Original Research Article

Effect of selected botanicals and carbendazim against Alternaria blight disease (*Alternaria brassicae*) of mustard (*Brassica juncea* L.)

ABSTRACT

A field experiment was conducted at the research plot of the Department of Plant Pathology, SHIATS, Allahabad, U.P. during the *Rabi* season of 2023-24 to evaluate selected botanicals, and carbendazim for the management of Alternaria blight (*Alternaria brassicae*) of Indian mustard (*Brassica juncea* L.) by applying of foliar spray of botanical and seed treatment of carbendazim.The disease intensity(%),yield (q/ha), and cost benefit ratio were recorded. The minimum disease intensity (%)at 75 and 90 DASwas recordedof neem leaf extract + carbendazim(31.72) and (35.63) followed by lantana leaf extract+ carbendazim (33.54) and (38.72)ascompared with the control(T_0). The maximum yield (q/ha) was recorded (13.07q/ha) and cost benefit (1:1.82) neem leaf extract followed by lantana leaf extract + carbendazim as compared to untreated check(T_0).

Key words: *Alternaria brassicae*, botanicals, carbendazim

1.1INTRODUCTION

Mustard [*Brassicajuncea* (L.) Czem and Cross] is important *Rabi* oilseed crop which belongs to family “Cruciferae”.It is also growing in certain tropical and subtropical regions as cold weather crop. Indian mustard required annual temperature of 6 to 27℃, and pH of 4.3 to 8.3 (Kumar and Shete, 2021).The seed and oil of mustard have a peculiar pungency due to presence of glucosinolate and its hydrolysis products such as Allyl Isothiocyanate (0.30-0.35%) Mustard seed in general, contains 30- 33% oil, 17-25% proteins, 8-10% fibres, 6-10% moisture, and 10-12% extractable substances (Pandey *et al*., 2023).

The productivity saw 7% jump from 1331 to 1419 kg/ha. The area under rapeseed & mustard increased by 28% from 68.56 in 2019-20 to 88.06 lakh ha in 2022-23 (Source: DA&FW National Conference for *Rabi* Campaign 2023-24).

Alternaria blight, sclerotinia stem rot, white rust and nutrient deficiency causing substantial yield loss. which of the following alternaria blight is a major concern.Alternaria blight disease caused by *Alternariabrassicae* have been reported from all thecontinents of the

world affect most cruciferous crops and is one among the important diseases of rapeseed-mustard causing severe yield losses with no proven source of transferable resistance in any of the hosts.

2.1 Materials and Methods

2.1.1 Isolation

Potato Dextrose Agar (PDA) was prepared and 80 mg of streptomycin, an antibiotic was added to each 500 ml preparation of the PDA to inhibit probable bacterial growth. The infected leaf parts were cut into small pieces of 2-3 mm dimension in a manner so that pieces may have some green portion also. Such leaf bits were surface sterilized with 0.1 per cent sodium hypochlorite (NaOCl) solution for 30 seconds and washed three times with sterile distilled water to remove any traces of sodium hypochlorite adhered with leaf bits (Tuite, 1969). Two to three leaf bits were transferred on PDA medium contained in petri plates aseptically with the help of sterilized forceps. These petri plates were incubated at 27±2°C.

2.1.2 Morphological characters of *Alternariabrassicae:*

The mycelium of *Alternaria brassicae* is septate and it becomes brown to brownish grey in colour. The conidiophores are dark septate, measuring 14-74µ×4-8µ. The structure of conidia is brownish black, singly borne or sparingly in chains with 2-4, Muriform along with beak (Ellis, 1971).

2.1.3 Preparation of plant extracts:

The fresh leaves of selected plants were gently washed under running tap water and finally in sterile distilled water. They were separately grinded in sterile water at the rate 1 ml/g of plant material in pestle and mortar. Then were filtered through double layer of muslin cloth and finally through sterilized Whatman no.1 filter paper. This forms 100 % standard plant extract solution. Further its dilution were performed of required concentration with sterilized water. By grinding 10 g of leaves in 100 ml of sterile water 10 % of leaf extract can be obtained.

