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Short Note

Influence of Row Direction and Spacing on Growth, Yield and Oil Content of Toria (*Brassica compestris*)

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A Field experiment was conducted to study the effect of row direction and row spacing on growth, yield and oil content of toria. The treatments consisted of two row directions (North-South and East-West) and four row spacings (25, 30, 35 and 40 cm). Among the row directions, maximum plant height (108.57 cm), number of primary branches/plant (6.63), number of secondary branches/plant (11.44) and plant dry weight (33.82 g) were recorded under North-South direction, whereas, among the row spacing, maximum plant height (113.94 cm), number of primary branches/plant (8.33), number of secondary branches/plant (14.91) and plant dry weight (34.92 g) were recorded with wider (40 cm) row spacing. The results indicated that maximum number of siliqua per plant (295.08), number of seeds per siliqua (15.85), test weight (3.51 g), seed yield (11.63 q ha^{-1}), harvest index (26.94 %) and oil content (38.41 %) were obtained under north-south row direction, whereas, amongst the row spacings the highest number of siliqua per plant (353.83), number of seeds per siliqua (16.77), test weight (3.81 g), seed yield (14.75 q ha^{-1}), harvest index (29.56 %) and oil content (41.33 %) were recorded under 40 cm row spacing.

Key words: Toria (*Brassica compestris*), North–south row direction, East-West row direction,row spacings.

Rapeseed-mustard (*Brassica spp.*) group of crops is the second most important oilseed crop after groundnut, contributing nearly 25-30 % of the total oilseed production in the country. India contributes 28.3% and 19.8% in world acreage and production respectively. India produces around 6.7mt of rapeseed-mustard next to China (11-12 mt) and EU (10-13 mt) with significant contribution in world rapeseed -mustard industry (Shekhawat *et al.,* 2012). At present 337 districts in 23 states in India are associated with oilseeds production programme. Rapeseed is seldom fertilized and generally raised as a rainfed crop where the seeds are broadcasted without any row arrangement as a consequence, the average yield is low. In this context, the study was undertaken to find out the effect of non monetary inputs *viz;* different row directions and row spacing on growth and yield of rapeseed.

Materials and Methods

A field experiment was conducted during *rabi* season of 2010 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad. The soil of the experimental field was sandy loam, with an organic carbon content of 0.6 per cent and pH of 7.6. The soil was analyzed to be high in available N (230 kg ha^{-1}) and K (264.44 kg ha^{-1}) and low in available P (14.0 kg ha^{-1}). The experiment was laid out in Randomized Block Design with two factors and eight treatment combinations, replicated thrice. The treatments consisted of two row directions (North- South and East-West) and four row spacing (25, 30, 35 and 40 cm). Rapeseed variety 'PT-303' was sown on 06th Oct 2010 with basal placement of half of the recommended dose of N (80 kg ha^{-1}) and full doses of P_2O_5 (40 kg ha^{-1}) and K_2O (40 kg ha^{-1}) and remaining N (40 kg ha^{-1}) was top-dressed in two equal splits. All the other recommended agronomic and plant protection measures were adopted to raise the crop. The data on plant height, primary branches, secondary branches and plant dry weight were recorded at different growth stages of toria. Seed yield of toria along with other yield-attributing characters like number of siliqua per plant, number of seeds per siliqua and test weight were recorded at harvest. Oil content was estimated by Soxhlet's method.

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Results and Discussion

Growth attributes

Plant height, number of primary branches/plant, secondary branches/plant and plant dry weight were influenced significantly by different treatments (Table 1). The maximum plant height (108.57 cm), number of primary branches/plant (6.63), secondary branches/plant (11.44) and plant dry weight (33.82 g) was observed under North-South row direction of sowing. With regards to row spacing the maximum

Table 1. Growth attributes of *Toria* as influenced by row direction and row spacing

