

## CHARACTERIZATION OF INDIAN MUSTARD GERMPLASM

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Introduction

"Germplasm of any crop is as vital as clay to the potter".

For an effective breeding programme, a significant diversity in the available germplasm is required. The available germplasm, therefore, needs to be precisely evaluated, characterized and documented for effective utilization of desirable plant attributes in hybridization programme. In the present study, an attempt has been made to evaluate germplasm of Indian mustard under limited moisture conditions as well as under irrigated conditions. The documented data would provide a ready reckoner to brassica breeders for selecting the genotypes of their choice for utilization in their breeding programme.

Material and Methods

In the present study, 1035 germplasm lines of Indian mustard were grown and evaluated in augmented design in the experimental area of the Department of Plant Breeding, Haryana Agricultural University, Hisar, using the national variety Varuna and the local variety RH-30 as checks. Each line was accommodated in paired rows of 5 m and distance between rows and between plants was maintained at 30 cm and 15 cm, respectively. Data were recorded for different traits like cotyledon length, cotyledon breadth, notch depth, days to first flowering, 50 per cent flowering, days to maturity, plant height, length of main raceme, primary branches, secondary branches, siliquae on main raceme, siliqua length, seeds per siliqua and seed yield per plant. Out of 1035 germplasm lines, 184 were evaluated

under limited moisture conditions /i.e., only pre-sowing irrigation was given/ while the remaining 851 lines were evaluated under irrigated conditions /one irrigation at full bloom stage/.

### Results and Discussion

Out of 184 lines grown under limited moisture conditions, the five promising lines with respect to each trait were selected /Table 1/. A perusal of data revealed that a culture RH-7813 /2.44 cm/ had maximum cotyledon breadth followed by RK-8204 /2.03/ and R-50-A /1.95/, as compared to RH-30 /1.66 cm/ and Varuna /1.45 cm/. The maximum cotyledon length was observed in RLM-215 /1.54 cm/ closely followed by RK-8204 /1.52/ and R-50-A /1.50/, as against RH-30 /1.26/ and Varuna /1.00/. The notch depth was maximum in RLM-185 /0.41 cm/ followed by RLM 234 /0.40/, and RK-8204 /0.39/, as compared to RH-30 /0.29/ and Varuna /0.23/.

In general, the data revealed that cotyledons exhibiting more breadth also possessed more length and notch depth.

The line UUR-48 was the earliest /46 days/ to flower and the line UUR-61 was last /83 days/ to flower. The varieties RH-30 and Varuna took 53 and 63 days, respectively. In general, the days to 50 per cent flowering followed the trend of days to first flowering. The maturity period ranged from 142 days /UUR-48/ to 160 days as compared to RH-30 /158 days/ and Varuna /159 days/ which matured very late. The maximum plant height was attained by the culture 5422-2 /266.2 cm/ against 186.2 cm and 190.2 cm of RH-30 and Varuna, respectively.

The length of main raceme was maximum in the culture KRV 7/6 /111.4 cm/ as compared to 84.8 cm and 67.3 cm of RH-30 and Varuna, respectively. A culture RLM 319 exhibited maximum number of primary branches /19.8/ as compared to RH-30 /5.12/ and Varuna /5.30/. As regards the secondary branches, it was observed that culture RLM-785 attained maximum secondary branches, /25.8/ followed by RIK-1 /25.6/, RLM-543 /23.2/, yellow rapeseed /22.0/ RH-7516

/21.0/ as compared to Varuna /9.92/ and RH-30 /101/.

The maximum number of siliqua on the main raceme was recorded by the strain IB 1445 /61.4/ as against RH-30 /42.4/ and Varuna /41.1/. The lowest number of siliquae per plant was born on PR-1004 /22.4/.

The siliqua length varied from 2.88 cm /UUR-38/ to 4.98 cm /UUR-65/ as compared to RH-30 /4.10/ and Varuna /4.02/, respectively. The line RS-79 /18.52/ possessed maximum number of seeds per siliqua as against RH-30 /12.65/ and Varuna /12.05/, respectively. The maximum seed yield per plant was recorded by RIK-78-4 /23.14 g/ followed by RNS-14 /22.34/, UUR-38 /22.10/, RH-78 27 /22.10/, RH-7856 /21.20/ while the check RH-30 and Varuna recorded 12.69 and 9.13 g seed yield per plant.

Under irrigated conditions, the best lines selected are presented in table 2. A perusal of the data revealed that RC-289 attained the maximum cotyledon breadth /2.98 cm/ as against 1.76 cm and 1.57 cm of RH-30 and Varuna, respectively. The cotyledon length of line RC-180 was maximum /1.73 cm/ while the smallest cotyledon length was observed in the culture B-189 /0.69/. The maximum notch depth was observed in the line RC-109 /0.41/ as against RH-30 /0.25/ and Varuna /0.22/. The culture RC-366 was the earliest to flower in 40 days as against 50 days of RH-30 and 63 days of Varuna. The line B-440 attained 50 per cent flowering in 46 days as against 59 days of RH-30 and 71 days of Varuna. The line B-398 was the earliest to mature in 137 days. The maximum plant height was recorded in the line RC-126 /253.0 cm/ whereas the line /B-359/ recorded minimum height /93.4 cm/. The highest length of the main raceme was observed in culture RC-113 /122.6 cm/ as compared to RH-30 /79.41 cm/ and Varuna /74.73 cm/. The lowest value was recorded in B-235 /30.6 cm/. The maximum number of primary branches per plant was observed in RC-219 /12.0/ as against 4.71 of RH-30 and Varuna. The total number of secondary branches was maximum in line B-316 /31.8/ as against 9.70 /RH-30/ and 9.41 /Varuna/.

