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Research Article

Response of Sources, Levels of Sulphur and Varieties on Indian Mustard (*Brassica juncea* L) Czern and Coss.

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Abstract The experiment was carried out during Rabi season of 2014-15 and 2015-16 at Research Farm of S.D.J. Post Graduate College Chandeshwar, Azamgarh U.P. The study comprised assessment of response of Indian mustard with special reference to the yield attributes of the crop under 3 varieties(Varuna,Vardan,Narendra Rai-1) 3 sources of sulphur and 4 levels(gypsum,elemential sulphur,pyrites) (fertility levels 0,20,40,60) respectively The experiment was laid out statistically under split plot design (S.P.D). Results showed that the most of the yield and yield attributes were significantly influenced by different varieties. The yield and yield contributing characters significantly differ amongst but Narendra Rai-1 and Varuna statistically at par. The entire yield components such as number of siliqua/plant, siliqua lenth, seeds/siliqua, test weight were found maximum from the treatments with 60 kg. Sulphur ha-1 and significantly superior to 20 kg ha ^{1} and control and at par 40kg ha ^{1}. Therefore, used Narendra Rai-1 variety of Indian Mustard along with applied Gypsum source of sulphur and 60kg/ha may be recommended in respect to yield attributes viz., siliqua/ plant, siliqua length seeds/ siliqua and test weight and yields as seed yield (q/ ha), stower yield (q/ha) and harvest index in both year of study.

Keywords: Gypsum, pyrites, sulphur and cultivars of Indian mustard

Introduction

Oilseeds constitute the second largest agricultural commodity in India after cereals accounting for nearly 5% of gross national product and 10% of the value of all agricultural products. Despite the fact that India is one of the leading oilseed producing country in the world, it is not able to meet the edible oil requirement for its own vast population. Among the oilseeds rapeseed-mustard group of crops occupies prominent position in the country during(Rabi) winter season contributing nearly 21.6% and 23.1% to the total oilseed cropped area and product on respectively(Anonymous, 2007). Mustard is an important oilseed crop of India standing next only to groundnut in terms of both area and production.The plant types play an important role in raising the seed yield of the crops. Development of high yielding varieties of mustard has been one of the major concern of the scientists because the use of improved varieties alone accounts for 15-20% increase in productivity. This probably because of their altered morphology which results in to efficient utilization of water and nutrients. It increased metabolic activities which results in dry matter production. According to Tondon(1990) widespread sulphur difficiency has been observed in crops and soil. In India irrespective of soil texture and cropping pattern, including some districts of eastern Uttar Pradesh. Sulphur is the fourth most important nutrients after nitrogen,phosphorus and zinc for Indian agriculture. It is best known for its role in the synthesis of proteins, oils, vitamins and flavouring components in plants. Three aminoacids viz Methionine (21% S), cysteine (26% S) cystine (27% S) which are building blocks of proteins contain sulphur and about 90% of sulphur is represent in these aminoacids. Application of 30-60 kg/ha is recommended for coarse textured soils which have low sulphur retantive capacity (Tondon 1990). Sulphur fertilization in deficient soils is known to increase seed yield due to sulphur application has also been reported by various workers(Sharma 1994 and Chauhan et.al. 2002) Hence the present experiment was under take to access the response of Indian mustard varities in terms of yield and yield contributing attributes with different sources and doses of sulphur.

Materials and Methods

The present experiment was conducted at Reaserch farm of S.D.J. Post Graduate College Chandeshwar, Azamgarh. Department of Agronomy during Rabi season of 2015-16 and 2016-17. The site of experimentation is situated 8 km away from Azamgarh city on Azamgarh Ghazipur road at about 26°4' N latitude and 83°11' E longitude with the an attitude of 84 meters above mean sea level. The experimental plot had silty loam in texture, having basic in reaction of pH 7.5 and 7.8, EC of 0.35 and 0.32 mm hos/cm at 25 C, organic carbon of 0.40 and 0.47%, available nitrogen of 178.30 and 180.80 kg/ha, available phosphorus of 15.66 and 15.72 kg/ha available potassium of 257.00 and 259.00 kg/ha and available sulphur of 8.00 and 8.45 ppm during Rabi season of 2014-15 and 2015-16, respectively. The experimental crop was sown on first week of November during the both years. The experiment was conducted in split plot design(S.P.D.) having different treatments and each treatment was replicated thrice. The treatments comparised three varieties viz. Varuna,Vardan and Narendra Rai-1 in main plots, three sources of sulphur viz. gypsum,elemental sulphur and pyrites in sub plot and levels of sulphur viz. O, 20,40, and 60 kg/ha in sub-sub plots. The recommended doses of N.P.K (80:40:40) through urea, D.A.P and potassium sulphate , half amount of N and full amount of P2O5 and K2O was applied as basal and remaining half of the nitrogen applied after first irrigation during respective years. The required amount of fertilizer of sulphur was applied in the various forms as per treatment before sowing, and applied in the furrow opened by Kudal with distance 45 cm row-row, seed were sown in opened furrows at the rate of 5 kg/ha. Thinning was done 15-20 days after sowing and all cultural practices were applied.