2.1.4 Per cent disease intensity

Per cent disease intensity was recorded at 45, 60, 75 and 90 days after sowing. The disease intensity was calculated using the following formula (Wheeler, 1969)

$$Disease\ intensity\ (\%) = \frac{Sum\ all\ disease\ ratings}{Total\ number\ of\ ratings\ \times Maximum\ disease\ grade} \times 100$$

2.1.5 Disease intensity scale

Fiveplantswererandomlyselectedasgrades ineachplot attheinterval of 15days asperthescalegivenbyMayeeandDatar (1986)which isgivenbelow:

List 1 : Disease intensity scale

Grade	Leafareainfected
0	Nosymptomsontheleaves
1	Smallspotscovering1%orlessarea
3	Smallspots(upto5mminsize)covering1-10%ofleafarea
5	Spotsenlargingandcovering26-50%ofleafarea
7	Spotcoalescetoformbig patchescovering26-50%ofleafarea
9	Bigspotcovering51%ormoreofleafarea

2.1.6 Cost benefit ration

Gross return was calculated by multiplying total yield with the market price of the produce. Cost of cultivation and cost of treatment imposition will be deducted from the gross returns, to find out net returns and cost benefit ratio by following formula(Reddy and Reddi 2004)

$$C : B\ ratio = \frac{Gross\ return}{Total\ cost\ of\ cultivation}$$

3.1 Result and Discission

The application of botanicals and seed treatmentwith carbendazim,such asneem leaf extract + carbendazim, lantana leaf extract + carbendazim, eucalyptus leaf extract + carbendazim, datura leaf extract + carbendazim, chenopodium leaf extract + carbendazimand mancozeb 75% WP (0.2%) + carbendazim.

The results revealed that the application of botanicals and seed treatment with carbendazim,showed minimum disease intensity (%) @ 75 DAS was recorded with neem leaf

extract + carbendazim (31.720%) followed by lantana leaf extract + carbendazim (33.547%) as compared to treated check mancozeb + carbendazim (26.760%) and control (47.597%).Minimum disease intensity (%) @ 90 DAS was recorded with neem leaf extract + carbendazim (35.630%) followed by lantana leaf extract + carbendazim (38.723%) as compared to treated check mancozeb + carbendazim (29.547%) and control (53.537%).

In the present study, the minimum disease intensity at 45, 60, 75 and 90 DAS was recorded with neem leaf extract + carbendazim followed by lantana leaf extract + carbendazim and found to be effective over other treatments. The probable reason for such a finding may be that neem possess fungicidal property. It might be due to the presence of azadirachtin, nimbin, and salannin that are the most important biologically active substances of neem, which exhibit antimicrobial, insecticidal, and antifungal properties. The antifungal properties of neem extract are may be attributed to its ability to inhibit the fungal growth through mechanisms disruption of fungal cell membranes, causing leakage of cellular contents. Inhibition of spore germination and mycelial growth, may reduce the spread of the pathogen and enhance the plant health. Similar findings have been reported by Shrivastava and Swarnkar (2014) and Thakur and Zacharia (2017).

Maximum yield (q/ha) was recorded with neem leaf extract + carbendazim (13.07q) followed by lantana leaf extract + carbendazim (12.42q) as compared to treated check mancozeb + carbendazim (14.00q) and control (9.14q). Maximum cost benefit ratio was recorded with neem leaf extract + carbendazim (1:1.82) followed by lantana leaf extract + carbendazim (1:1.74) as compared to treated check mancozeb + carbendazim (1:2.01) and control (1:1.41).

In this study, the increases in yield (q/ha) could potentially be attributed to the presence of neem leaf extract + carbendazim followed by lantana leaf extract + carbendazim and found to be effective over other treatments. It may have released growth-regulating substances and aided in the control of pathogen, also leading to the observed enhancement of yield. The antifungal properties of neem have suppressed fungal growth and increased in yield. Similar findings have been reported by Sailaja *et al.* (2017), Sharma *et al.* (2021) and Ravella *et al.* (2023).

