The Pharma Innovation Journal 2021; SP-10(12): 2102-2104

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(12): 2102-2104

www.thepharmajournal.com
Received: 18-10-2021
Accepted: 23-11-2021

Hansraj Shivran
CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Sanjeev Kumar
CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Ravindra Tomar
CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Gautam Veer Chauhan
CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Correspondence
Hansraj Shivran
CSA University of Agriculture and Technology, Kanpur, Uttar Pradesh, India

Effect of various irrigation schedule and sulphur levels on economics of Indian mustard [*Brassica juncea* L.]

Hansraj Shivran, Sanjeev Kumar, Ravindra Tomar and Gautam Veer Chauhan

Abstract
A field experiment was conducted during r*abi* season of 2013-2014 on sandy loam soil of student instructional farm (SIF) of C.S. Azad University of Agriculture & Technology, Kanpur (U.P.) to study the effect of various irrigation schedule and sulphur levels on productivity and water use efficiency of Indian mustard [*Brassica juncea* (L.)]. The pH of soil of experiment field was 7.3 with available N_2 129.0, P_2O_5 17.1 and K_2O 187 kg ha^{-1}. The treatment consisted of six irrigation stages IR_0 (no sown irrigation), IR_1 (30-35 DAS), IR_2 (flowering), IR_3 (30-35 DAS and flowering), IR_4 (30-35 and siliqua development) and IR_5 (30-35, flowering + siliqua development) in main plot and three levels of sulphur S_0 (no sulphur), S_1 (20 Kg ha^{-1}) and S_2 (30 kg ha^{-1}) in sub plot were tested in slit plot design (SPD) with three replications. Results showed that the maximum profit was observed with the three irrigation levels IR_5 (30-35 + F + SD) which were higher by 20.47, 25.51, 47.01, 54.65 and 123.90 percent over IR_4, IR3, IR_2, IR1 and IR0 respectively. In case of sulphur the maximum profit was observed in S_2 treatment which was higher by 4.36 and 11.71 percent then S_1 and S_0 respectively.

Keywords: Irrigation, mustard, sulphur, net income, gross income and yield

Introduction
Oilseeds together occupy 26.48 million ha which accounts for 14% of total cropped area in the country with a production of 30.94 million tones (2013-14), accounting for nearly 5% of the gross national product and 10% of the value of all the agricultural products. Mustard ranks third in area (21%) and production (23%) after the groundnut and soybean, however, the productivity of the mustard is quite low in the country (1153 kg ha^{-1}) against the world average of 1400 kg ha^{-1} in world (Piri and Sharma 2006). It is due to majority of growers, who are mostly small and marginal adopted low standard of management technology viz. substandard seeds, lower dose of inputs like fertilizers, plant protection materials and lack of irrigation facilities. Among them irrigation is one of the important component which improves the productivity and income of rapeseed and mustard. The significant response is in the range of 1-3 irrigations (Singh *et al*., 1994) [5]. The significant response of sulphur in mustard (Parihar *et al*. 2014) [3]. Keeping the above facts in view the present investigation was undertaken to study the effect of various irrigation schedule and sulphur on productivity and water use efficiency of Indian mustard [*Brassica juncea* (L.) under irrigated ecosystem' during *rabi* 2013-14.

Materials and Methods
A field experiment was conducted during *rabi* 2013-14 at C.S. Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh, situated 26029' 5"N latitude, 80029'25 83.03°E longitude and at an altitude of 125.9 above mean sea level in the Central plain zone. The soil of the experimental field was sandy loam in texture, alkaline in reaction (pH 7.6), low in organic carbon (0.35%) and available nitrogen (163 kg ha^{-1}), medium in available phosphorus (18.60 kg ha^{-1}), and potassium (203 kg ha^{-1}). The total rainfall received during crop season 2013-14 was 152.4 mm of which 105.6 mm in January, 36.8 mm in February and 20.6 mm in March. Crop experienced foggy weather from mid December to mid January. After pre-sowing irrigation, subsequent irrigations were given as per treatments. First irrigation was given at initiation of branching (35 DAS, second at flowering (65 DAS) and third at siliqua development stage (95 DAS) respectively.

Indian mustard variety – Varuna was sown @ 5 kg seed ha^{-1} on 22th November 2013 with plant geometry of 45×15 cm apart and evaluated in split plot design with three replications. Optimum plant population maintained by thinning operation and planting gaps were filled by re-sowing of seeds or by dibbling methods. The first thinning operation was completed within 15 days stage of crop in which the plants were maintained in single rows, in second thinning intra row plant spacing was maintained at 15 cm apart by removing extra plants from the rows up to 25 days stage of crop. Two weeding and hoeing operation was done in the crop after first irrigation from the point of view to remove the weeds as well as to provide aeration in the plant rhizosphere for proper root development. One spray of monocrotophos was applied to protect the crop saw fly at the 20 DAS. The observations were recorded on the different growth parameters viz. plant height, primary and secondary branches $plant^{-1}$ at maturity, yield attributes, seed yield and economics at harvest. The experimental crop was harvested in the month of march 28.The produce from net plots were harvested in one lot and tied in bundles and allowed to complete sun drying. After that the complete dried material was passes through threshing operation. After threshing and winnowing the clean seeds from each plot were weighed and the weight was recorded as seed yield in kg $plot^{-1}$ and then converted in kg ha^{-1}.