Results and Discussion

Results on the yield and yield attributing characters are presented in Table. It is clearly indicated that siliqua per plant, siliqua length, seeds siliqua per plant, test weight, seed yield, stover yield and harvest index (%) differed in varieties and fertilizer levels. Data pertaining to above characters except harvest index(%) affected by different varieties Narendra Rai-1 influenced the yield and yield components and statistically at par to Varuna and significantly superior to Vardan. The seed yield of mustard mainly depends on the above characters have high degree of positive correlation with seed yield. The similar results were reported by Kumar et.al. (2001) and Singh and Singh (2002).

The various sources sulphur viz-gypsum, elemental sulphur and pyrites were equally effective number of siliqua/plant, length of siliqua, number of seeds par siliqua, test weight, seed yield (q/ha) and stover yield. This might be due to similar effect of various sources of sulphur and hence non-significant difference in yield and yield characters were observed. Similar results were obtained by Sharma (1994).

It is apparent from the data contained in Table that sulphur application brought about significant effect on length of siliqua number of seeds per siliqua, test weight, grain yield(q/ha) and stover yield (q/ha) were obtained application of 60 kg ha-1, which was at par with 40 kg S ha-1, but significantly superior 20 kg S ha-1, and control. Higher doses of sulphur at the rate of 60 kg ha-1, did not agreement appreciably the yield and yield contributing characters (which was apparently not economic). Sulphur is closely associated with seed containing constituents such as greater accumulation of sulphur containing amino acid, higher synthesis of protein and glucoside such findings are close conformity with Sharma(1994), and Chauhan et.al. (2002).

The data on harvest index presented in Table that the variety Narendra Rai-1 has higher value of harvest index (%) than Vardan and Varuna and various sources of sulphur gave almost similar value of harvest index. It is obvious from the data that the application of sulphur at all levels was found superior over control. Maximum harvest index was recorded with the application of 60kg S ha-1, while minimum value found in control during both the years which may be due to increased supply of sulphur and better trans location of photosynthetic in seeds and thus increased harvest index (%) Kumar et.al. (2001) also reported that increasing levels of sulphur increased the harvest index.

Table-1 Effect of varieties, sources of sulphur and levels yield attributes and yield of mustard.

Treatments	Siliqua/plant		Siliqua length		Seeds/siliqua		Test weight		Seed yield (q/ha)		Stover yield (q/ha)		Harvest index	
	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
Varieties														
Varuna	321.1	287.7	5.2	4.9	14.5	13.3	5.1	4.9	20.72	19.43	63.48	61.47	24.61	24.02
Varden	290.4	235.3	4.3	3.8	12.7	11.4	4.2	4.0	18.06	17.04	57.71	53.96	23.84	23.34
Narendra Rai-1	327.5	295.0	5.4	5.1	15.0	13.9	5.3	5.0	21.0	19.99	63.72	62.27	24.79	24.30
S.Em+_	**5.10**	**5.47**	**0.11**	**0.08**	**0.18**	**0.25**	**0.09**	**0.31**	**0.29**	**1.06**	**0.93**	**-**	**-**	**-**
C.D(P=0.05	**20.0**	**21.47**	**0.43**	**0.31**	**0.71**	**0.98**	**0.35**	**0.36**	**1.23**	**1.15**	**4.14**	**3.66**	**-**	**-**
Source of sulphur														
Gypsum	315.4	272.5	4.9	4.7	14.2	13.1	4.9	4.7	20.0	18.90	61.84	59.95	24.44	23.97
Elemential sulphur	310.8	269.0	4.8	4.6	13.9	12.7	4.6	4.5	19.85	18.78	61.46	59.86	24.41	23.88
Pyrites	313.0	271.4	4.9	4.8	14.7	12.8	4.8	4.6	19.93	18.81	61.62	59.88	24.44	23.90
S.Em+_	**4.41**	**2.31**	**0.10**	**0.07**	**0.22**	**0.29**	**0.11**	**0.08**	**0.29**	**0.34**	**0.39**	**0.76**	**-**	**-**
C.D.=(P=0.05)	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**-**	**-**
Levels of sulphur (kg/ha)														
20	292.5	257.3	4.6	4.3	13.5	12.3	4.5	4.5	19.13	17.95	57.74	57.64	24.25	23.75
40	319.7	275.4	4.9	4.7	14.1	13.4	4.9	4.9	20.25	19.15	62.35	60.55	24.52	24.03
60	326.9	280.3	5.0	4.9	14.6	13.5	5.0	5.0	20.35	19.34	62.54	61.00	24.55	24.07
S.Em+_	**4.41**	**2.31**	**0.01**	**0.07**	**0.22**	**0.21**	**0.11**	**0.11**	**0.24**	**0.34**	**0.39**	**0.76**	**-**	**-**
C.D.=(P=0.05)	**12.5**	**6.53**	**0.29**	**0.20**	**0.61**	**0.81**	**0.31**	**0.31**	**0.82**	**0.96**	**1.16**	**2.15**	**-**	**-**

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