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Original Research Article

Effect of Sowing Time and Crop Geometry on Productivity of Mustard (*Brassica juncea* L.) Under Irrigated Condition of Jharkhand

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A B S T R A C T

Mustard is an important rabi oilseed crop of Jharkhand. The best sowing time and crop geometry with respect to yield optimization of newly released Indian mustard var. NRCHB-101 is still under question. Therefore, a field experiment was conducted during the winter (rabi) seasons of 2015-16 to study the response of Indian mustard (*Brassica juncea* L.) var. NRCHB-101 to sowing dates and crop geometry. Sowing on 27th October was recorded significantly higher number of branches, seeds per siliquae, siliquae per plant,1000 seed weight, and seed yield than that on07th November, 17th November and 27th November. Seed yield decreased progressively with delay in planting. However seed yield was significantly influenced by different crop geometry. Higher seed yield /ha was recorded with 30cm row to row and 10 cm plant to plant spacing (30 X 10 cm) \crop geometry. A planting geometry of 30X 10 cm was found to be suitable for the Indian mustard var. sown on 27th October.

Keywords

Indian mustard, crop geometry, sowing dates, yield and yield attributes

Introduction

Indian mustard is the second important oilseed crop in India next to groundnut. In plateau of Jharkhand it is an important winter (*Rabi*) oilseed crop grown as rainfed as well as irrigated crop and occupies about 67 % of the total oilseed area. But its productivity is per unit area is low (719 kg/ha) as compared to that of national average of 1233 kg/ha. An option of suitable crop management practices are important factors for improving crop productivity. Sowing time has profound effect on growth and yield of mustard (Pawar *et al.,* 1976). Sowing dates and crop geometry are the two foremost non-monetary inputs of production can be manipulated to increase the crop productivity. Since information on sowing dates and crop geometry of Indian mustard var. NRCHB-101 in plateau of Jharkhand is meagre. An experiment was conducted to determine the response of newly released Indian-mustard var. NRCHB-101 to sowing dates and planting geometry for yield optimization under irrigated condition of plateau region of Jharkhand.

Materials and Methods

The field experiment was conducted during the winter (rabi) seasons of 2015-16 at Birsa Agricultural University Farm under irrigated condition. The soil was sandy loam, low in available nitnogen (254 kg/ha) phosphorus (34.5 kg/ha), potassium (122.45 kg/ha) with

pH 5.52.The experiment was laid out in split plot design with 3 replications. On main plots there were four sowing dates 27th October, 07th November 17th November and 27th November and on sub plots there were 5 planting geometries viz.30X10cm, 30X20cm, 30X30cm, 45X15cm and 45X30cm was laid out. Indian mustard var. NRCHB-101 was grown with recommended dose of fertilizers (80, 40, 20 kg N.P and K/ha).by maintaining plant spacing of respective spacing by thinning at 15-20 days after sowing. Half dose of nitrogen and full dose of phosphorus and potassium were applied basal and remaining half of nitrogen was top dressed at flowering stage. The observations on growth yield attributes were recorded on the basis of 5 random plants. Harvesting of experimental crop was carried out at 90 percent physiological maturity stage. The post harvest observations viz. Siliquae length (cm) seeds per siliquae and1000 seeds weight (gm) were also recorded.

Results and Discussion

Growth attributes

Plant height ofNRCHB-101Indian mustard varied due to differences in sowing dates. Crop sown on 27th October and 07th November produced taller plants (Table-1) which were at par with each other but significantly taller than later sown crop. Plant height decreased with progressive delay in sowing from 27th October to 27th November.

Number of primary and secondary branches showed the same trend. Secondary branches per plant increased with increasing row spacing. Secondary branches at planting geometry 30X10 cm and 45X30 cm were at par. Singh *et al.,* (1989) also reported the similar result.

Yield attributes

The number of siliquae per plant, seeds per siliquae and 1000 seed weight were important yield attributing charcters of Indian mustard. All these yield attributes were significantly influenced due to sowing dates. Crop sown on 27th October produced highest siliquae per plant (137), seeds per siliquae (14) and 1000 seed weight (5.12 gm) respectively, but at par with 07th November sowing.

But further delay in sowing adversely affects the yield attributes. This may be due to variation in prevailing weather condition.

Earlier sown crop (27th October and 07th November) faced favourable soil moisture condition and relateivly warmer temperature during vegetative growth and conducive temperature during 50% flowering and pod formation stages while later sown crop (17th November and 27th November) faced low temperature at the time of emergence as well as 50% flowering stage. Pal *et al.,* (1985) also reported declining trend in yield attributes with delay in sowing.

Seed yield and economics

The crop sown on 27th October sowing gave(Table-2) seed yield (kg/ha),straw yield (kg/ha), net monetary return (Rs./ha) and B:C ratio ().The higher seed yield with early sowing could be attributed to its beneficial influence on yield attributes because the crop has longer growth period and favourable soil moisture and temperature during crop growth period.

Interaction effect

The interaction effect on sowing dates and planting geometry was significant. (Table-3).

