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Effect of Nutrient Management Practices and Row Spacing on Growth Yield Attributes and Yield of Indian Mustard (*Brassica juncea* L.)

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Abstract

A field experiment was conducted during winter season of 2001-02 and 2002-03 to study the effect of nutrient management practices and planting geometry on growth, yield attributes and yield of Indian mustard (B. juncea L.) under sandy clay loam soils. The experimental soil had 188, 7.4 and 212 kg/ha available N, P_2O_5 and K_2O respectively, with pH 6, 7. The experiment was laid out in split-plot design with three replications, having three planting geometry (spacing 30 × 15 cm) S_1,(spacing 45 × 15 cm) S_2, and (broadcasting) S_3 as main plot treatments and four nutrient management including (30 kg N/ha) N_1, (60 kg N/ha)N_2, (90 kg N/ha) N_3 and (30 kg N/ha + FYM 5t/ha) N_4 as sub-plot treatments. The yield attributes viz. branches per plant, siliquae length, seed per siliquae were not affected significantly due to plant geometry except the siliquae per plant (59.93) and seed yield (6.38 q/ha) which were significantly higher under row spacing of 45 cm and 30 cm than broadcasting treatment. Increasing levels of nitrogen increased the seed yield up to 90 kg N/ha in pooled analysis of two years. Combined application of 30 kg N/ha + FYM 5t /ha (N_4) gave the higher seed yield over the 30 kg N/ha alone at par with 60 kg N/ha (N_2) and 90 kg N/ha (N_3). Increase in seed yield due to combined application of nitrogen and FYM (N_4) might be attributed to favorable improvement in all the yield attributes particularly siliquae/ plant. The adequate supply of nutrients based on the plant need under N_3 and N_4 treatments improved the yield attributes and yield of mustard over N_1 treatment.
Key words : Nutrient management, Mustard, Row spacing, Growth,Yield.

The inclusion of oilseeds in national priorities indicates its importance. Oilseeds are grown in 27.86 million hectare with annual production of 27.98 million tonnes and productivity of 1004 kg/ha, contribute significantly towards the agricultural economy of the country (1). Altogether, these crops not only constitute the rich source of vegetable oil industry but also provide quality seeds for human consumption. Rapeseed-mustard occupy 7.28 million hectare area with production of 8.13 million tonnes and productivity of 1,117 kg/ha (1). The productivity of mustard in slightly acidic soils of eastern part of Chhattisgarh is low. This might be due to poor growth of the crop grown under poor nutrient management with wide range of plant densities in short and mild winter situation of this belt after kharif rice harvest. Information on response of the crop to plant densities and nutrient management practices under short winter situations in this belt is meager. Hence this experiment was conducted. The rapeseed-mustard requires relatively large amount of nutrients for realization of yield potential but inadequate supply often leads to low productivity. Hence, it becomes imperative to increase crop productivity by providing balanced and adequate nutrition through organic and inorganic sources. Use of total organic or inorganic nutrient sources has few limitations. Therefore, judicious use of organic and inorganic fertilizers is needed for enhancing productivity of rapeseed mustard. Integrated use of organic and inorganic fertilizers not only ensures availability of all the essential plant nutrients but also maintain better soil health. Use of farm yard manure (FYM), vermicompost and bio-ferilizers like Azotobacter in judicious combination with fertilizers can facilitate profitable and sustainable production and are found to improve physical, chemical and biological soil properties (2). Toenhance the productivity of mustard, it is important to develop suitable nutrient management practices for mustard to boost its growth.

Methods

A field experiment was conducted during winter

Table 1. Growth, yield attributes and yield of mustard as influenced by nutrient management and planting geometry (Pooled data of 2 years).

Treatments	Plant height (cm)	Branches/ plant (No.)	Siliquae plant (No.)	Siliquae length (cm)	Seed per pod (No.)	Seed yield (q/ha)	Stover yield (q/ha)
				Plant Geometry (Plant Spacing)			
S_1	113.18	4.22	58.64	7.53	10.91	6.16	22.21
S_2	111.27	4.97	59.93	7.49	11.25	6.38	25.66
S_3	109.68	3.88	52.52	7.41	11.01	5.33	19.05
SE ±	1.41	0.29	0.48	0.17	0.36	0.12	0.29
CD at 5%	NS	NS	1.89	NS	NS	0.46	1.18
				Nutrient Management			
N_1	106.50	3.30	46.30	7.22	10.08	4.50	18.53
N_2	110.36	3.99	55.77	7.50	11.17	5.62	21.73
N_3	115.13	5.13	64.44	7.61	11.60	7.10	25.33
N_4	113.52	5.01	61.61	7.58	11.36	6.58	23.33
SE±	1.87	0.18	1.90	0.11	0.22	0.34	0.62
CD at 5%	5.55	0.55	5.66	NS	0.66	1.02	1.86
				Interaction			
SE±	3.25	0.32	3.30	0.19	0.38	0.60	1.09
CD at 5%	NS	NS	NS	NS	NS	NS	NS

