Plant Archives Vol. 14 No. 1, 2014 pp. 479-481 *ISSN 0972-5210*

PERFORMANCE OF DIFFERENT RAPESEED- MUSTARD VARIETIES IN GANGETIC PLAINS OF WEST BENGAL, INDIA

P. Somondal, P. Haldar and M. Ray*

Department of Agronomy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia-741 252 (West Bengal), India.

Abstract

Traditional rapeseed-mustard varieties grown in alluvial plains of West-Bengal are showing yield decline. To overcome this problem a field experiment was conducted at the University Farm of Bidhan Chandra Krishi Viswavidyalaya during two consecutive *rabi* season of 2010/11 and 2011/12 to evaluate the performance of some improved rapeseed-mustard varieties. Significantly higher plant height at harvest was recorded with JD-6 (191.17 cm/193.06 cm) followed by Ashirbad (187.47/193.06 cm) and SEJ-2 (177.32/187.03 cm). In both the years, significantly higher yield was observed in K-6 (1566/1633 kg ha^{-1}), followed by JD-6 (1534/1502 kg ha^{-1}). However, varieties like K-6, JD-6, NPJ-112 and SEJ-2 were at par and found significantly superior than the traditional variety B-9 (1003/1058 kg ha^{-1}).

Key word : Rapeseed-mustard, variety, seed yield.

Introduction

Rapeseed–mustard (*Brassica* spp.) is the third important oilseed crop in the world after soybean and groundnut. Rapeseed-mustard accounts for 24.3% of the total oilseeds area and 24.7% of the total oilseeds production and occupying second position in area and production next to soybean (Anonymous, 2011). However, its average productivity is 1152 Kg ha^{-1} as against world average of 1400 Kg ha^{-1}. In West Bengal out of total oilseed area, rapeseed-mustard occupies more than 70% area and produce only 50% of its total requirement. This is because of continuous growing of low yielding traditional cultivars *viz.* B-9, B-54, B-85, NC-1 and T-9 etc. These cultivars are also showing yield declination. To make up this short fall in oil production through rapeseed-mustard cultivation, the traditional cultivars of rapeseed-mustards are to be replaced by the new promising cultivars, which suit well in short winter of West-Bengal.

Materials and Methods

Keeping this view, a field experiment was conducted by taking some new promising cultivars of Rapeseed-mustard at Central Research Farm, Gayeshpur in New Alluvial Zone under Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal (India) during two consecutive *rabi* season of 2010/11 and 2011/12. The soil of experimental site was sandy clay loam, low organic carbon (0.41%), available N (216 kg ha^{-1}), P_2O_5 (38 kg ha^{-1}) and K_2O (202 kg ha^{-1}) with pH 6.9. The experiment was laid out in simple Randomized Block Design (RBD) with three replications. In this experiment, six different promising mustard varieties *viz*. NRCHB-101, SEJ-2, Ashirwad, NPJ-112, JD-6 and K-6 were tested along with predominant rapeseed variety B-9 as control. Plant height and LAI were measured at 20 DAS (days after sowing), 40 DAS, 60 DAS and at harvest. Crop growth rate (CGR) was determined between 0-20 DAS, 20-40 DAS and 40-60 DAS. Seed yield and straw yield were taken at maturity stage. Recommended similar management practices were followed for all the cultivars during both the years.

The data obtained in this experiment was analyzed following Gomez and Gomez (1983).

Results and Discussion

Plant height

Plant height of different cultivars for both the years are depicted in the table 1. Irrespective of the cultivars, in both the years of experiment, plant height increased with the progress of age. At 20 DAS significant difference was observed among different cultivars and the highest

***Author for correspondence:** E-mail: manabbckv@gmail.com

Table 1: Plant height of different varieties at different varieties at different growth stages.

Cultivars	20 DAS		40 DAS		60 DAS		At the time of harvesting	
	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12
B-9 (Control)	8.63	9.00	42.00	39.47	73.59	84.25	115.39	118.40
NRCHB-101	9.97	9.23	39.63	44.03	140.55	133.23	182.49	186.42
SEJ-2	9.33	9.53	48.17	41.25	120.82	121.37	177.32	187.03
ASHIRWAD	8.33	9.50	38.00	39.02	140.31	145.13	187.47	193.60
NPJ-112	8.63	8.37	44.17	43.00	136.46	142.70	162.07	160.08
JD-6	10.53	10.83	50.83	44.10	126.86	124.33	191.17	193.06
K-6	9.20	9.13	39.67	41.89	135.65	137.90	175.05	181.33
S.Em (±)	**0.55**	**0.52**	**1.35**	**1.64**	**4.26**	**3.05**	**4.58**	**3.60**
CD at 5%	**1.69**	**1.60**	**4.16**	**5.07**	**12.92**	**9.24**	**13.88**	**10.71**

Table 2: Leaf area index (LAI) and Crop growth rate (CGR) affected by different varieties.

