (43.53 %). [11, 12] They were also used Garlic bulb extract *T. harzianum* and Neem leaf extract botanicals which significant effective reduce disease incidence. Also [13,14, 15] revealed that *Trichoderma harzianum* which was best among the botanicals. [6,16] garlic bulb extract Tulsi and Neem extract at concentration 5%, 10% is more effective on disease intensity. [17,18,19] supported the present investigation by their study on Carbendazim and Trichoderma harzianum reducing the disease severity and increasing the grain yield. [9,10] use Neem leaf extract and garlic bulb extract which were significantly effective which reduce disease severity and increase yield.

The data indicate that all the treatments were significantly best over the T9 (control) (58.83). It may be seen from the data (table no.3) that best result found in T8 (32.07), T1 (38.47), T5 (39.33) followed by T2 (41.67), T6 (41.67), T7 (42.77).[20] also confirm reduced disease intensity the present investigations finding were also supported by. [21, 22]. The Per cent leaf area disease (LAD) in data it is indicated that all the treatments were significantly best over the T9 (21.33 %). It may be seen from the data (table no.3) that best result found in T8 (5.67 %), T1 (8.00 %), T5 (10.0 %) over the control [T9 (21.33 %)] respectively. followed by T2 (13.00 %), T6 (13.67 %), T7 (14.33 %). Per cent pod infection. A perusal of the data indicates that all the treatments were significantly superior over the T9 [control (41.83 %)] in Per cent pod infection. It may be seen from the data (table no.3) that minimum per-cent pod infection was found in T8 (25.17 %), T1 (25.50 %), T5 (25.87 %) followed by T2 (26.50 %), T6 (26.80 %), T7 (31.17 %). Similar observation was reported by scientists [1]as they also observed effect of botanicals in reduce disease severity and they were also used Garlic bulb extract *T. harzianum* and Neem leaf extract botanicals which significant effective reduce disease incidence [12, 18,13]. A perusal of the data indicates that all the treatments were significantly superior over the T9 [control (2.17)] Number of spots per pods. It may be seen from the data (table no.3) that minimum per-cent pod infection was found in T8 (0.97), T1 (1.17), T5 (1.17) followed by T2 (1.67), T6 (1.60), T7 (1.67). [23,24] They were used botanicals which significant effective reduce disease incidence.

After harvest percent seed infection was examined. Percent seed infection by *Alternariabrassicae* and *Alternariabrassicicola* of harvested seed received from treated plot with different botanicals, bio-agent and fungicide was found to be significant. Seed obtained from control treatment showed the highest percent seed infection (19.17%) while seed obtained from carbendazim (T8) treated plot showed the lowest seed infection (13.37%) preceded by T1 (13.67%), T5 (14 %) followed by T2 (14.83)], T6(14.53)], T7 (16.07). T8 [Carbendazim] was found more effective for controlling seed borne *Alternariabrassicae* of harvested mustard seeds. Similar result was recorded by (Singh *et al.* 2017) He was use nine botanicals' Garlic bulb extract is more effective. Some researchers also used Garlic bulb extract was significantly effective in reducing disease incidence. *T. harzianum* and Neem leaf extract as botanicals [6, 12].

Table no.2. Effect of different treatments of growth parameters of crop.

