The Pharma Innovation Journal 2022; 11(6): 2335-2337

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(6): 2335-2337

www.thepharmajournal.com
Received: 04-03-2022
Accepted: 16-05-2022

Satyendra Singh Gurjar
School of Agriculture, ITM University Gwalior, Madhya Pradesh, India

Nikita Nehal
School of Agriculture, ITM University Gwalior, Madhya Pradesh, India

Shiv Singh Tomar
School of Agriculture, ITM University Gwalior, Madhya Pradesh, India

Jai Dev Sharma
School of Agriculture, ITM University Gwalior, Madhya Pradesh, India

Corresponding Author:
Nikita Nehal
School of Agriculture, ITM University Gwalior, Madhya Pradesh, India

Effect of nitrogen level and spacing on growth and yield of mustard (*Brassica juncea* L.)

Satyendra Singh Gurjar, Nikita Nehal, Shiv Singh Tomar and Jai Dev Sharma

Abstract
The present investigation was conducted at Main Experiment Station, School of Agriculture, ITM University, Sithouli campus Gwalior (M.P.). The experiment was carried out in field in randomized block design with three replications and 8 treatments. Results of the experiments indicated that plant population under spacing 10 cm was better than the spacing 15 cm at 15 DAS, plant height was taller under 15 cm spacing at all growth stages, 10 cm spacing produced significantly maximum days taken to flowering than 15 cm spacing sown crop, 15 cm spacing produced significantly higher seed and stover yield than 10 cm spacing sown crop at harvest stage.

Keywords: Mustard, nitrogen, spacing, plant height

Introduction
Rapeseed-mustard is the third most important oilseed crop in the world after soybean (*Glycine max*) and palm (*Elaeis guineensis* Jacq.) oil. Among the seven edible oilseed crops cultivated in India, rapeseed-mustard (*Brassica spp.*) contributes 28.6 per cent in the total production of oilseeds. In India, it is the second more important edible oilseed after groundnut sharing 27.8 per cent in the India's oilseed economy (Shekhawat *et al*., 2012) [8].

Nitrogen is a major nutrient element that provides lush green color in crop (due to increase in chlorophyll) and its deficiency in arid and semi-arid regions is more common because the amount of organic matters, which are the main nitrogen reserves, is very low in these regions and even if they were found, they would be quickly decomposed (Bani-saeedi, 2001) [1]. Bani-saeedi (2001) [1] reported that by reducing the nitrogen flower abscission and consequently affecting thousand-seed weight (TSW), increasing the number of siliquae per unit area and decreasing the number of seeds siliqua^{-1} caused more seed yield hectare^{-1}. While increase the nitrogen dose significantly increased the crop yield (Singh and Rahi-1985); they observed the highest yield with 160 kg N ha^{-1}. Notwithstanding, Mirzashahi *et al*. (2000) [5] noticed that increasing rates of N upto 180 kg ha^{-1} progressively increased the growth and yield components.

Usually, plant density is one of the most effective agronomic factors for determining the yield which is individually affected by cultivar and climatic conditions (Zandi *et al*., 2011) [11] as well as production system. For each crop and environmental conditions, the optimum plant population should be determined through local research.

Previous studies have shown that plant density is an important factor affecting mustard yield; however, it can govern the components of yield and the yield of individual plants (Sing and Verma, 1993). A study by Sharif *et al*. (1990) [7] showed that the highest crop yield is gained from the lowest population density of 30 plant m^{-2} as compared to other treatments (60 and 90 plant m^{-2}). In research carried out by Singh and Verma (1993) [9] on mustard, the highest crop yield achieved at 30 cm row spacing against the lowest at 45 and 60 cm respectively. According to the findings of Yousaf and Ahmad (2002) [10], Mobasser *et al*. (2008) [6] and Kazemeini *et al*. (2010) [3], the highest dry matter (above-ground biomass) was produced under higher plant populations. Several researchers (Danesh-shahraki *et al*., (2008) [2] noticed that seeds siliqua^{-1} and thousand-seed weight were remained unaffected (stable) across populations. Yet, McGregor (1987) [4] stated that number of seeds siliqua^{-1} and seed weight increased with reduced plant density and the makeup was predominantly attributed to the increase in number of siliquae on the remaining plants.