Table.1 Effect of Date of sowing DOS X planting geometry on the plant population, plant height, yield attributes, 50% flowering, maturity and harvest index of the latest released mustard variety NRCHB-101

Treatments	Plant population	Plant Height (cm)	No. of Primary Branches	No of Secondary Branches	Siliqua per Plant	Siliquae Length (cm)	No. of seeds per siliquae	1000 seeds Wt. (gm)	Days to maturity	Harvest index
Sowing Dates										
D1: First (28 Oct.)	155	135	3.95	5.0	137	4.74	13.8	5.12	104	26.03
D2: Second (07 Nov.)	148	108	3.69	4.7	132	4.43	13.8	4.72	108	27.17
D3: Third (17 Nov.)	145	96	3.29	3.2	85	4.16	13.2	4.48	115	25.99
D4: Forth (27Nov.)	139	93	3.25	3.1	78	4.20	12.7	3.53	105	23.22
SEm+_	3.36	3.46	0.08	0.14	7.33	0.098	0.199	0.054	0.054	0.730
CD 5%	**11.65**	**12**	**0.28**	**0.47**	**25.41**	**0.340**	**0.690**	**0.186**	**NS**	**2.55**
Planting Geometry										
G1:30 X 10 cm	217	110	3.63	4.9	119	4.69	13.9	4.74	108	27.39
G2:30 X 20 cm	177	110	3.72	3.8	110	4.51	13.4	4.52	108	26.56
G3:30 X 30 cm	127	105	3.53	3.6	104	4.14	13.2	4.28	108	26.22
G4:45 X 15 cm	130	110	3.38	3.6	103	4.34	13.2	4.27	108	25.19
G5:45 X 30 cm	84	106	3.47	4.2	106	4.25	13.2	4.48	108	22.65
SEm+_	3.37	1.95	0.12	0.17	4.33	0.125	0.228	0.072	0.053	0.828
CD 5%	**9.74**	**5.65**	**0.34**	**0.49**	**12.51**	**0.361**	**0.659**	**0.207**	**NS**	**2.39**
SEm+_	6.74	3.93	0.24	0.34	8.66	0.250	0.456	0.144	0.105	1.66
CD 5% (SD x V)	**19.47**	**11.32**	**0.69**	**0.98**	**25.02**	**0.722**	**1.318**	**0.415**	**0.304**	**4.78**
CV %	7.95	6.28	11.66	14.69	13.88	9.87	5.91	5.58	0.17	11.20

Table.2 Effect of Date of sowing DOS X planting geometry on the yield (Kg/ha) and economics (Rs./ha) of the latest released mustard variety NRCHB-101

Treatments	**Seed Yield (kg/ha)**	**Straw Yield (Kg/ha)**	**Cost of cultivation (Rs/ha)**	**GMR (Rs./ha)**	**NMR (Rs./ha)**	**B:C Ratio**
Sowing Dates						
D1: First (28 Oct.)	1091	3105	18825	40017	21192	1.12
D2: Second (07 Nov.)	1066	2814	18825	38672	19847	1.12
D3: Third (17 Nov.)	971	2714	18825	35598	16773	0.89
D4: Forth (27Nov.)	684	2229	18825	25676	6851	0.43
SEm+_	32	82.77		1051	1051	0.08
CD 5%	**112**	**287**		**3641**	**3641**	**0.264**
Planting Geometry						
G1:30 X 10 cm	1241	3284	18825	45026	**26201**	**1.39**
G2:30 X 20 cm	1084	2982	18825	39565	**20740**	**1.10**
G3:30 X 30 cm	838	2322	18825	30619	**11794**	**0.63**
G4:45 X 15 cm	964	2859	18825	35600	**16775**	**0.98**
G5:45 X 30 cm	639	2165	18825	24145	**5320**	**0.37**
SEm+_	32	81.24		1008	1008	0.08
CD 5%	**92**	**325**		**2910**	**2910**	**0.217**
SEm+_	64	162.48		2015	2015	0.151
CD 5% (SD x V)	**184**	**469**		**5820**	**5820**	**0.435**
CV %	11.56	10.34		9.98	-	-

Table.3 Interaction table of seed yield Kg ha^{-1} of rapeseed-mustard as influence by different sowing dates and planting geometry

G / D	G1 30 X 10 cm	G2 30 X 20 cm	G3 30 X 30 cm	G4 45 X 15 cm	G5 45 X 30 cm	Avg.D
27 th Oct.	1492	1204	733	1133	890	1091
07th Nov.	1340	1232	1072	1089	597	1066
17th Nov.	1220	1152	984	889	612	971
27th Nov.	909	748	562	745	458	684
Avg. of G	1232	1084	838	964	639	

CD 5%(D)	**286.77**	CD 5%(G)	**234.61**
CD 5%(DxG)	**469.21**	CV%- 10**.34**	

The highest seed yield () of Indian –mustard var. NRCHB-101 was recorded with the first date of sowing i.e. 27th October of sowing under 30X10 cm crop geometry.

It was concluded that optimum sowing time for Indian-mustard var. NRCHB-101 is 27th October with planting geometry 30X10cm for its yield maximization under irrigated condition of plateau region of Jharkhand.

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