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Effect of nitrogen and sulphur levels on growth and yield of yellow mustard (*Brassica campestris* L. var. yellow sarson)

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Abstract
The experiment was conducted during the *Rabi* season 2020, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.). The soil of the experimental field is sandy loam in texture, nearly neutral in soil reaction (pH 7.1), the available P and K fertilizers are applied along with different levels of nitrogen and sulphur. The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. The treatment with Nitrogen 60kg/ha + Sulphur 10kg/ha found significantly higher in plant height (132.83 cm), dry weight (14.87 g/plant), and crop growth rate (0.018 g/m^2/day), as compared to other treatments. Maximum number of siliqua/plant (55.13), seeds/siliqua (2.23), test weight(4.50 g), seed yield (3.24 t/ha) and stover yield (2.21t/ha) were found significantly higher with the application of treatment Nitrogen 60kg/ha + Sulphur 10kg/haas compared to other treatments. Maximum Gross return (29160 INR/ha), Net return (13240.2 INR/ha) and B: C ratio (1.83) were recorded in treatment with the application of Nitrogen 60kg/ha + Sulphur 10kg/ha.

Keywords: yellow mustard, nitrogen levels, sulphur levels

1. Introduction
Rapeseed/mutard is an important rabi season oilseed crop in India which belongs to the family Cruceferae, crucifers contain high amount of glycosinolates have a high sulphur demand (Rathore *et al.* 2015) [12]. India is the third largest producer of rapeseed/mustard in the world after China and Canada. It occupies prominent place, next in importance to groundnut in area and production. Its area, production and productivity in the country is 5.43 M. ha., 6.41 M. tonnes and 1161 kg/ha, respectively. The average productivity of mustard needs to be enhanced upto 2562 kg ha^{-1} by 2030 for ensuring self sufficiency in edible oil (DRMR, 2011) [4]. It contains about 37 to 49 per cent oil in the seed. Low cost of production and high yield potentials, hold promise for its large scale cultivation in the country (Chiddha Singh, 1998) [3]. The seed and oil are used for preparing pickles, cooking and frying purposes, for preparation of soap, grease, hair oil, medicines. The oil cakes is used for cattle feed and manure. The leaves of young plant are also consume as a leafy vegetable. In the tanning industry, mustard oils is used for softening leather (Singh, 2001) [15]
The crop can be raised well under both irrigated and rainfed conditions. Rapeseed-mustard is reported to tolerate annual precipitation of 500 to 4200 mm, annual temperature of 6º to 27 ºC and pH of 4.3 to 8.3. Rapeseed-mustard follows C_3 pathway for carbon assimilation. Therefore, it has efficient photosynthetic response at 15-20 ºC temperature. At this temperature the plant achieve maximum CO_2 exchange range which declines thereafter. Nearly 20% area under these crops is rainfed.
Nitrogen is considered to be the most important nutrient for the crop to activate the metabolic activity and transformation of energy as well as chlorophyll and protein synthesis (Kumar *et al.*, 2011) [7]. Significant response of nitrogen was obtained when it was applied up to 80 kg under rainfed and 120 kg ha^{-1} under irrigated conditions. (Keivanrad and Zandi 2014). Nitrogen also affects uptake of other essential nutrients and it helps in the better partitioning of photosynthates to reproductive parts which increased the seed: stover ratio (Singh A. and Meena NL 2004) [14].
Mustard is responsive to sulphur in comparition to other crops. Sulphur fertilization has also been shown to increase the oil content in seeds of rapeseed-muustard (Singh *et al*; 2015) [13]
The importance of sulphur is obvious in oilseed production as it is required for the synthesis of

sulphur containing amino acids methionine (21%), cysteine (26%) and cystine (27%), Because of its volatile nature, a large amount of Sulphur has become dispersed in the atmosphere. Such atmospheric fraction contributes significantly to the plant growth and nutrition (Das, 2004) [5].

Materials and Methods

The experiment was conducted during the *Rabi* season 2020-21, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) which is located at 25º39‟ 42‟‟‟N latitude,81º67‟56”E longitude and 98m altitude above the mean sea level (MSL).This area is situated on the right side of the Yamuna river by the side of Prayagraj - Rewa road about 12 km from the city. The investigation was laid out in Randomized block design, which was replicated three times. During the developing season, the mean week by week most extreme and least temperature, relative humidity and rainfall were 37.17 ºC, 8.03 ºC, 95 %, 38.14 % and 17.34 mm, respectively. Sowing of Yellow mustard was done at a spacing of 30 cm X 10 cm using seed rate of 3 kg ha^{-1}. The field was uniformly irrigated one day before sowing. Nitrogen (40, 50 and 60 kg ha^{-1}) was applied in two split doses first at the time of sowing and second after 30 days of sowing in the form of Urea, full dose of Phosphorous (40 kg ha^{-1}) and full dose of Potassium (40 kg ha^{-1}) were applied through DAP and MOP at the time of sowing. Sulphur was applied in each plot according to the treatments before sowing of seed along with fertilizers. Observations on growth parameters, yield attributes and yield of yellow mustard, was recorded and their significance was tested by the variance ratio and F-value at 5% level of significance. Relative economics was calculated as per the prevailing market prices of the inputs and produced during *Rabi* season.