Materials and Methods

The present investigation was conducted at Main Experiment Station, School of Agriculture, ITM University, Sithouli campus Gwalior (M.P.), India during rabi season of 2019-2019. The soil of the experimental field was alluvial, sandy clay loam

in texture. The experiment constituted of 8 treatment combinations were laid out in randomized block design (RBD) with three replications. The 100 kg N, 60 kg P_2O_5, 40 kg K_2O and 30 kg S ha^{-1} were optimum dose (100 per cent) for NPKS. Half dose of the N in the form of urea was applied as basal and remaining quantity of nitrogen was top dressed after first irrigation. The Complete Dose of P and K were applied as super phosphate and muriate of potash at the time of sowing. One metre long row was selected randomly at different places in each plot. Later on the numbers of plants from each such selected row were counted and their average was taken and converted into plant population m^{-2} at 30 DAS and at harvest stage. The height of the plant was measured in centimetre by metre scale from ground level to the collar of the flag leaf. Height was measured at three stages, first at 30 days after sowing, second at 30 days interval and at harvest. Days taken to flowering were counted and recorded separately. The total dry matter from each plot was separately threshed, winnowed and cleaned manually. The produce was sun dried and weighed plot wise on precision balance and the yield was converted in kilogram per hectare (kg ha^{-1}).

Result and Discussion

The data on plant population per meter row length as recorded on initial and harvest stage were subjected to statistical analysis. The data exhibited that differences in plant population per meter row length recorded at initial and harvest stages were significant due to spacing but non-significant due to levels of nitrogen and their interaction with spacing. However, on the basis of Table 1 plant population under spacing 10 cm was better than the spacing 15 cm.

Table 1: Effect of nitrogen levels and spacing on plant population/m row length at initial in mustard

Treatments	Plant population m^{-1} row length at 15 DAS		
	S_1	S_2	Mean
N_1	5.36	5.70	5.53
N_2	9.43	9.50	9.47
N_3	9.51	9.56	9.54
N_4	9.54	9.57	9.55
Mean	8.46	8.58	8.52
	S	N	SXN
S.E.(m)±	0.0128	0.0128	0.0181
C.D. (at 5%)	0.0383	0.0383	0.0542

The days taken to flowering is presented in Table 2. The analysis of variance for the data on days taken to flowering is given in Appendix-III, from the data it is amply clear that the effects of spacing, levels of nitrogen and their interaction were significant at all growth stages. The crop had sown under 10 cm spacing produced significantly maximum days taken to flowering than 15 cm spacing sown crop. The significantly maximum days taken to flowering were recorded with 50 kg ha^{-1} nitrogen level than other nitrogen levels, followed by 75 kg ha^{-1} nitrogen level. However, minimum days taken to flowering were recorded under 125 kg ha^{-1} nitrogen level. The interaction effect of spacing with levels of nitrogen on days taken to flowering was significant. 10 cm spacing was significantly superior over 15 cm spacing with all nitrogen levels under days taken to flowering. Under all treatment combinations, the S_1N_1 combination recorded significantly maximum days taken to flowering over rest of the treatment combinations followed by S_1N_4.

Table 2: Effect of nitrogen levels and spacing on days taken to flowering and branches plant^{-1} in mustard

Treat.	Days taken to flowering		
	S_1	S_2	Mean
N_1	44.52	44.62	44.57
N_2	44.74	45.08	44.91
N_3	45.45	46.17	45.81
N_4	45.98	49.00	47.49
Mean	45.17	46.22	45.70
	S	N	SXN
S.E.(m)±	0.190	0.190	0.268