Cultivars	LAI (Leaf area index)						Crop growth rate (CGR) in $gm^{-2}day^{-1}$					
	20 DAS		40 DAS		20 DAS		40 DAS		20 DAS		40 DAS	
	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12
B-9 (Control)	1.72	1.73	4.53	4.44	2.04	2.09	8.61	8.65	7.84	8.45	4.07	4.07
NRCHB-101	1.14	1.21	3.15	3.21	2.03	2.20	7.06	8.12	7.59	7.17	7.90	7.91
SEJ-2	1.42	1.51	3.30	3.18	1.59	1.62	7.19	7.48	7.51	7.26	4.46	4.46
ASHIRWAD	1.31	1.50	4.55	3.89	1.44	1.68	7.29	7.01	6.86	7.10	7.54	6.79
NPJ-112	1.56	1.39	3.19	3.19	1.54	1.53	6.47	6.91	7.64	7.95	4.84	5.31
JD-6	1.60	1.45	3.65	3.64	1.80	1.88	7.78	8.16	9.06	9.51	5.18	5.35
K-6	1.52	1.45	3.78	3.76	1.63	1.83	6.84	6.86	7.47	6.92	5.61	5.80
S. Em (±)	**0.09**	**0.08**	**0.24**	**0.24**	**0.12**	**0.15**	**0.43**	**0.29**	**0.41**	**0.54**	**0.61**	**0.76**
CD at 5%	**0.29**	**0.23**	**0.75**	**0.75**	**0.38**	**0.47**	**1.32**	**0.90**	**1.27**	**1.67**	**1.88**	**2.34**

height was recorded with JD-6 (10.53 cm and 10.83 cm, respectively for first and second year). Similar type of observation was also found at 40 DAS, where JD-6 recorded 50.53 cm and 44.10 cm of plant height. At 60 DAS, no definite trend was found, but B-9 recorded significantly shorter height than all other cultivars. In both the experimental years, the final plant height at harvest was found to be influenced significantly by the cultivars. All the cultivars recorded significant higher plant height than B-9 and maximum plant height was recorded by JD-6 (191.17 cm and 193.06 cm). Here, all the mustard varieties recorded higher plant height than rapeseed variety B-9 may be due to promoted meristematic activities resulting in higher apical growth. Similar finding had been recorded by Rana and Pachauri (2001) and Rawat and Ramadas (1991).

Leaf area index (LAI)

LAI is one of the most important factors of growth in any crop. The LAI of rapeseed-mustard positively increased from 20 to 40 DAS and there after decreased again. In both the years at 20 DAS, highest leaf area index was observed with control variety B-9 (1.72 and 1.73 respectively for 1st and 2nd year), which was significantly different from other varieties. Similar trend was observed at 40 and 60 DAS (table 2). Among the cultivars rapeseed variety (B-9) showed higher leaf area index than the mustard varieties. Similar results reported by Singh and Chaudhuri (2003), Rana *et al.* (2007) and Saren *et al*. (2009). Though, LAI is better for B-9, but this was not reflected on yield. This is may be due to the fact that not only the green leaves, taller green stems, branch and other plant parts contributed significantly to the harvesting of photosynthetically active radiation.

Crop growth rate (CGR)

In most of the cases crop growth rate of rapeseed-mustard increased upto 40 DAS and then stared declining. In both the years during 0-20 DAS the highest CGR was recorded with control variety B-9 (8.61 and 8.65 g m^{-2} day^{-1} in 1st and 2nd experimental year respectively) followed by JD-6 (7.78 and 8.16 g $m^{-2}day^{-1}$ for first and second year, respectively). During 20-40 DAS the highest CGR was found with JD-6 (9.06 and 9.16 g $m^{-2}day^{-1}$ for 1st and 2nd year respectively), which was significantly different from other varieties. During 40-60 DAS the highest CGR in both the experimental year (7.91 and 7.91 g $m^{-2}day^{-1}$ for first and second year respectively)

Table 3 : Seed yield, productivity, yield advantage and harvest index.

