INTERNATIONAL JOURNAL OF PLANT PROTECTION | VOLUME 6 | ISSUE 2 | OCTOBER, 2013 | 373-375

IJPP

RESEARCH ARTICLE

Efficacy and economic effect of sulphur in black spot disease (*Alternaria brassicae*) management as well as yield attribute and oil content of toria

■ S.R. SHARMA[1]* AND DHERMENDRA P. SINGH[2]

[1]Krishi Vigyan Kendra, Piproudh, KATNI (M.P.) INDIA
[2]Agriculture Research Station, SAGAR (M.P.) INDIA

ARITCLE INFO

Received : 01.07.2013
Revised : 26.08.2013
Accepted : 03.09.2013

Key **W**ords :
Alternaria brassicae, Soil applied sulphur, Toria var.PT303, Black spot disease

***Corresponding author:**
Email: srsharmasrsgkp@rediffmail.com

ABSTRACT

Effect of soil application of eight treatments of sulphur(S) as nutrient on the severity of black spot disease(BSD) caused by *Alternaria brassicae* and yield of toria (*Brassica campestaris* L.) were investigated in 2009-10 and 2010-11.The severity of BSD was significantly greater(43.68%)on plant grown in 50 kg/ha sulphur(T5) in comparison to 10 to 40 kg S/ha. It was seen that as increased the dose of sulphur also increases the incidence of disease up to 50 kg but after that reduced the incidence on the leaves . The same pattern was also found on the pod. Maximum yield (14.68q/ha) and oil content(41.69%) was obtained in the plot treated with 50 kg sulphur than all other treatments. It was at par with 40 kg S /ha which proved to be the next best treatment. The control treatment had 9.99 q yield and 36.70% oil content than T_5 (35 kg sulphur). Sulphur applied @ 35kg/ha (T_5)gave maximum net profit than 28 kg and 21 kg.

How to view point the article : Sharma, S.R. and P. Singh, Dhermendra (2013). Efficacy and economic effect of sulphur in black spot disease (*Alternaria brassicae*) management as well as yield attribute and oil content of toria. *Internat. J. Plant Protec.*, **6**(2) : 373-375.

INTRODUCTION

Toria or lahi (*Brassica campestris* var. toria, Duth and Full) is one of the most important edible oilseed crops under the rapeseed mustard group. Normally the toria crop planted in September/first week of October, if taken as pure crop yield about 09-13q/ha-1.The crop is highly susceptible to *Alternaria brassicae* (Sacc.) Berk. which causease the black spot disease (BSD). The disease causes an average yield loss of 35-40% in India (Kolte *et al.*, 1987). The Alternaria blight can be controlled by chemicals spray but there is much limitation such as cost, availability, development of resistance and pollution hazards by their continuous use. Maximum work has been conducted on nitrogenous fertilizers. Application of nitrogen fertilizer without phosphorus and potashium increased the disease severity, whereas potashium alone reduced black spot disease (Sandhu *et al.*, 1985). Therefore, use of crop nutrition like sulphur as a management practice affects relationship between crop and pathogen in many ways. It only not improved the crop health but also increased the yield and oil content in rapeseed–mustard (Shukla *et al.*, 1981). Limited work is available on the application of sulphur in the production of crops and management of the disease. Use of sulphur as crop nutrients and fungicide reduced fungal leaf pathogen (McGrath and Johnston 1986). Sulphur increases the severity of rust of cereal. Rashid *et al.* (1985) reported that with increase the dose of sulphur there was a increase the severity of disease caused by *A. triticina* on the wheat crop. Hence, the present investigation was carried out by using different doses of sulphur in the management of black spot disease (BSD) and qualitative production of toria.