season of 2001-02 and 2002-03 at Regional Agricultural Research Station, IGKVV, Raigarh (CG), to study the effect of nutrient management practices and planting geometry on growth, yield attributes and yield of Indian mustard (*B. juncea* L.) under sandy clay loam soils. The experimental soil had 188, 7.4 and 212 kg/ha available N,P_2O_5 and K_2O respectively, with pH 6.7. The experiment was laid out in split-plot design with three replications, having three planting geometry S_1 (spacing 30 × 15 cm), S_2 (spacing 45 × 15 cm) and S_3 broadcasting as main plot treatments and four nutrient management namely, N_1(30 kg N/ha), N_2(60 kg N/ha), N_3(90 kg N/ha) and N_4 (30 kg N/ha + FYM 5t/ha) as sub-plot treatments. The crop was sown on of second week of November and harvested on last week of February in both the years.

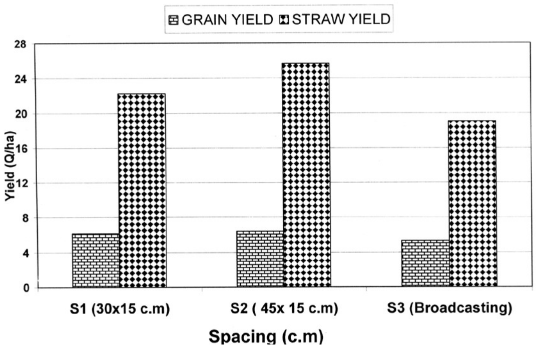

Figure 1. Effect of planting geometry on mustard.

Results and Discussion

Plant Geometry

Pooled data of 2 years (2001-02 and 2002-03) on growth, yield attributes and yield of mustard as influenced by nutrient management and planting geometry are presented in Table 1. The yield attributes viz. branches per plant, siliquae length, seed per siliquae were not affected significantly due to plant geometry except the siliquae per plant (59.93) and seed yield (6.38 q/ha) which was significantly higher under row spacing of 45 cm and 30 cm than broadcasting treatment. However, S_2 treatment recorded significantly higher straw yield (25.66 q/ha) over other planting geometry treatments S_1 and S_3 (Fig. 1). The signifi-

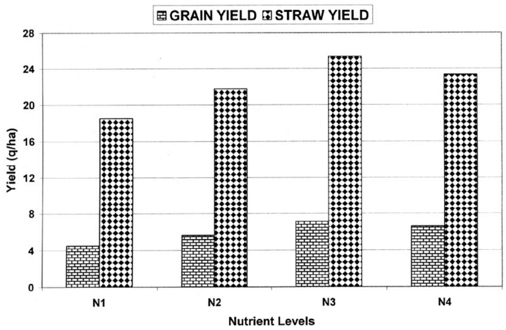

Figure 2. Effect of different nutrient levels on mustard.

cant reduction in seed yield in broadcasting (S_3) may be ascribed to comparatively poor plant growth and development of yield attributes due to competition for growth resources, as such both the spacing S_1 (45 cm) and S_2 (30 cm) did not show any significant effect on yield attributes and yield indicating optimum number of plants per hectare. Examination of yield elements showed that rapeseed and mustard can compensate considerable degree for reduced plant density by increasing the number of lateral branches (3).

Nutrient Management

Increasing levels of nitrogen increased the seed yield up to 90 kg N/ha in pooled analysis of two years. Maximum plant height (115.13 cm), branches per plant (5.13), siliquae per plant (64.44) and seed per siliquae (11.60), seed yield (7.10 q/ha) and (25.33 q/ha), stover yield (Fig. 2) were obtained with N_3 treatment, however, there was non-significant interaction between planting geometry and nutrient management levels. Increase in yield due to application of N may largely be attributed to increased siliquae/plant, branches / plant and seed / plant. Combined application of 30 kg N/ha + FYM 5 t/ha (N_4) gave the higher seed yield over 30 kg N/ha alone and was at par with 60 kg N/ha (N_2) and 90 kg N/ha (N_3). Increase in seed yield due to combined application of nitrogen and FYM (N_4) might be attributed to favorable improvement in all the yield attributes particularly siliquae/plant. FYM when applied with inorganic fertilizer N, acts as a slow releasing source of N, are expected to more closely match N supply and crop N demand. This could reduce the N losses (4). since photosynthesis by siliquae contributes maximum to seed yield, the availability of nitrogen to prolong the photosynthesis will enhance the seed yield directly. the adequate supply of nutrients based on the plant need under N_3 and N_4 treatments might have improved the yield attributes and yield of mustard over N_1 treatment. The positive response of application of FYM on different *Brassica* spp. has also been reported by Patel and Shelke (5) and Premi and Kumar (6). The FYM incorporation increased the dry matter, different yield attributes and finally the seed yield over no incorporation with respective fertilizer levels.

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