Treatments	Germination % Mean±SD	Leaves Per Plants *Mean±SD*	Branches Per Plants *Mean±SD*	Plant height (cm) *Mean±SD*	Pods Per Plants *Mean±SD*	1000 seed weight Mean±SD	Yield Per Plant In(g) Mcan±SD	Yield Per hectare in (q) Mean±SD
T^1*Trichodermaharzianum*	93.60±0.96	18.93±1.33	6.57±0.12	75.73±1.70	198.47±11.23	4.17±0.76	4.33±0.76	6.83±1.26
T^2 Neem oil	93.63±2.69	21.13±0.70	7.03±0.42	77.87±1.33	216.27±18.83	4.33±1.53	4.83±1.26	8.17±1.04
T^3 Aliumcepa	95.04±1.80	17.73±2.10	6.30±0.20	71.67±1.53	177.07±3.31	3.80±0.82	4.13±0.81	6.64±1.30
T^4 Ginger rhizome extract	95.00±0.33	17.27±2.00	6.03±0.50	68.27±1.03	163.20±8.32	3.67±1.53	3.80±1.06	5.50±0.87
T^5 Garlic bulb extract	95.12±4.00	16.33±2.08	5.77±0.61	65.60±1.74	159.20±10.25	3.17±0.76	3.50±0.50	5.10±1.15
T^6*Ocimumsactum* extract	94.08±1.46	18.20±2.23	6.37±0.31	74.67±2.14	190.80±7.79	4.00±1.32	4.17±0.76	6.80±0.75
T^7 Neem leaf extract	95.75±1.69	20.13±1.33	6.77±0.12	77.60±1.44	205.93±8.90	4.17±1.76	4.63±1.31	7.30±0.82
T^8 Carbendazim	93.88±3.96	25.00±0.53	7.17±0.46	79.53±1.63	247.20±9.10	4.50±1.32	5.60±0.53	8.97±1.05
T^9 Control	92.94±1.12	14.93±2.05	5.17±0.50	61.40±2.75	156.33±9.19	2.77±0.93	3.07±1.01	4.70±0.82
SE(in)	1.28	0.47	0.12	1.05	6.15	0.56	0.54	0.60
CD	3.71	1.37	0.35	3.05	17.88	1.64	1.56	1.75

Table no.3. Effect of different treatments of disease parameters of crop.

Treatments	Per cent disease intensity Mean±SD	Per cent leaf infection Mean±SD	Per cent leaf Area Disease(LAD) Mean±SD	Per cent Pod infection Mean±SD	Number of spots per pods Mean±SD	Per cent seed infection Mean±SD
T^1*Trichoderma harzianum*	41.93±0.12	38.47±2.34	8.00±1.00	25.50±1.32	1.17±0.76	13.67±1.26
T^2 Neem oil	43.00±0.72	41.67±3.21	13.00±3.61	26.50±2.78	1.67±1.15	14.83±2.25
T^3*Aliumcepa*	42.73±2.77	40.33±3.79	11.67±1.53	26.17±1.04	1.27±0.64	14.33±1.53
T^4 Ginger rhizome extract	42.93±0.76	41.33±3.21	12.67±1.53	26.33±3.79	1.33±0.76	14.50±2.21
T^5 Garlic bulb extract	42.40±2.46	39.33±3.06	10.00±1.00	25.87±2.20	1.17±0.76	14.00±2.00
T^6*Ocimumsactum* extract	43.00±1.04	41.67±4.04	13.67±2.08	26.80±1.59	1.60±0.53	14.53±3.32
T^7 Neem leaf extract	43.53±1.29	42.77±2.54	14.33±1.53	31.17±1.04	1.67±0.58	16.07±2.50
T^8 Carbendazim	41.93±1.14	32.07±2.10	5.67±2.08	25.17±1.44	0.97±0.06	13.37±1.70
T^9 Control	48.07±0.81	58.83±1.76	21.33±1.53	41.83±1.26	2.17±0.76	19.17±1.04
SE (m)	0.81	1.51	1.14	1.21	0.37	1.14
CD	2.35	4.40	3.31	3.52	1.06	3.31

4. CONCLUSION

As the chemicals have the hazardous effect on environment, mammalians and also economical consideration. Researchers are trying to find eco-friendly bio compounds for plant diseases management which should beneficial, cheaper and easily available too. To generate awareness of harmful effects of fungicides integrated use of bioagents *Trichoderma harzianum* and botanicals will be the perfect solution as foliar spray against Alternaria blight. In this investigation among the botanicals and bio agent Neem oil, Neem leaf extract, *Trichoderma harzianum* and Garlic bulb extract is effective to for of management Alternaria blight of mustard cause by *Alternariabrassicae.* So with this investigation it can be say that the many of the botanicals can be used as the alternatives of the chemicals which can be so cheap and good for human and environment too.

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