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A potential source of dwarfing gene in Indian mustard— *Brassica juncea* L. (Czern & coss)

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Abstract

A potential source of dwarf gene in *Brassica juncea* has been described. This was considerably short in plant height than those of commercial varieties and could possibly be utilized in developing dwarf and high yielding varieties of Indian Mustard.

Keywords : Dwarf, Transgressive segregants, compact plant type, *Brassica juncea* L., Indian Mustard

Introduction

The sixties and seventies are the era of high yielding varieties in India. In particular, is the era of manipulation of plant height, non-lodging, fertilizer responsive varieties in major cereal crops like wheat and rice. It change the entire outlook of the production potential of these crops. There are many reports on the useful effect of the dwarfing genes in enhancing the average grain yield in wheat (Jain and Kulshreshtha, 1976; Nelson *et al*.,1980; Allan, 1983; Brandle and Knott, 1986 and Tripathi *et al*., 1990).

In Indian mustard, incorporation of such genes could be helpful in developing dwarf or semi-dwarf genotypes which can give higher yield under high population density. Further, *per se* ceiling to the genetic potential of the crop could be raised by restructuring plant type (Singh, 2014). Keeping this point of view, several crosses were made over the years. Parental materials/lines were grown with recommended cultural practices and plant protection measures including fertilizer dose of 80 kg N: 40 kg P per hectare under irrigated conditions at Agricultural Research Station, Navgaon, Alwar. During the rabi 2005-06 the strain RW-01-02 (Berhampur, W.B.) and variety Patan-67 (Gujrat) were grown along with other parental lines. The plants were grown in 5 m row length with row to row spacing 1 m each. A cross was made between these two lines. The seed were harvested and planted in the subsequent season. The F_1 plants were of medium in height and the self seed were harvested. The seeds of these plants were grown to raise F_2 generation were grown during 2007-08 in 10 rows of 5 m length with 30 cm row to row distance and 10 cm plant to plant spacing. A short plant height transgressive segregant from segregating population was selected, the progeny of this desirable F_2 plant (dwarf plant) grown upto F_5 generation under selection pressure. The accession number was allocated and named as RRN-727. The dwarfness character was confirmed for three consecutive years (Kumar, 2010,2012 and 2014). The morpho-physiological attributes were recorded for five randomly selected single plants and enumerated with attributes of nation check Varuna and zonal check Aravali.

The dwarf strain RRN-727 showed comparatively and significantly lesser values for all attributes except

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secondary branches and number of seeds per siliquae which were marginally less in comparison to Varuna and Aravali (Table 1). The strain RRN-727 have distinguishing feature *i.e*. , its tertiary branches ranging from 39- 48 with mean value 42. Though it is sensitive to frost but at par to other mustard plants.

Momentous attribute *i.e.*, almost one-third of plant height of the popularly grown commercial variety Varuna (156 cm) and zonal check Aravali (181 cm). The days to flowering values of dwarf strain RRN-272 have relatively lesser (32 DAS) in comparison to Varuna (56 DAS) and Aravali (62 DAS). Its plants matures in 113 DAS. Short maturity period has been cited as a desirable trait (Swaminathan,

Table 1. : Morph-physiological attributes of RRN – 727, Varuna and Aravali

S. No.	Attribute	RRN-727		Varuna			% decrease or increase over varuna	Aravali			% decrease or increase over varuna
		Mean	Range	Mean	Range	t value		Mean	Range	t value	
1	Plant height	55.0	50.0-61.0	156.1	151.0-	40.1**	-66.0	181.0	175.0-	40.9**	-70.7
2	cm	4.0	3.0-7.0	9.0	160.0	4.8**	-55.6	7.0	187.0	3.2**	-42.9
	Primary				7.0-11.0				5.0-8.0		
3	branches	17.0	12.0-24.0	18.0		0.4	-5.6	13.0		1.6	30.8
	Secondary				14.0-22.0				10.0-16.0		
4	branches	32.0	30.0-35.0	56.0		24.0**	-42.9	62.0		23.8*	-48.4
	Days to 50%				55.0-58.0				60.0-65.0		
5	flowering	262.0	200.0-292.0	325.0		2.6*	-19.4	300.0		1.8	-12.7
6	No. of siliqua	2.6	2.4-3.0	4.0	280.0-377.0	11.1**	-35.0	5.2	280.0-	11.1**	-50.0
	Siliqua length				3.8-4.2				350.0		
7	cm	10.6	7.0-13.0	12.0		1.2	-11.7	13.0	4.8-6.0	1.2	-18.5
8	Seed/siliqua	2.3	2.0-2.5	6.1	10.0-14.0	20.3**	-62.3	4.2		20.0**	-45.2
	1000 seed				5.8-6.5				9.0-18.0		
9	weight g	113.4	110.0-117.0	133.0		10.9**	-14.7	140.0	4.1-4.3	19.0**	-19.0
	Days to				130.0-						
10	maturity	4.0	3.1-4.8	12.0	138.0	10.4**	-66.7	13.0	138.0-	20.5**	-69.2
	Seed yield/								412.0	8.5**	-13.6
11	plant g	35.0	34.0-36.0	39.2	10.0-14.0	10.8**	-10.7	40.5		-	-
12	Oil %	41.2	39.0-48.0	-		-	-	-	12.0-14.0		
	Tertiary				38.9-39.8				39.0-41.6		
	branches *						-			-	

1970). It provides better potential for intensification of cropping system through addition of species or multiple plantation of same species during the crop year (Gill, 1985). Rice fallow areas of West Bengal, Bihar, Orisa, Jharkhand and Chattisgarh and North eastern hill states which is estimated about 11.65 mha can be harnessed by growing early maturing varieties. Conclusive attribute *i.e*., seed yield and oil % in seeds of RRN-727 have lower values. It would be worthwhile to transfer the dwarfness in agronomic background of the tall commercial varieties of mustard having higher oil and seed yield. It could be explore in developing dwarf plant with high oil and seed yield which suits for high plant population density. Great possibilities and potentialities exist for developing suitable variety which may result productivity similar to wheat and rice through better partitioning.

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