Short Communication

PERFORMANCE OF PROMISING MUSTARD (*Brassica juncea* L.) CULTIVARS UNDER WEST BENGAL CONDITION

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ABSTRACT
Two high yielding mustard (*Brassica juncea* L.) cultivars TM-204 and TM-143 developed at Bhaba Atomic Research Centre (BARC), Trombay, Mumbai were used as initial material. The cultivars were tested in different agro climatic zones of West Bengal for 4 years at 16 locations. Among them TM-204, a yellow seed coat mustard produced seed yield of 1336 kg/ha and TM-143 another yellow seed coat mustard produced seed yield of 1316 kg/ha. TM-204 also demonstrated in farmers' field trial and it surpassed the yield of local check varieties (B-85 and B-9) by 4.2 to 24.3 %. Both the entries were found superior for seed and oil yield over national (Kranti) and zonal check (Pusa Bold) varieties.

INTRODUCTION

Seed is most vital input for higher agricultural production for sustainable yield with higher economic returns. To enhance overall rapeseed mustard production without bringing more area, new improved varieties play a big role. The per capita consumption of vegetable oil is rising continuously. The country needs to produce at least 66.0 m t of oilseeds by 2020. Although Pulses occupy unique position in the world agriculture by virtue of their high protein content (23-25 %) (Himani *et al.,* 2016); rapeseed mustard also occupy an important role due to its high oil content (38-46%).

In India farmers prefer to grow early maturing varieties of mustard in varied agro climatic conditions during *rabi* (winter) season. Mutation breeding technique has been successfully utilized to bring about desirable changes leading to development of 2252 mutant varieties in all crops across the world (Maluszynski *et al*., 2000). Bhaba Atomic Research Centre (BARC), Trombay, Mumbai has initiated mutation breeding programme in several crops including rapeseed mustard with an objective to improve further productivity and agronomic traits. In the present communication, the performance of stable mutants selected at BARC was studied under West Bengal condition for their agronomical traits and yield performance.

MATERIALS AND METHODS

In this present experiment mustard seeds were irradiated at Bhaba Atomic Research Centre (BARC), Trombay, Mumbai with gamma rays. TM-102 was crossed with TM-28. TM-102 is an inter specific recombinants and TM-28 is a yellow and bold seed coat mutant. Pedigree method was followed in the experiment. The stable cultivars TM-204 and TM-143 were grown during rabi (winter) season in the research farms (Kalyani, Kakdwip, Burdwan, Jhargram, Raghunathpur and Shekhampur) of Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia at different agro climatic zones of West Bengal during 2013-14 to 2016-17.

The data collected from four years trial were recorded at each 16 locations and compared with the National check variety Kranti, Zonal Check variety Pusa Bold, disease susceptible check variety Varuna and Local Check variety B-85 and B-9. The design of experiment was Randomised Block Design (RBD) with 4 replications with plot size of 10 m^2 and spacing of 30 cmX10 cm. The seed oil content was estimated at laboratory of Department of Seed Science of Technology, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia by following standard solvent extraction method.

RESULTS AND DISCUSSION

During 2013-14 the entries TM-204 and TM-143 were tested against three check varieties *viz*. Kranti (National check), Pusa Bold (Zonal Check) and B-85 (Local Check) in the three locations of different agro climatic zones of West Bengal. Analysis of mean data over locations revealed that TM-204 recorded 19.6%, 35.9% and 37.6% yield advantage against Kranti (National check), Pusa Bold (Zonal Check) and B-85 (Local Check).

Table 1. Comparative data of plant growth, seed yield attributes and oil content% (Average of four years over 16 locations)

Characters	TM 204	TM 143	Kranti (NC)	Pusa Bold (ZC)	B-9 (LC)
Plant height (cm)	155.7	145.9	160.1	161.8	103.3
50% flowering (days)	51.0	48.2	52.2	53.1	38.8
Maturity (days)	110.7	102.8	111.5	111.8	93.2
No. of primary branches (plant^{-1})	5.2	4.8	4.9	5.1	5.1
No. of siliqua (plant^{-1})	233.3	212.8	233.7	245.3	193.1
Length of siliqua (cm)	6.2	6.0	5.7	5.8	5.9
No. of seeds siliqua^{-1}	14.8	13.1	12.9	13.5	14.7
1000 seed weight (g)	4.7	5.1	5.2	4.9	3.4
Oil content (%)	41.7	41.3	38.2	38.0	44.5