The seed and stover yield per plot and their converted value in hectare are presented in Table 3. The analysis of variance for the data on seed and stover yield are given in table 3, from the data it is amply clear that the effects of spacing, levels of nitrogen and their interaction were significant. The crop had sown under 15 cm spacing produced significantly higher seed and stover yield than 10 cm spacing sown crop. The significantly maximum seed and stover yield were recorded with 125 kg ha^{-1} nitrogen level than other nitrogen levels, followed by 150 kg ha^{-1} nitrogen level. However, minimum seed and stover yield were recorded under 25 kg ha^{-1} nitrogen level. The interaction effect of spacing with levels of nitrogen on seed and stover yield were significant. 15 cm spacing was significantly superior over 10 cm spacing with all nitrogen levels under seed and stover yield. Under all treatment combinations, the S_2N_5 combination recorded significantly higher seed and stover yield over rest of the treatment combinations followed by S_2N_6.

Table 3: Effect of nitrogen levels and spacing on seed and stover yield in mustard

Seed yield ha^{-1} (q)			Stover yield ha^{-1} (q)		
S_1	S_2	Mean	S_1	S_2	Mean
1439.73	1489.63	1464.68	5451.47	7448.17	6449.82
1606.92	1656.08	1631.50	8034.58	8280.42	8157.50
1753.30	2060.68	1906.99	8766.50	10303.42	9534.96
1822.68	2109.93	1966.31	9113.42	10549.67	9831.54
1655.66	1829.08	1742.37	7841.49	9145.42	8493.45
S	N	SXN	S	N	SXN
1.335	1.335	1.888	231.102	231.102	326.827
4.002	4.002	5.659	692.874	692.874	979.871

References

1. Bani-saeedi A. Examination of different amount of nitrogen and density on growth, quantity and quality characters in canola, in Khozestan climate condition. M.Sc. Thesis, Dezfool University, Dezfool, Iran. (In Persian), 2001.
2. Danesh-shahraki A, Kashani A, Mesgarbashi M, Nabipour M, Koohi-dehkordi M. The effect of plant densities and time of nitrogen application on some agronomic characteristic of rapeseed. Pajouhesh & Sazandegi 2008;79:10-17. (In Persian)
3. Kazemeini SA, Edalat M, Shekoofa A, Hamidi R. Effect of nitrogen and plant density on rapeseed (*Brassica*

napus L.). J Appl. Sci. 2010;10:1461-1465.
4. McGregor DI. Effect of plant density on development and yield of rapeseed and its significance to recovery from hail injury. Can. J Plant Sci. 1987;67:43-51.
5. Mirzashahi K, Salimpour S, Daryashenas A, Malakouti MJ, Rezaie H. Determination of the best rate and application method of nitrogen in rapeseed in Safiabad. Iranian J Soil & Water Sci. (Special Issues: Canola) 2000;12:7-11. (In Persian)
6. Mobasser HR, Shojaee-ghadikolaee M, Nasiri M, Daneshian J, Barari-tari D, Pourkalhor H. Effect of nitrogen rates and plant density on the agronomic traits of canola (*Brassica napus* L.) in paddy field. Asian J Plant Sci. 2008;7:233-236.
7. Sharif SA, Shabana R, Ibrahim AF, Geisler G. Variation in seed yield and quality characters of four spring rapeseed cultivars as influenced by population arrangements and densities. J Agron. Crop Sci. 1990;165:103-109
8. Shekhawat K, Rathore SS, Premi OP, Kandpal BK, Chauhan JS. Advances in Agronomic Management of Indian Mustard (*Brassica juncea* (L.) Czernj. Cosson): An Overview. International Journal of Agronomy. 2012, Article ID 408284, 14.
9. Singh NB, Verma KK. Performance of rainfed Indian mustard (*Brassica juncea*) in relation to spacing in diara land of eastern Uttar Pradesh. Indian J Agron. 1993;38:654-656.
10. Yousaf N, Ahmad A. Effect of different planting densities on the grain yield of canola varieties. Asian J Plant Sci. 2002;4:322-333.
11. Zandi P, Shirani-rad AH, Bazrkar-khatibani L. Agronomic study of fenugreek grown under different in-row spacing and nitrogen levels in a paddy field of Iran. Am-Euras. J Agric. Environ. Sci. 2011;10:544-550.

.