

Study of the effect of different doses of chemical fertilizers on the incidence and intensity of the Alternaria blight of mustard

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Abstracts

Alternaria blight is an important disease of mustard caused by Alternaria brassicae (Berk) Sacc., all the continents of the world, in India it causes up to 47% yield losses. It is the major disease in mustard growing region of Madhya Pradesh and causing heavy losses. The experiment was conducted at college of Agriculture, Tikamgarh during the Rabi season of 2015-16 with the different doses of NPK. All the different doses of N, P & K were significantly effective in reducing the intensity and incidence of Alternaria blight. The minimum per cent disease intensity and incidence was recorded in 60:60:50 (32.96%) & 60:60:50 (18.28%) respectively. The maximum per cent disease intensity and incidence was recorded in 80:40:30 (45.33% & 34.42%) respectively. The highest seed yield was recorded for NPK dose 60:60:50 (1202.46 kg/ha), which was significantly superior over all other treatments.

Key words: *Different doses of NPK, incidence, intensity, Alternaria blight, mustard*

Introduction

Mustard is an important oilseed crop of India and ranks first position with regard to area and production of mustard. India is the fourth largest producer of oilseeds in the world and stands second in Asia. Rapeseed –mustard is the major oilseed crop grown in Rabi season in different regions of the country. It is the second most important edible oilseed after groundnut sharing 27.8% in the India's oilseed production. In India Mustard is cultivated in an area about 5.79 million hectare with the production of 6.31 million tonnes and productivity of about 1089 kg ha⁻¹ (Anonymous, 2015). In Madhya Pradesh Mustard crops are cultivated in area about 12.31 million hectares with the production of about 11.36 million tonnes and productivity of about 1006 kg ha⁻¹ (Anonymous, 2015). In Tikamgarh district mustard crops are cultivated in area about 0.40 million hectares with production of 0.21 million tonnes and productivity of about 539 kg ha⁻¹ (Anonymous, 2016). The major mustard producing states are Rajasthan, Uttar Pradesh, Punjab, Haryana, and Madhya Pradesh. Among these states Rajasthan, Uttar Pradesh and Madhya Pradesh are the major rapeseed-mustard growing states (Chauhan et al., 2011). Severe infection caused by

disease creates substantial yield loss as a result of early defoliation, flower-bud absorption, pre-mature ripening, siliqua dehiscence and seed shriving (Seidle et al., 1995). In India, yield losses due to this disease of 15-71% were reported (Kumar 1997, Ram and Chauhan 1998).

Materials and Method

The experiment was conducted at college of Agriculture, Tikamgarh during the Rabi season of 2015-16. Among the three macro elements, Nitrogen (N) was applied at the rate of 60, 70, 80 & 90 kg/ha, phosphorus (P) at 40, 50 and 60 kg/ha and Potassium (K) at 30, 40 and 50 kg/ha. The nutrient elements were applied in eight different treatments combination viz, T₁ = 60:50:40, T₂ = 60:60:40, T₃ = 60:60:50, T₄ = 70:50:40, T₅ = 70:60:40, T₆ = 80:40:30, T₇ = 80:50:40 and T₈ = 80:50:40. Urea, Single super phosphate and Muriate of potash were used as sources of N, P & K. Among the treatments T₈ as considered as standard check. The experiment was laid out a randomized complete block design with three replications. The unit plot size was 4x3 m². The mustard variety Pusa Bold was sown on 1st week of November maintains a spacing of 30 cm between the lines Intercultural operation viz.,

weeding, irrigation and insecticide spray were done as and when required. The intensity of the disease was calculated by following 0-5 scale (Conn et al., 1990) on randomly selected plants. The grain yield per plot was also recorded which was extrapolated to give the value of yield in kg ha⁻¹. The recorded data were analyzed statistically.

The per cent disease intensity (PDI) was calculated by using the following formula:

$$\text{PDI} = \frac{\text{Sum of numerical grade} \times 100}{\text{No. of leaves assessed} \times \text{Maximum grade}}$$

The incidence of *Alternaria* leaf blight was calculated by observing the per cent infected plants spread across the field.

The formulae employed to arrive at the disease incidence is given below:

$$\text{Incidence (\%)} = \frac{\text{The number of infected plants with ALB}}{\text{Total number of observed plants}} \times 100$$

Results and Discussion

The data on the field evaluation of different doses of N, P & K on disease intensity and incidence controlling *Alternaria* leaf blight of mustard are present in Table 1.

The results data in Table 1 reveal that all the different doses of N, P & K were significantly effective in reducing the intensity of *Alternaria* blight. The minimum per cent disease intensity was recorded in 60:60:50 (32.96%) followed by 60:60:40 (33.94%),

60:50:40 (35.55%), 70:60:40 (36.71%), 70:50:40 (37.00%), 80:50:40 (37.26%) and 90:60:50 (42.67%) while maximum disease intensity was recorded in 80:40:30 (45.33%). The efficacy of 60:60:50 was statistically best among themselves.