Result and Discussion

Growth parameters

Growth parameters of yellow mustard, *viz.* plant height (cm), Dry weight (g), and Crop Growth Rate (g/m^2/day), varied due to different Nitrogen and Sulphur levels are presented in Table 1. Treatment with the application of Nitrogen 60 kg/ha + Sulphur 10 kg/ha resulted in significantly highest plant height (137.53 cm), Dry weight (17.81 g), Crop Growth Rate (0.60 g/m^2/day).Nitrogen is a significant component of nucleic acids such as DNA, the genetic material that allows cells (and eventually whole plants) to grow and reproduce which expressed morphologically increased in plant height. It is well known that nitrogen being the constituents of amino acids, protein, chlorophyll and protoplast would directly influence the growth and yield attributing characteristics throught better utilization of photosynthates. This argument was supported by Singh and Kumar, 2014 [16]. The overall improvement in growth character of plant owing of sulphur application were known sulphur enhance cell multiplication, elongation and expansion, imparts a deep colour to leaves due to better chlorophyll synthesis resulting in greater amount of dry matter in comparision to sulphur deficient plant. This argument was also supported by Singh and Meena (2004) [14], Mishra (2001) [8], Nepalia and Jain (2000) [9]

Table 1: Effect of Nitrogen and Sulphur levels on growth attributes of Yellow mustard

Sr. No.	Treatment	At 90 75-90 DAS			
		Plant height (cm)	Dry weight (g/plant)	CGR (g m^{-2} day^{-1})	RGR (g g^{-1} day^{-1})
1.	Nitrogen 40 kg/ha + Sulphur 10kg/ha	120.00	12.09	0.33	0.012
2.	Nitrogen 40 kg/ha + Sulphur 15 kg/ha	114.60	13.07	0.30	0.011
3.	Nitrogen 40 kg/ha + Sulphur 20 kg/ha	121.73	14.84	0.23	0.012
4.	Nitrogen 50 kg/ha + Sulphur 10 kg/ha	133.27	16.67	0.49	0.009
5.	Nitrogen 50 kg/ha + Sulphur 15 kg/ha	122.20	13.89	0.27	0.009
6.	Nitrogen 50 kg/ha + Sulphur 20 kg/ha	121.09	13.27	0.31	0.008
7.	Nitrogen 60 kg/ha + Sulphur 10 kg/ha	137.53	17.81	0.60	0.012
8.	Nitrogen 60 kg/ha + Sulphur 15 kg/ha	125.53	13.58	0.30	0.011
9.	Nitrogen 60 kg/ha +Sulphur 20 kg/ha	121.23	14.25	0.27	0.008
	F- test	S	S	S	NS
	S. ED (±)	4.83	1.30	0.03	0.02
	CD at 5%	10.25	2.75	0.06	-

Yield attributes

Yield parameters of yellow mustard, *viz.* Siliqua/plant, Seeds/siliqua, Test weight (g), Seed yield (kg/ha) and Stover yield (t/ha) varied due to different Nitrogen and Sulphur levels are presented in Table 2. Treatment with the application ofNitrogen 60 kg/ha + Sulphur 10 kg/haresulted in significantly highest Siliqua/plant (64.80), Seeds/siliqua (48.20), Test weight (5.28 g), Seed yield (1.64 kg/ha) and Stover yield (3.87 t/ha). Nitrogen is a significant component of nucleic acids such as DNA, the genetic material that allows cells (and eventually whole plants) to grow and reproduce which expressed morphologically increased in plant height. It is well known that nitrogen being the constituents of amino acids, protein, chlorophyll and protoplast would directly influence the growth and yield attributing characteristics throught better utilization of photosynthates. This argument was supported by Singh and Kumar, 2014 [16]. The overall improvement in growth character of plant owing of sulphur application were known sulphur enhance cell multiplication, elongation and expansion, imparts a deep colour to leaves due to better chlorophyll synthesis resulting in greater amount of dry matter in comparision to sulphur deficient plant. This argument was also supported by Singh and Meena 2004 [14] and Agarwal *et al.* 2000 [1]

Table 2: Effect of nitrogen and sulphur levels on yield attributes of Yellow mustard

