

Effect of plant spacing and direction of sowing on growth and yield of rainfed Indian mustard (*Brassica juncea*)

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ABSTRACT

A field experiment was conducted at Kanpur during 1992–93 and 1993–94 to find out the effect of plant spacing and direction of sowing on Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson]. The plant spacing of 15 cm yielded significantly higher when compared with 25 and 30 cm spacings. Direction of sowing did not differ significantly. East–west sowing showed higher values of yield attributes and yield than North–south sowing in both the years.

Spacing of crop plants mainly depends on their growth habits; however, the magnitude of growth is governed by edaphic and climatic factors. Singh and Singh (1987) and Singh and Singh (1991) reported significant effect of spacing on yield of Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson]. The rows on East–west direction gives higher yield of wheat and rice than rows on North–south direction of sowing (Sharma and Singh, 1971; Rathi and Kumar, 1980). Since research work done on this aspect under the conditions of central Uttar Pradesh is meagre, an effort was made to find out response of Indian mustard to plant spacing and direction of sowing under rainfed condition.

MATERIALS AND METHODS

The field investigation was carried out with Indian mustard cv. 'Vaibhav' during 1992–93 and 1993–94 at Soil Conservation and Water Management Farm of the University at Kanpur, under rainfed conditions. Treatments comprised 6 plant

spacings (no thinning, 10, 15, 20, 25 and 30 cm) and 2 directions of sowing (North–south and East–west) replicated 4 times in randomized block design. The recommended doses of fertilizer, seed rate (@ 6 kg/ha), row spacing (45 cm apart), interculture operations and plant-protection measures were followed. The soil was well-drained sandy-loam in texture having 0.32% organic carbon, 16.5 kg/ha available P_2O_5 and 250 kg/ha available K_2O , with pH 7.2. The total rainfall during the crop season was 10 and 40 mm during 1992–93 and 1993–94 respectively. The seed was sown on 9 and 10 October and harvested on 21 and 20 February during 1992–93 and 1993–94 respectively.

RESULTS AND DISCUSSION

Effect of plant spacing

Plant spacing of 15 cm was at par with 10 and 20 cm spacings, giving 39.8 and 51.8% more seed yield than 25 and 30 cm respectively. The increase in yield due to medium spacing was mainly due to

Table 1. Effect of plant spacings and direction of sowing on growth and yield attributes of Indian mustard

Treatment	Plant stand at maturity (⁰ 000/ha)			Plant height (cm)			Siliquae/ plant			Seeds/ siliqua			1,000-seed weight (g)		
	1992— 93	1993— 94	Mean	1992— 93	1993— 94	Mean	1992— 93	1993— 94	Mean	1992— 93	1993— 94	Mean	1992— 93	1993— 94	Mean
<i>Plant spacing (cm)</i>															
No thinning	303	307	305	158	171	164	230	268	249	9.0	10.8	9.9	2.3	2.8	2.5
10	198	211	204	156	168	162	314	335	324	11.8	12.5	12.1	3.0	3.8	3.4
15	158	160	159	150	164	157	325	342	333	12.2	13.2	12.7	3.4	4.0	3.7
20	105	106	105	146	158	152	330	348	339	12.5	13.8	13.1	3.7	4.3	4.0
25	92	94	93	143	153	148	331	353	342	13.1	14.2	13.6	3.9	4.5	4.2
30	79	80	79	141	150	145	340	360	350	13.8	14.7	14.2	4.3	4.8	4.5
CD (P = 0.05)	41	53		2.8	3.2		12.8	10.6		0.9	0.7		0.5	0.4	
<i>Direction of sowing</i>															
North—south	155	158	156	147	160	153	310	329	319	11.2	12.3	11.7	3.2	3.8	3.5
East—west	157	161	159	151	162	156	319	340	329	12.8	14.1	13.4	3.6	4.3	3.9
CD (P = 0.05)	NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	

Table 2. Effect of plant spacing and direction of sowing on yield of Indian mustard

Treatment	Seed yield (q/ha)			Stick + straw yield (q/ha)		
	1992-93	1993-94	Mean	1992-93	1993-94	Mean
<i>Plant spacing (cm)</i>						
No thinning	5.55	6.80	6.17	19.13	23.80	21.46
10	9.91	11.05	10.48	32.89	36.46	34.67
15	11.24	12.20	11.72	34.10	36.60	35.35
20	10.44	11.71	11.07	31.26	35.15	33.20
25	8.08	8.68	8.38	24.66	26.82	25.74
30	7.18	8.26	7.72	22.06	25.61	23.83
CD (P = 0.05)	1.40	1.26	1.30	2.88	1.72	2.24
<i>Direction of sowing</i>						
North-south	8.46	9.33	8.89	26.77	30.10	28.43
East-west	9.00	10.26	9.63	28.46	31.31	29.88
CD (P = 0.05)	NS	NS	NS	NS	NS	NS

optimum number of plants/ha. Plants spaced widely (at 30 cm) produced more siliquae/plant, seeds/silique and 1,000-seed weight than closer (no thinning) and medium plant spacings (Table 1). Moreover, no thinning treatment was not found favourable to yield attributes and yield, though both plant stand at maturity and plant height were observed higher under this treatment (Table 1). Singh and Singh (1984) and Giri and Ganga Saran (1985) also reported similar results.

Effect of direction of sowing

Yield attributes and yield of Indian mustard were not significantly influenced by direction of sowing (Tables 1, 2). However, East-west sowing increased the seed and stick + straw yields by 8.3 and 5.1% respectively over the sowing in North-south direction mustard. This could be attributed to better plant growth as measured in terms of yield attributes, viz. plant stand at maturity, plant height, siliquae/plant, seeds/silique and 1,000-seed weight, due to better light interception leading to prolonged photosynthetic activity in former as compared to earlier. These findings are in accordance with

the results observed by Pal (1995).

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