The maximum number of siliquae on <sup>the</sup> main raceme was recorded

for the line RC-275 /63.8/. The checks RH-30 and Varuna recorded 38.52 and 36.02 siliquae, respectively. The highest siliqua length /4.92 cm/ was recorded for B-451 while the seeds per siliqua were recorded to be maximum /13.24/ in culture B-238. The standard check varieties, Varuna and RH-30, however, had 10 seeds per siliqua. The highest seed yield per plant /27.54 g/ was recorded for the line B-199 followed by B-409 /22.24 g/, B-227 /21.98 g/ as compared to 12.91 g of RH-30 and 10.12 g of Varuna.

As a national service organisation, one of the major objectives of the germplasm management research unit /Rape-seed Mustard/ is to make available the genetically diverse germplasm to brassica breeders for crop improvement studies. The promising lines indentified would be further tested for their yield and other desirable characteristics in multi-location testing, secondly, the diverse introductions would be utilized as donors of desirable traits.

Table 1: Promising lines identified from germplasm of Indian mustard under rainfed conditions.

Cotyledon breadth (cm)	Cotyledon length (cm)	Notch depth (cm)	Days to 1st flowering	Days to 50% flowering
(1)	(2)	(3)	(4)	(5)
RH-7813 2.04	RLM-215 1.54	RLM-185 0.41	UUR-48 46	UUR-48 54
RK-8204 2.03	RK-8204 1.52	RLM-234 0.40	RID PR-45 46	RID-PR-45 56
R-50A 1.95	R-50 A 1.50	RK-8204 0.39	UUR-47 48	PR-1003 61
PR-1004 1.94	RLM-514 1.49	TM-2 0.38	UUR-12 49	UUR-12 58
UUR-166 1.93	RH-7813 1.48	RLM-82 0.37	UUR-62 52	UUR-42 59
Days to maturity (6)	Plant height (cm) (7)	Length of main raceme (cm) (8)	Primary branches per plant (9)	Secondary branches per plant (10)
UUR-48 142	5422-2 266.2	KRV 7/6 111.4	RLM-319 19.8	RLM-785 25.8
UR-15 146	RLM-152 261.8	UUR-57 104.0	UUR-90 10.0	RHK-1 25.6
RJ-338 146	RH-7857 247.4	RJ-338 100.0	RLM-82 10.0	RLM-543 23.2
RLM-543 147	PR-24 256.4	KR-79 99.4	RH-7847 9.8	Yellow apressed 22.0
UUR-47 150	RLM-234 243.8	PR-43 97.4	RHK-46-1 9.6	RH-7516 21.0
Siliques on main raceme (11)	Siliques length (cm) (12)	Seeds per siliques (13)	Seed yield per plant (g) (14)	
18-1445 61.4	UUR-65 4.98	RJ-79 18.52	RHK-78-4 23.14	
RL-18 60.0	RH-7856 4.96	Kash1 18.04	RNS-14 22.34	
RJ-36 59.4	RI-7361 4.96	RJ-82 18.00	UUR-38 22.10	
RH-12 57.8	UUR-62 4.64	PR-36 17.48	RH-7827 22.10	
RLM-29 54.0	RH-7813 4.54	RJ-61 17.04	RH-7856 21.20	

Table 2: Promising lines identified from germplasm of Indian mustard under irrigated conditions

Cotyledon breadth (cm) (1)	Cotyledon length (cm) (2)	Notch depth (cm) (3)	Days to first flowering (4)	Days to 50% flowering (5)
RC-289 2.98	RC-180 1.73	RC-109 0.41	RC-366 40	B-440 46
RC-436 2.16	RC-197 1.72	B-259 0.40	B-97 41	B-305 46
B-250 2.14	RC-109 1.70	B-22 0.39	B-156 41	B-362 47
RC-326 2.14	B-60 1.70	B-23 0.39	B-160 41	B-160 49
RC-224 2.13	RC-224 1.69	B-256 0.38	B-164 41	B-156 50
Days to maturity (6)	Plant height (cm) (7)	Length of main raceme (cm) (8)	Primary branches per plant (9)	Secondary branches per plant (10)
B-398 137	RC-126 253.0	RC-113 122.6	RC-219 12.0	B-316 31.8
B-10 139	RC-153 243.0	B-76 115.2	B-199 11.4	B-284 28.8
B-15 139	RC-197 222.4	RC-58 110.2	B-260 10.8	B-94 27.0
B-60 140	RC-423 220.0	RC-125 106.8	B-259 10.6	B-129 26.2
B-61 141	B-400 218.0	B-231 105.4	RC-135 10.0	B-281 26.0
Siliques on main raceme (11)	Siliqua length (cm) (12)	seeds per siliqua (13)	seed yield per plant (g) (14)	
RC-275 63.8	B-451 4.92	B-238 18.24	B-199 27.54	
B-76 62.6	B-304 4.72	RC-346 18.08	B-409 22.24	
B-61 62.4	B-94 4.70	B-268 17.20	RC-227 21.78	
B-151 62.0	B-278 4.62	RC-350 16.92	B-43 21.64	
RC-58 61.8	B-391 4.60	B-229 16.64	B-183 21.64	