Sr. No.	Treatment	Siliqua/ plant	Seeds/ siliqua	Test weight (g)	Seed yield (kg/ha)	Stover yield (t/ha)
1.	Nitrogen 40 kg/ha + Sulphur 10kg/ha	55.13	45.20	4.50	1.14	2.21
2.	Nitrogen 40 kg/ha + Sulphur 15 kg/ha	57.20	46.30	4.52	1.20	2.61
3.	Nitrogen 40 kg/ha + Sulphur 20 kg/ha	56.40	47.50	4.70	1.28	2.72
4.	Nitrogen 50 kg/ha + Sulphur 10 kg/ha	60.20	48.10	4.80	1.40	2.90
5.	Nitrogen 50 kg/ha + Sulphur 15 kg/ha	55.60	44.62	4.37	1.10	2.18
6.	Nitrogen 50 kg/ha + Sulphur 20 kg/ha	54.35	43.20	4.40	1.07	1.89
7.	Nitrogen 60 kg/ha + Sulphur 10 kg/ha	64.80	48.20	5.28	1.64	3.87
8.	Nitrogen 60 kg/ha + Sulphur 15 kg/ha	54.80	45.60	4.47	1.11	2.34
9.	Nitrogen 60 kg/ha +Sulphur 20 kg/ha	57.00	46.7	4.50	1.19	2.24
	F- test	S	S	S	S	S
	S.ED (±)	0.69	0.73	0.06	0.11	0.16
	CD at 5%	2.10	2.13	0.13	0.22	0.34

Conclusion

It is concluded that for obtaining higher yield in Yellow mustard during Rabi season, the treatment combination with the application of Nitrogen 60 kg/ha + Sulphur 10 kg/ha was found more productive with maximum net returns and B:C ratio of 1.84. Combined treatment of Nitrogen 60 kg/ha + Sulphur 10 kg/ha is very effective and can be used by the farmers as it gives good yield with less cost of cultivation.

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References

1. Agarwal MM, Verma BS, Kumar C. “Effect of split application of sulphur and nitrogen on growth and yield attributes of *Brassica* genotypes differing in time of flowering”. Canadian Journal of Plant Sciences 2000;92:175-180.
2. Ahmadi A, Bahrani G. “Influecne of nitrogen and sulphur fertilization on quality of canola under rainfed conditions”. Journal of Zhejiang University Science 2009;B8:731-737.
3. Chiddha Singh. Importance of mustard in modern techniques of raising field crops. Oxford and IBH publishing Co. Bombay, 1998, 301.
4. DRMR. VISION 2030. Directorate of Rapeseed-Mustard Research, Bharatpur Rajasthan 2011, 30.
5. Das DK. Nutrient transformation in relation to soils plant system from introductory soil science. Published by Usha Raj Kumar for Kalyani Publisher, New Delhi (India) 2004.
6. Keivanrad S, Zandi P. Effect of nitrogen levels on growth, yield and oil quality of Indian mustard grown under different plant densities. Thai Journal of Agricultural Science 2012;45(2):105-113.
7. Kumar S, Verma SK, Singh TK, Singh S. Effect of nitrogen and sulphur on growth, yield and nutrient uptake by Indian mustard (*Brassica juncea*) under rainfed condition. Indian J Agril Sci 2011;81:145-149.
8. Mishra SK. Effect of sulphur and zinc on yield, uptake of nutrients and quality of mustard. Annals of Plant and Soil Research 2001;3:206-21.
9. Nepalia V, Jain GL. Effect of wee control and sulphur on yield of Indian mustard (*Brassica juncea* L.) and their residual effect on summer green gram (*Phaseolus radiatus*). Indian journal of Agronomy 2000;45:483-488.
10. Panwar KS, Sharma SK, Nanwal RK. Influence of sowing time on the yield of different mustard cultivars (*Brassica* spp.) under conserved soil moisture conditions. Ind. J Agri. Sci. 2000;70(6):398-399.
11. Rathore SS, Kapila S, Premi OP, Kandpal BK, Chauhan JS. Comparative effect of irrigation systems and nitrogen fertigation on growth, productivity and water-use efficiency of Indian mustard (*Brassica juncea* L.) under semi-arid conditions of Rajasthan. Indian Journal of Agronomy 2014;59(1):112-118
12. Rathore SS, Shekhawat K, Kandpal BK, Premi OP, Singh D. Sulphur management for increased productivity of Indian mustard: Areview. Annals of Plant and Soil Research 2015;17(1):1-12.
13. Singh U, Tomar SS, Rameshwar, Choudhary S. Yield, nutrient uptake and economics of Indian mustard as influenced by varieties, sources and levels of sulphur. Annals of Plants and Soil Research 2015;17(3):266-268
14. Singh, Meena NL. Effect of nitrogen and sulphur on growth, attributes and seed yield of mustard (*Brassica juncea*) in eastern plain of Rajasthan. Indian Journal of Agronomy 2004;49:186-188.
15. Singh, Chhidda. Rapeseed and mustard from principles of agronomy. Oxford and IBH Publishing Co. Pvt. Ltd., 22-A, Sarojani Naydu Marg, Allahabad (U.P.) India 2001.
16. Singh M, Kumar M. “Effect of nitrogen and sulphur levels on seed yield and some other characters in mustard (*Brassica juncea* L.)”. International Journal of Agricultural. Sciences 2014;10(1):449-45.