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Short Communication

RGN-48 — A high yielding Indian mustard [*Brassica juncea* (L.) Czern. & Coss.] variety for frost and drought tolerance

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Rapeseed-mustard (*Brassica* spp.) is the second important oilseed crop of the country after groundnut and plays a significant role in the oil economy of which Indian mustard [*Brassica juncea* (L.) Czern. & Coss.] is dominating. Unfortunately, in spite of having a large number of high yielding (2.0-2.5 t/ha) varieties, our national average is very low (about 1.0 t/ha) as compared to the rapeseed growing countries of the West (UK about 4.0 t/ha, France 3.0 t/ha, World average 1.5 t/ha (Source FAO Database) [2]. The North Western Plain Zone (NWPZ) comprising of the states of Punjab, Haryana, Rajasthan, UP and Delhi is the most potential area where Indian mustard is being grown extensively. Among them, Rajasthan is the leading state with nearly 40 per cent of the total area of rapeseed mustard. Mustard is grown on conserved moisture in major area and the crop faces moisture stress. Moreover, in NWPZ, the temperature goes very low (near zero) in the month of January, which leads to high damage in the form of poor seed filling or seed rapture in the pods and this damage is more in the rainfed areas. As far as drought tolerant varieties are concerned, some good varieties like RH-819 and RN-393 have been developed for this zone but the varieties tolerant to frost are the need of hour for which systematic efforts were initiated. As a result of concentred efforts made in this direction, RGN-48, a high yielding mustard variety having trost and drought tolerance has been released and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties (CVRC) for Agricultural Crops of Govt. of India.

Sriganganagar is an ideal good location for natural screening of the material for frost and drought tolerance as temperature slides to near 0°C in January and average rainfall is 326 mm of which 75 % is received in the months of July to September. During Rabi 1994-95, 10 crosses were attempted involving the donors tolerant to frost (B-75, RH-781, RGN-4) and drought (RH-819, RSM-204, RGN-7) at ARS, Sriganganagar. The segregating material was advanced using modified pedigree method of selection [3] and rigorous screening was done for frost *vis-a-vis* drought tolerance under field conditions. For seeing the effect of frost, the number of damaged seeds were counted on an average in 50 silique in each cross on every single plant showing good performance for yield and yield attributing traits. On the basis of yield performance and tolerance to frost under rainfed situations, one genotype from cross RSM-204 × B-75 was isolated and designated as RGN-48. It was contributed to the AICRP on Rapeseed -Mustard programme for multilocation testing in 2000-2001 and was tested at Bhatinda, Sriganganagar, Kotputli, Hisar, Bawal and R.S. Pura for four consecutive years. Data were recorded on yield and yield contributing characters; and oil content (%) and subjected to analysis of variance for testing the significance of differences for seed yield.

Variety RGN-48 has a very high degree of frost resistance under natural as well as artificial screening. Under artificial screening it has only 0.5 % killed seeds/ siliqua, which is negligible as compared to Laxmi (15.60 % killed seeds/ siliqua), one of the popular variety in Haryana and Rajasthan (Table 1). It has wider adaptability as it has shown consistent superiority for seed and oil yields in NWPZ for four consecutive years under rainfed conditions [4]. It has given 30.76, 12.50,

Table 1. Reaction of variety RGN-48 to deep freezing at -4.5±1°C for 2 hours after 35-40 days of antheses at Hisar during *rabi* 2001-2002 (Source AICRP-RM Annual Reports)

Varieties	Killed seeds/ siliqua (%)	Remarks
RGN-48	0.50	Highly frost tolerant (< 10 % killed seeds/siliqua)
Laxmi	15.60	Moderately frost tolerant (10-20% killed seeds/siliqua)
RH-781	1.80	Highly frost tolerant

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Table 2. Performance of mustard variety RGN-48 under rainfed conditions in Zone II (Source AICRP-RM Annual Reports)

Varieties	Weighted mean over years (2000-2004)		Per cent increase over cnecks	
	Seed yield (kg/ha)	Oil yield (kg/ha)	Seed yield	Oil yield
RGN-48	1692 (15)	687 (9)	-	-
Varuna	1294 (15)	491 (9)	30.76	39.92
Kranti	1504 (15)	605 (9)	12.50	13.55
PBR-97	1508 (10)	616 (7)	12.20	11.52
RH-819	1487 (12)	579 (6)	13.79	18.65

Values in parenthesis indicate no. of locations

12.20 and 13.79 % higher seed yield over the checks Varuna, Kranti, PBR-97 and RH-819, respectively in 15 environments over four years across NWPZ.

For oil yield also it has shown 39.92, 13.55, 11.52 and 18.65 % superiority over the checks (Table 2) [1]. Even under different dates of sowing starting from September to November, RGN-48 has exhibited 5.64 % higher oil yield over check Kranti.

In Adaptive Trials at Adaptive Trial Centre (ATC), Srikaranpur it gave 12.5 and 8.4 % yield increase over checks Varuna and RH-819, whereas, at farmers' fields it exhibited 16.25 and 10.93 % yield superiority over Varuna and RH-819, respectively (Table 3).

Table 3. Performance of mustard variety RGN-48 under rainfed conditions in the adaptive trials during *rabi* 2003-04 at Adaptive Trial Centre, Srikaranpur (Distt. Sriganganagar), Deptt. of Agriculture, Govt. of Rajasthan and at Farmers' fields in Sriganganagar and Hanumangarh Distt.

Treatments	ATC, Srikaranpur		Farmers' field (9 locations)	
	Mean seed yield (kg/ha)	Percent increase	Mean seed yield (kg/ha)	Percent increase
RGN-48	1964	-	1431	-
Varuna (Local Check)	1746	12.5	1231	16.25
RH-819 (Zonal Check)	1811	8.4	1290	10.93
S.Em	26	-	22	-
C.D. at 5%	71	-	62	-

It has medium tall (ranging from 160-175 cm), erect and compact plant type. Silique are of medium length (4.2 cm) having 13-16 seeds/siliqua with seed weight of 3.84 g/1000 seeds. Average oil content in this variety is 40.62 per cent, which is higher than the checks. Seeds are of dark brown colour. The variety flowers between 45-59 days after sowing and matures in 148 days. It has on an average 7 primary branches/ plant with a range of 5-10. The mean silique/plant is 300 and it ranges from 256-359 and is the major yield-contributing attribute in this variety. Hence, this variety can be used as a frost tolerant donor also for the crop improvement programme in Indian mustard.

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