Results and Discussions

Yield attributes and yield

Application of three irrigations IR_5 (30-35 DAS, flowering + siliqua development) with 30 kg ha^{-1} of sulphur level produced maximum seed (21.45q ha^{-1}) and stover yields (49.81 q ha^{-1}) and harvest index. This might be due to higher photosynthesis and translocation of assimilates towards reproductive structures owing to sufficient soil moisture. During linear phase of development at the time of sufficient moisture availability, enough assimilates might have produced and utilized by the plant during the growth and development stages and thus the excess diverted towards storage compounds. But at later phase for greater assimilate demand of plant sinks i.e. reproductive structures, more remobilization of storage compounds to active sites due to increased moisture in soil might have increased the yield significantly. The highly significant positive correlation existing between seed yield and yield attributes confirmed the above findings. This might be due to higher photosynthesis and translocation of assimilates towards reproductive structures owing to sufficient soil moisture (Panda *et al*. 2004) [1]. Yield and yield attributes increased with increasing in number of irrigations at different phonological stages and level of sulphur viz. siliqua $plant^{-1}$, seeds $siliqua^{-1}$, test weight, seed yield, stover yield and biological yield (Table 2). Therefore, the yield attributing characters were not fully developed due to some stress in IR_4, IR_3, IR_2, IR_1 and IR_0 (Control) treatments. As optimum moisture regime throughout the growth and development stages and optimum sulphur are very important for the balanced metabolic activities of the plants, which in turn might resulted in increased growth of the plants and yield attributing characters (Singh, *et al*. 2012) [6].

Economics

The effect of irrigation and sulphur interaction on the gross income was non-significant. Application of IR_5 X S_2 increased the gross income 63.78 % over IR_0X S_0.

The net income IR_5 X S_2 was 81.45 % over the IR_0X S_0. It was obvious increase in seed yield under this treatment appreciably has been compensated by the increased because increase the number of irrigation and level of sulphur then benefit was increase more as the added cost. (Sanjeev Yadav, 2014).

Table 1: Effects of irrigation schedule and sulphur level based on yield attributes and yield of mustard

Treatment	No. of siliqua $plant^{-1}$	Weight of seed $plant^{-1}$	Test weight	Seed yield	Stover yield
Irrigation level					
IR_0	208.16	10.32	4.21	9.58	25.13
IR_1	211.89	13.06	4.28	13.87	34.74
IR_2	337.36	14.03	4.61	14.59	36.01
IR_3	375.74	17.83	4.79	17.58	42.00
IR_4	363.59	17.13	4.58	17.09	41.65
IR_5	390.07	27.50	4.86	21.45	49.81
S.EM	2.83	0.39	0.21	0.71	1.12
CD 5%	4.00	0.55	0.97	1.61	2.53
Sulphur ($kgha^{-1}$)					
Control	373.68	10.03	4.49	14.77	36.67
20	388.61	10.76	4.48	15.81	38.46
30	401.93	11.13	4.69	16.50	39.45
SEM	1.73	0.22	0.053	0.51	0.77
CD 5%.	2.44	0.31	0.11	1.07	1.60

Table 2: Effect of irrigation schedule and level of sulphur based on economics of mustard

Treatment	Gross income	Net income	B:C ratio	Harvest index
Irrigation level	**Rs X 10^3 ha^{-1}**	**Rs X 10^3 ha^{-1}**		
IR_0	33	12	0.62	27.15
IR_1	47	25	1.16	28.25
IR_2	49	27	1.27	28.81
IR_3	61	38	1.27	29.50
IR_4	58	35	1.70	29.08
IR_5	73	50	2.16	30.10
SEM	464.65	385.53	0.02	0.49
CD 5%	1043.75	858.56	0.06	1.12
Sulphur ($kgha^{-1}$)				

Control	50	29	1.37	28.55
20	53	31	1.40	28.97
30	56	34	1.47	29.28
SEM	428.35	371.65	0.01	0.33
CD 5%	884.31	767.26	0.03	NS

References

1. Panda BB, Bandyopadhyay SK, Shivay YS. Effect of irrigation level, sowing dates and verities on yield attributes, yield, consumptive water use and water use efficiency of Indian mustard (*Brassica juncea*). Journal of Agril. Sci. 2004; 74(6):339-342.
2. Pirri Issa, Sharma SN. Effect of levels and sources of sulphur on yield attributes, yield and quality of Indian mustard (*Brassica juncea).* Indian J Agron. 2006; 51(3):217-220.
3. Parihar S, Kameriya PR, Choudhary R. Response of mustard (Brassica Juncea) to varying levels of Sulphur and Fortified Vermicompost under Loamy Sand Soil Agric. Sci. Digest. 2014; 34(4):296-298
4. Sanjay Yadav, Singh BN, Singh MM. Effect of Phosphorus and Sulphur on Growth, Yield and Economics of Indian mustard (*Brassica Junceacoss*.) India Plant Archives. 2014; 14(1):379-381
5. Sharma JP. Response of Indian mustard (13. *Juncea*) to different irrigation schedules, nitrogen and sulphur levels. Indian. J Agron. 1994; 39:421-425.
6. Singh R, Singh SB, Manas SS, Kumar A. Effect of different levels of sulphur and varities on growth, yield and quality of Indian mustard. Internation J of plant sciences. 2012; 7(2):290-294.