Factors		Plant height (cm)	No.of primary branches/ plant	No.of secondary branches/ plant	Plant dry weight (g)
Row directions (D)					
D_1	North-South	108.57	6.63	11.44	33.82
D_2	East-West	105.50	6.20	10.59	33.00
	S.Ed (±)	0.15	0.03	0.10	0.03
	C.D. (P=0.05)	0.33	0.07	0.22	0.07
Row spacings (S)					
S_1	25 cm	100.04	4.93	7.55	31.85
S_2	30 cm	104.53	5.67	9.60	32.92
S_3	35 cm	109.30	6.73	12.00	33.94
S_4	40 cm	113.90	8.33	14.91	34.92
	S.Ed (±)	1.22	0.05	0.14	0.08
	C.D. (P=0.05)	2.47	0.10	0.31	0.19

plant height (113.90 cm), number of primary branches/plant (8.33), secondary branches/plant (14.91) and plant dry weight (34.92 g) was observed under 40 cm row spacing. The recorded values for growth attributes under North- South row direction and 40 cm row spacing were significantly higher than that obtained under other treatments. The probable reasons for higher growth attributes under north – south row direction sowing are better sunlight interception and thereby an increased photosynthetic activity. These findings are in conformity with the findings of Bilgili *et al.*(2003).

Yield attributes

The highest number of siliqua per plant (295.08), number of seeds per siliqua (15.85), test weight (3.51 g) and harvest index (26.94 %) were recorded under North-South row direction (Table 2). Among

Table 2. Yield attributes, yield and oil content of *Toria* as influenced by row direction and row spacing

Factors		No.of siliqua plant^{-1}	No. of seeds siliqua^{-1}	Test weight (g)	Seed yield (q ha^{-1})	Harvest index (%)	Oil content (%)
Row directions (D)							
D_1	North-South	295.08	15.85	3.51	11.60	26.94	38.41
D_2	East-West	274.67	15.29	3.40	10.50	26.16	37.44
	S.Ed (±)	0.56	0.03	0.01	0.06	0.13	0.02
	C.D. (P=0.05)	1.21	0.05	0.02	0.12	0.29	0.03
Row spacings (S)							
S_1	25 cm	229.33	13.79	3.10	7.46	23.38	35.32
S_2	30 cm	263.83	15.44	3.32	10.00	25.61	36.40
S_3	35 cm	292.50	16.27	3.59	12.04	27.65	38.64
S_4	40 cm	353.83	16.77	3.81	14.75	29.56	42.33
	S.Ed (±)	4.82	0.04	0.01	0.08	0.19	0.02
	C.D. (P=0.05)	11.71	0.08	0.02	0.17	0.41	0.05

the row spacings, the highest number of siliqua per plant (353.83), number of seeds per siliqua (16.77), test weight (3.81 g) and harvest index (29.56 %) were recorded with 40 cm row spacing. Data obtained under North-South row direction and 40 cm row spacing was significantly higher than that obtained under other treatments. These findings are in conformity with the findings of Sunil and Sharma (2002) and Mirza and Karim (2007). The higher values for yield attributes *viz*., number of siliqua per plant, number of seeds per siliqua, test weight and harvest index recorded under north – south sown direction and a wider spacing of 40 cm might be due to higher sunlight receptivity, which might have led to higher photosynthate accumulation, as also depicted by higher growth attributes recorded under the same treatments.

Yield

The highest seed yield (11.63 q ha^{-1}) was obtained under North-South row direction (table 2) and 40 cm row spacing (14.75 q ha^{-1}). Seed yield obtained under the north -south row direction and 40 cm row spacing was significantly higher than that obtained under other treatments. This may be attributed to the favorable growth and yield contributing characteristics obtained under the same treatment. These results are in conformity with the findings of Shaffullah *et al.,* 2000 and Charak *et al.,* 2006.

Oil content

The highest oil content (38.41 %) was recorded under the north-south sown direction, whereas, among the row spacing tried, the higher oil content (41.33 %) was obtained with 40 cm row spacing (table 2). The higher oil content recorded with north – south sown direction and 40 cm spacing may be due to bolder seeds of higher test weight recorded under the above treatments and hence an increased oil content. However, no influence has been reported earlier on this effect.

Conclusion

From the above results, it can be concluded that for obtaining higher yield of toria, the seeds should be sown in North-South direction at a row to row spacing of 40 cm.

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