Table 1 Effect of selected treatments on yield (q/ha) and per cent disease intensity (%) of alternaria leaf blight at 45, 60, 75, and 90 DAS

Tr. No.	Treatment	Per cent disease intensity (%)				Yield (q/ha)	C:B ratio
		45 DAS	60 DAS	75 DAS	90 DAS		
T_0	Control	21.613	35.410	47.597	53.537	9.14	1:1.43
T_1	Neem leaf extract @10% (F.S.) + Carbendazim 2g (S.T.)	16.897	23.503	31.720	35.630	13.07	1:1.85
T_2	Lantana leaf extract @10% (F.S.) + Carbendazim 2g (S.T.)	18.360	25.100	33.547	38.723	12.42	1:1.76
T_3	Eucalyptus leaf extract @10% (F.S.) + Carbendazim 2g (S.T.)	18.620	30.820	38.340	43.263	10.76	1:1.53
T_4	Datura leaf extract @ 10% (F.S.) + Carbendazim 2g (S.T.)	19.413	31.160	37.820	42.697	11.10	1:1.58
T_5	Chenopodium leaf extract @ 10% (F.S.) + Carbendazim 2g (S.T.)	20.420	32.470	41.733	47.533	11.70	1:1.66
T_6	Mancozeb 75 % WP (0.2%) (F.S.) + Carbendazim 2g (S.T.)	15.563	21.603	26.760	29.547	14.00	1:2.04
	C.D. (P=0.05%)	0.554	0.538	0.526	0.588	0.498	
	C.V. (%)	1.664	1.058	0.804	0.795	2.386	

*F.S. Foliar Spray and *S.T. Seed Treatment

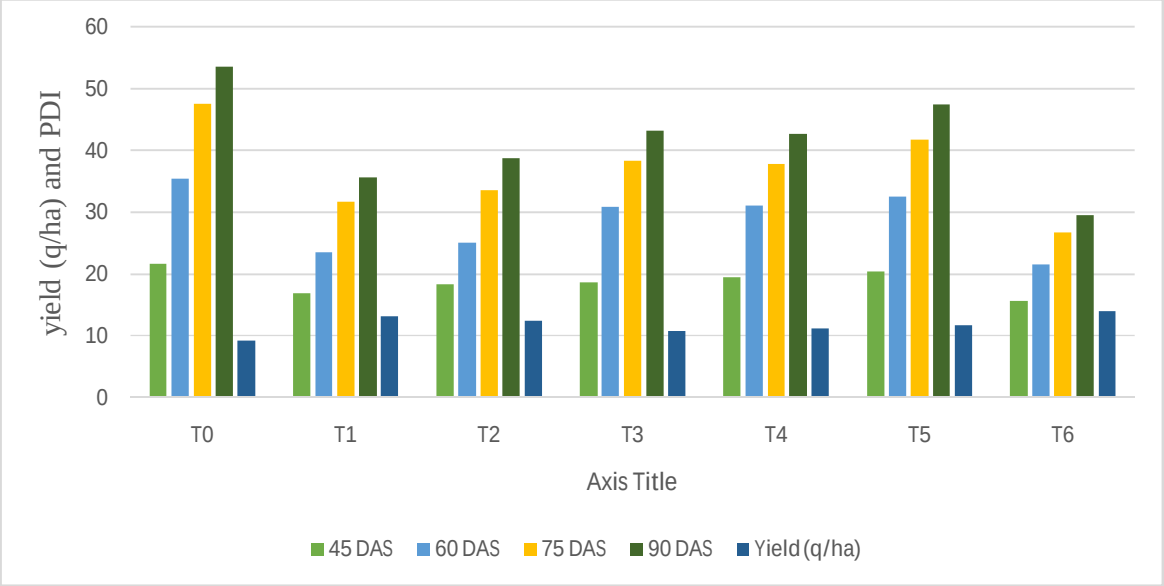

Figure1.Effect of selected treatments on yield (q/ha) and percent disease intensity (%) of alternaria leaf blight at 45, 60, 75, and 90DAS

4.1 CONCLUSIONS

This study "Effect of selected botanical and carbendazim against Alternaria blight disease (*Alternaria brassicae*) of mustard (*Brassica juncea* L.)". found that plant extracts can help manage the disease alternaria blight in mustard plants. It was found that botanical neem leaf extract significantly managed *Alternaria brassicae* which causes Alternaria blight disease on mustard. The findings also indicate that neem leaf extract (Foliar Spray) + carbendazim (Seed Treatment) to observe the minimum disease intensity (%), maximum plant height (cm), yield (q/ha) and cost benefit ratio. The study concludes that plant extracts play a key role to manage alternaria blight in mustard. This experiment proves that farmers can manage alternaria blight in mustard without chemicals by using various plant extracts. However, these findings are from just one growing season. To confirm these results, researchers should run more trials in the future.

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