MATERIAL AND METHODS

Field experiments were conducted during two crop season 2009-10 to 2010-11 with different doses of soil

application of sulphur (0,7,14,21,28,35,42and 49 kg/ha designated as T_0, T_1,T_2, T_3, T_4 ,T_5, T_6 and T_7 treatments, respectively) to study the effect on severity of Alternaria blight of toria. These treatments were taken in Randomized Block Design with three replications. Toria var. PT303 was taken for experiment. The sowing was done on 3rd October in 2009 and 5th in 2010 with recommended dose of NPK fertilizers. The plot size was 3m × 4m withrow spacing of 30 cm and plant spacing with in two row of 10 cm. For artificial inoculation, inoculum was collected from naturally infected field grown crop(var. PT303) leaves having high sporulated spots, were collected and rubbed to dislodge spores in 10 l of water The conidial suspension thus obtained was allowed to stand for 3-5 min. to settle the dust particles and then filtered to remove leaf tissue. Plants were artificially inoculated at 45 DAS. About 1.5 l suspension was sufficient to give good coverage for each plot. Plant was inoculated in the evening for better infection due to favourable temperature and humidity. The severity of the BSD was assessed as the average disease index on leaf and pods The disease index was calculated for assessment on ten plants selected randomlyin each plot and tagged for scoring the infected leaves at 55 and 75 DAS and scoring the infected pods on main racemes at 60 and 80 DAS. Twenty-five infected leaves and 50 infected pods from main racemes were selected and score using a 0-5 disease ratting scale. The disease index was then calculated using the (rating) formula :

Disease Index (%) = (Sum of all numerical / No. of leaves or pods examine × Maximum grade) × 100

Plant were allowed to dry after harvesting and threshed carefully to get the seeds. The seeds were cleaned and dry to less then 10% moisture by weight the yield per plant based on the average of ten plants. Yield /ha-1 and 1000 seed weight ware calculated. The oil content in the seed was determined by nuclear magnetic resonance technique using the NMR. Net profit/ha in production was also calculated in compression to control.

RESULTS AND DISCUSSION

Average disease index of two years 2009-10 to 2010-11 on leaf was analyzed and has been summarized in Table 1 which showed that, maximum disease index (43.68) was found in those plot applied with 35kg sulphur followed by 40 kg in

Table 1 : Average disease severity of Alternaria blight of toria (BSD) at different stages of plant growth (AV.2009-10 to 2010 -11)

Dose of sulphur	Disease severity on leaf(%)		Disease severity on pod(%)	
	55DAS	75DAS	60DAS	80DAS
T_1	31.96	53.84	40.67	55.00
T_2	34.89	56.36	43.39	56.67
T_3	35.93	59.02	46.19	56.99
T_4	39.26	62.23	49.59	60.02
T_5	43.68	68.84	52.17	65.85
T_6	39.39	61.85	43.23	57.53
T_7	35.36	60.40	39.50	50.19
T_0 (check)	32.15	52.84	37.28	52.18
C.D. at 5%	2.45	4.35	5.01	4.27
SE ±	0.73	1.30	1.50	1.28
C.V	2.37	3.68	5.11	3.69

Table 2 : Influence of sulphur nutrition on the yield and oil content of toria (Av.of 2009-10 to 2010-11)

Dose of sulphur in soil	Yield/plot(g)	Yield/ha(q)	1000 seed wt.(g)	Oil content (%)
T_1	800.00	11.11	3.37	37.23
T_2	837.67	12.13	3.45	38.71
T_3	898.23	12.46	3.51	43.78
T_4	968.33	13.44	3.71	43.62
T_5	1057.33	14.68	3.93	41.69
T_6	900.00	12.49	3.76	41.94
T_7	870.00	12.08	3.43	40.78
T_0	719.67	9.99	3.02	36.70
CD at 5%	62.64	0.59	0.85	0.27
SE ±	22.37	0.21	0.17	0.89

Table 3 : Efficacy and Economic of sulphur as soil application on toria production