The minimum disease incidence per cent was recorded in 60:60:50 (18.28%), followed by 60:60:40 (20.84%), 60:50:40 (23.66%), 70:60:40 (24.27%), 70:50:40 (25.35), 80:50:40 (27.10%) and 90:60:50 (29.84%) while maximum disease incidence was recorded in 80:40:30 (34.42%). The efficacy 60:60:50 was statically superior among themselves.

The highest seed yield was recorded for 60:60:50 (1202.46 kg/ha) followed by 60:60:40 (1150.43kg/ha), 60:50:40 (1101.05), 70:60:40 (1100.07 kg), 70:50:40 (847.58 kg/ha), 80:50:40 (755.94kg/ha) and 90:60:50 (744.32kg/ha) over 80:40:30 (723.05 kg/ha).

Tikamgarh is the one of the major mustard growing area in Bundelkhand region of Madhya Pradesh, but the farmers usually grow local varieties with their own fertilizers management so the yield is very low. There is a good scope to introduced high yielding variety of mustard with optimum fertilizers management in that area which will help to minimum the yield and gap between existing production and potential yield of the crop.

The present investigations also explored to determine the optimum N, P & K combination for the management of *Alternaria* blight of high yielding mustard variety Pusa Bold.

During the experiment 8 different combination dose of N, P & K was applied in the mustard found

Table 1: Effect of different doses of N, P& K on the Incidence & intensity of *Alternaria* blight of mustard

S.No.	Treatments	PDI	Incidence (%)	Yield (kg/ha)
1.	60:50:40	35.55(36.61)	23.66(29.08)	1101.05
2.	60:60:40	33.94(35.64)	20.84(27.14)	1150.43
3.	60:60:50	32.96(35.02)	18.28(25.22)	1202.46
4.	70:50:40	37.00(37.45)	25.22(30.13)	847.58
5.	70:60:40	36.71(37.28)	24.27(29.48)	1100.07
6.	80:40:30	45.33(42.32)	34.42(35.93)	692.02
7.	80:50:40	37.26(37.54)	27.10(31.37)	755.94
8.	90:60:50	42.67(40.78)	29.84(33.10)	723.05
	C.V.	12.40	13.12	16.28
	SEm±	2.70	1.93	88.94
	CD at 5%	7.85	5.61	258.85

and reveal that the combination 60:60:50 NPK (kg/ha) was found has best combination for reducing disease incidence and intensity of *Alternaria* blight and gave higher seed yield as compare other combination of NPK. Present investigations indicate that maximum dose of P & K with minimum dose of N where applied then incidence and intensity of disease decrease and yield increase. When, higher dose of P & K were applied with higher dose of N, then incidence and intensity of disease increase and yield of mustard decrease. The results of present investigations also indicate that N fertilizers play an imported role disease development and seed yield of mustard.

The present finding are agreement with Khatun et al., (2011) he was reported that higher dose of K decrease the intensity of *Alternaria* blight of mustard but higher dose of N increase the disease incidence. Singh (2004) also found that a spot size on leaves and pods of rapeseed-mustard increase with the increase in the application of N fertilizers, but it decreased with the increased application of P & K fertilizers. Meena et al., (2015) an experiments was conducted to study the effect of nutrients and lower leaf removal in Indian mustard (*Brassicae juncea*) on *Alternaria* blight results indicated that maximum *Alternaria* blight reduction (26%) was observed by soil application of Potash at 40 kg ha⁻¹+Zinc sulphate at 25 kg ha⁻¹+Copper sulphate at 40 kg ha⁻¹+Sulphur at 10 kg ha⁻¹+Ridomil-MZ 72 as foliar spray at 0.25% was better when applied as foliar spray (21%)

Several reports indicate that soil application of NPK decreased *Alternaria* blight intensity to various levels and increased seed yield of mustard. Higher dose of N then a balanced rate enhanced the severity and incidence of various diseases caused by *Alternaria brassicae*, *Alternaria brassicola*, *Alternaria porri*, *Alternaria solani* and *Alternaria spp.* Based on finding present investigation, it may be controlled that higher dose of P & K with lower dose of N decreases the incidence and intensity of *Alternaria* blight and the seed yield of mustard increases.

The use of application of optimum combination of nutrients facilitate induced tolerance at the same time as lower leaf removal keep away from the reach of inoculums to the plants. Their role to minimize disease severity in Indian mustard resulted higher seed yield and their adoption could be economically and environmental friendly to the mustard farmers.

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