Table 2. Seed yield performance of TM-204 and TM-143

Season	TM-204	TM-143	Kranti	Pusa Bold	Local Check (B-85/Varuna/B-9)
	Seed yield (Kg./ha)				
2013-14	1097	1083	917	807	797 (B-85)
2014-15	1390	1195	1229	1191	969 (B-85)
2015-16	1520	1598	1483	1465	1389(Varuna)
2016-17	1337	1389	1213	1173	971 (B-9)
Pooled Mean	1336	1316	1211	1159	1032
G.M	1211				
S.Em.(+-)	34.59				
C.D. (at 5%)	106.58				
% increase over					
Kranti (National Check)	10.32	8.67			
Pusa Bold (Zonal Check)	15.27	13.55			
Local Check ((B 85/Varuna/B-9)	29.45	27.52			

TM-143 recorded 18.1%, 34.2% and 35.8% yield advantage against Kranti (National check), Pusa Bold (Zonal Check) and B-85 (Local Check). During 2014-15 the performance of the entries TM-204 and TM-143 were again tested at four locations against three check varieties *viz*. Kranti (National check), Pusa Bold (Zonal Check) and B-85 (Local Check). Mean data of four locations revealed that TM-204 recorded 13.1%, 16.7% and 43.4% yield advantage against Kranti (National check), Pusa Bold (Zonal Check) and B-85 (Local Check). TM-143 recorded 23.3% yield advantage over B-85 (Local Check). The performance of TM-204 and TM-143 were also tested against disease susceptible check variety Varuna along with two check varieties *viz*. Kranti (National check), Pusa Bold (Zonal Check) during 2015-16 at six locations of West Bengal. Analysis of data revealed that TM-204 and TM-143 produced seed yield of 1520 and 1598 kg/ha respectively, whereas Kranti, Pusa Bold and Varuna produced seed yield of 1483, 1465 and 1389 kg/ha (Table 2). The percentage increase of seed yield of TM-204 and TM-143 against susceptible check variety varuna was 9.4% and 15% respectively.

The performance of TM-204 and TM-143 was also tested against popular local check variety B-9 (Benoy) at three locations during 2016-17. Pool data of three locations showed 10-38% seed yield increase of TM-204 against three check varieties Kranti (National check), Pusa Bold (Zonal Check) and B-9 (Local Check). TM-143 also performed better against the three checks and the seed yield increase was in the range of 9-36%. Since a predominant cropping sequence in West Bengal (WB) is rice-rapeseed mustard–rice, farmers prefer short duration oilseed as catch crop in between two rice crops. Therefore, the entry TM-204 and TM-143 may suit under such condition since the entries mature within 100-110 days (Table 1).

Table 3. Performance of TM-204 at farmers' field demonstration trial during 2016-17 (Average data collected from five farmers of each location)

Location	Mean yield (kg/ha)		% increase of seed yield over farmers variety	Cost of cultivation (Rs./ha)		Gross Return (Rs./ha)		Net Return (Rs./ha)		Benefit: Cost Ratio	
	TM-204	Farmers variety		TM-204	Farmers variety	TM-204	Farmers variety	TM-204	Farmers variety	TM-204	Farmers variety
Kalyani, Nadia	1252	1200	4.2	13700	10568	50080	48000	36380	35432	2.66	2.82
Shekhampur, Birbhum	815	687	18.8	22130	22140	36693	30915	14563	8775	1.66	1.40
Kakdwip, 24 parganas	1276	1016	24.3	23730	23730	57402	45711	33672	21981	2.42	1.93
Mean (Over 3 locations)	1114	967.7	15.8	19853	18813	48058	41542	28205	22063	2.25	2.05

CONCLUSION

It was revealed that the entry TM-204 recorded highest seed yield of 1336 kg ha^{-1} followed by TM-143 (1316 kg ha^{-1}). In terms of percentage increase of seed yield, TM-204 registered 10.32, 15.27 and 29.45% and TM-143 registered 8.67, 13.55 and 27.52% more than Kranti (National check), Pusa Bold (Zonal Check) and local check varieties.

Based on the four years trial, the performance of TM-204 was tested in the farmers' field at three agro climatic conditions of West Bengal (Table 3). There is a great impact of demonstration of improved cultivar in the farmers' field. Adoption of improved variety can increase the productivity of 27% (Dutta, 2016). Both cost minimization and output maximization is possible by introduction of innovative technology in agriculture (Vinoth and paramasivam, 2016). In all locations the performance of TM-204 is better than local varieties. Hence the entry TM-204 and TM-143 can be adopted by the farmers to replace the old varieties at least partially. Thus adoption of improved varieties will boost up the oilseed production of the state as well as of the country and thereby farmers will be economically benefitted.

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