Dose of sulphur in soil	Yield/ha (q)	Yield increased over check	Value of increased yield (Rs.)	Cost of treatment (Rs.)	Net profit (Rs.)
T1	11.11	1.12	3600	320	3568
T2	12.13	2.13	6390	640	5750
T3	12.46	2.47	7410	960	6450
T4	13.44	3.45	10350	1289	9061
T5	14.68	4.69	14070	1609	12461
T6	12.49	2.50	7500	1929	5571
T7	12.08	2.09	6270	2249	4021
T0 (Check)	9.99	–	–	–	–
CD at 5%	0.59	–	–	–	–
SE ±	0.21	–	–	–	–

comparison to 10 kg at 50 DAS of plant growth. In second observation, the disease index was more in 35 kg/ha sulphur supplemented plot in comparison to 42 kg and 49 kg/ha soil applied sulphur at 75 DAS. It was observed that sulphur increased the amount of disease in comparison to check. Disease index on pod was recorded at 60 and 80 DAS of plant growth in both seasons and average disease index is given in Table 1. The disease index was significantly higher on pod of plant supplemented with 35 kg sulphur than on plants fertilized with other doses of sulphur. The disease index increased with the increase in the dose of sulphur at 60 and 80 DAS. Development of the disease was noted up to 35 kg but beyond this dose of sulphur, there was a decrease of the disease severity in the plant. Similar reports have been made by Rashid *et al.* (1988) on leaf blight of wheat; Sastry 1966 on gaur plants and McGrath and Johnston 1986 on several leaf diseases. On the basis of two years data yield per plot was significantly higher in 35 kg (1057g) sulphur supplemented plot than 28 kg and 42 kg. (Table 2) The average yield of without sulphr supplemented plot was found 719.67 g. The same trend were also found in per hectare yield. This was interesting to note that sulphur application increased the disease severity one side and increased the yield in other side. Sulphur at higher dose showed toxicity in the plant resulting decrease in yield. One thousand seed weight of T_5 (3.93g) dose of sulphur application was significantly higher in comparison to T_6 and T_4. In check, 1000 seed wt was minimum (3.02g) than all the level of sulphur treatments. In addition to increase in yield, sulphur also increased the oil content from 37.23%. Oil content in the seed due to different treatments was significantly higher from that of check. T_3 (43.78%) had significantly higher oil content as compared to those seeds obtained from T_4 followed by T_6 (Table 2). Similar findings have been reported by Laurence *et al.* (1976) on groundnut, Shukla *et al.*, 1981 on rai. Significantly maximum net profit was found in 35 kg/ha sulphur (Rs. 12461) in comparison to 28 kg and 21 kg sulphur applied plot (Table 3).

REFERENCES

Kolte, S.J., Awasthi, R.P. and Vishwanath (1987). Assessment of yield losses due to Alternaria blight in rapeseed and mustard. *Indian Phytopath.*, **40** (2) : 209-211.

Laurence, R.C.N., Gibbons, R.W. and Young, C.T. (1976). Change in yield protein, oil and maturity of groundnut cultivars with the application of sulphur fertilizer and fungicides. *J. Agric. Sci.*, **86** (2) : 245-250.

McGrath, S.P. and Johnston, A.E. (1986). Sulphur crop nutrients and fungicides. *Span*, **29** : 57-59.

Rashid, A.Q.M.B., Meach, M.B., Jalaluddin, M. and Razzaque, A.H.M. (1985). Effect of nitrogen, phosphorus and sulphur fertilizers combination on the severity of *Alternaria, Drechslera* and bacterial leaf blight of wheat. *Bangla. J. Pl. Pathol.*, **1** (1) : 33-39.

Rashid, A.Q.M.B., Meach, M. B. Jalaluddin, M., and Razzaque, A.H.M. (1988). Effect of fertilizer treatments on the incidence of Alternaria leaf blight of wheat. *Acta Phyto Pathology* et *Entom. Hungarica*, **23** : 61-65.

Sandhu, K.S., Hari Singh and Kumar, R. (1985). Effect of different nitrogen levels and date of planting on Alternaria blight and downy mildew disease of radish seed crop. *J. Res. Punjab Agric. Univ.*, **22** (2) : 285-290.

Sastry, K.S.M. (1966). The effect of calcium, magnesium and sulphur nutrition on guar plants on local lesion formation by sun hemp mosaic virus. *Indian Phytopath*., **19** : 39-44.

Shukla, M.P., Harishanker, Verma, K.P. and Pathak, R.K. (1981). Effect of sulphur, zinc and boron nutrition on the yield and quality of rai (*Brassica juncea*) var. *Varuna*. *Indian J. Agric. Chem.* **15** : 195-198.