Cultivars	Seed Yield (kg ha^{-1})		Yield advantage (%)		Productivity (kg ha^{-1}day^{-1})		Harvest index (%)	
	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11	2011/12
B-9 (Control)	1003	1058	-	-	12.23	13.01	18.28	18.73
NRCHB-101	1329	1322	32.62	31.80	11.20	11.49	19.07	18.56
SEJ-2	1441	1487	43.54	44.65	14.49	15.02	20.25	21.12
ASHIRWAD	1340	1353	33.59	34.89	11.49	11.37	18.17	18.50
NPJ-112	1482	1447	47.97	40.33	15.38	15.12	19.41	20.00
JD-6	1534	1502	53.08	46.82	15.05	15.12	21.54	21.59
K-6	1566	1633	56.61	57.47	15.15	16.00	22.40	23.38
S. Em (±)	**84.00**	**72.00**	-	-	-	-	**2.15**	**1.69**
CD at 5%	**253.00**	**216.00**	-	-	-	-	**6.61**	**5.19**

was recorded with NRCHB-101. The lowest CGR was observed (4.07 g m^{-2}day^{-1} for first and second year respectively) during 40-60 DAS in both the experimental year was recorded with B-9 (table 2). Similar results were recorded by Singh and Chaudhuri (2003).

Seed yield, productivity, yield advantage and harvest index

Seed yield was affected significantly due to variation of varieties. In both the years K-6 showed its superiority over rest of the varieties in respect of seed yield (1566 and 1633 kg ha^{-1} in first and second year respectively), which was followed by JD-6 (1534 and 1502 kg ha^{-1} in first and second year respectively) and these two varieties were found at par. The K-6 variety recorded a higher yield of 56% and 54% respectively for first and second year than B-9, whereas this increase for JD-6 was 52% and 41% respectively for first and second year. In first year of experiment NPJ-112 recorded the highest productivity (15.38 kg ha^{-1} day^{-1}), followed by K-6 (15.15 kg ha^{-1} day^{-1}) and JD-6 (15.05 kg ha^{-1} day^{-1}), whereas during 2nd year K-6 recorded the highest productivity (16 kg ha^{-1} day^{-1}) followed by JD-6 (15.12 kg ha^{-1} day^{-1}) and NPJ-112 (15.12 kg ha^{-1} day^{-1}) (table 3). Increase in seed yield was due to the better genetic makeup and growth parameters and yield attributes. The results of this experiment supported by Pati and Achariya (2009).

The highest value of harvest index was recorded with variety K-6 (22.40% and 23.38% respectively for first and second year), followed by JD-6 (21.54% and 21.59% respectively for 1st and 2nd year) which were significantly different from the variety B-9 (18.28% and 18.73% respectively for first and second year). Due to greater transportation of assimilates to the economic sink as compared to biological sinks. This is in conformity with the findings of Rana and Pachauri (2001).

Conclusion

This study shows that the predominant B-9 rapeseed variety can be replaced by most of the varieties taken in this experiment. But in Gangetic plains of West Bengal the winter is very short and erratic; the duration is one of the important factors to be considered before recommending any rapeseed-mustard variety. In this experiment the duration was 84, 90, 94 and 103 days respectively for B-9, NPJ-112, JD-6 and K-6. NPJ-112 and JD-6 requires just 6 to 10 days more than B-9, but give fairly higher yield. Considering the yield and duration NPJ-112 and JD-6 can be recommended in Gangetic plains of West Bengal.

References

Anonymous (2011). Agriculture at a Glance. Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, New Delhi.

Gomez, K. A. and A. A. Gomez (1983). *Statistical Procedures for Agricultural Research.* Wiley-India Publication.

Pati, P. and N. N. Acharya (2009). Response of toria varieties to fertilizer levels. *Agricultural Science Digest*., **29(2)**:63-65.

Rana, D. S. and D. K. Pachauri (2001). Sensitivity of zero erucic acid genotypes of Oleiferous Brassica to plant population and planting geometry. *Ind. J. Agron*., **46(4)** : 736-740.

Rana, S. K., K. Raha, K. Banerjee and S. Maiti (2007). Irrigation and nitrogen management on the growth and yield of rapeseed under new alluvial zone of West Bengal. *Journal of Interacademicia*., **11(1)** : 59-64.

Rawat, D. S. and Ramadass (1991). 'Pusa Bahar', a new mustard variety for eastern zone. *Indian Farming*, **42(4)** : 33.

Saren, B. K., R. Show and A. Majumder (2009). Effect of irrigation and row spacing on growth and productivity of rapeseed (*Brassica rapa* var gluca). *Journal of Interacademicia*, **13(1)** : 19-22.

Singh, S. P. and A. K. Choudhary (2003). Selection criteria for drought tolerance in Indian mustard [*Brassica juncea* (L.) Czern & Coss]. *Indian Journal of Genetics and Plant Breeding*, **63(3)** : 263-264.