



Evaluation of stable and non shattering isabgol cultivar - Gujarat isabgol 4

D G Patel, H B Patel*, P T Patel, H Patel & A U Amin

Seed Spices Research Station, Sardarkrushinagar Dantiwada Agricultural University,
Jagudan-382 710, Mahesana, Gujarat.

*E-mail: hirenpbg@yahoo.co.in

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Abstract

Isabgol growing area was surveyed during 2009-10 and selected genotypes were evaluated in preliminary evaluation trial (PET) during 2010-13 and in large scale varietal trial (LSVT) during 2013-15. It was found that JI-09-21 recorded better growth and yield characters and yield over check Gujarat Isabgol 3. The JI-09-21 did not shatter much even after water dripping and recommended for cultivation as Gujarat Isabgol 4.

Keywords: gujarat isabgol 4, isabgol, new variety, non shattering type

Isabgol (*Plantago ovata* Forsk) is a short duration, more remunerative and medicinally important crop of arid and semiarid regions. In India, it is largely grown in Gujarat, Rajasthan, Madhya Pradesh and Haryana. The area under Isabgol in India during 2014-15 is 1.09 lakh hectares. The production recorded 72 thousand MT with productivity of 660 kg ha⁻¹. In Gujarat, area mostly falls in Banaskantha, Kachchh and Patan districts with acreage of nine thousand hectare with production and productivity 5000 MT and 556 kg ha⁻¹, respectively during 2015-16 (Anonymous 2016a). During the last decade, area and production of isabgol has decreased to the tune of 343% and 281%, respectively, mainly due to problems of seed shattering. At the time of maturity, unseasonal rain or heavy dew leads to failure of the crop which is the fact for reduction of area under Isabgol (Anonymous 2016b). The objective of the study was to evolve non-shattering isabgol cultivars.

Isabgol growing area of Kachchh in Gujarat was surveyed during 2009-10 and subsequently genotypes were evaluated. First three years (2010-11 to 2012-13) 13 genotypes (JI-09-03, 07, 10, 13, 15, 16, 20, 21, 22, 23, 24, 25 and 26) with check (Gujarat Isabgol -03) were evaluated in preliminary evaluation – trial (PET). During 2013-14 and 2014-15, nine genotypes (JI-08-02, JI-09-07, 13, 16, 20, 21, 22, 24 and 25) along with check (Gujarat Isabgol -03) was tested. The trials were carried out at three different locations *viz.*, Jagudan, Kholwada and Deesa in a randomized block design with three replications.

The stability analysis of variance and stability parameters *viz.*, linear regression coefficient (bi) and deviation from regression (S²di) of genotype means over environment were computed as suggested by Eberhart & Russell (1966).

Shattering per cent was computed as suggested by Singh *et al.* (2005) and Chandra (1967). Five

plants in each replication were selected at maturity stage. Entire spike were dipped in water and then observed for seed shattering from selected plants. The percentage of seed shattering calculated by using a following formula.

Shattering per cent = [(Expected seed yield - Seed wt. after threshing) / (Expected seed yield)] × 100

Expected seed yield = H.I. × Sun Dry wt. (kg) / 100

Considering eight trials at three locations for five years, JI-09-21 was recorded higher (928 kg ha⁻¹) seed yield against 830 kg ha⁻¹ of Gujarat Isabgol 3 (GI 3), which was 11.78% higher than GI-3 (Table 1). The new variety named as

Gujarat Isabgol 4 was having more tillers plant⁻¹ (6.0), more spikes plant⁻¹ (22.7), seeds spike⁻¹ (80.7), higher test weight (1.58 gm) and high swelling factor (11.4 cc g⁻¹) than that of check variety GI-3, due to these yield contributing traits GI-4 is having high seed yield potential (Table 3). The similar kind of results also obtained by Prajapati *et al.* (2011).

Gujarat Isabgol 4 recorded high mean with regression coefficient (bi) near unity and deviation from regression (S²di) around zero for seed yield, indicating GI-4 has average responsiveness and are highly stable over environments (Table 2).

The new culture has compact spike and did not separate easily even after dipping in water. Only 7.25% seeds shattered after dipping in water.

Table 1. The comparative yield performance (kg ha⁻¹) of JI-09-21 (GI 4) over different locations

Year	Trial	Yield (kg ha ⁻¹)		IOC (%)	Rank	S.Em. ±	CD (P<0.05)	C.V. %
		JI-09-21	GI-3					
Jagudan								
2010-11	PET	1014	894	13.42	1/14	56	167	10.80
2011-12	PET	1078	948	13.71	1/14	49	150	10.39
2012-13	PET	907	863	5.10	2/14	51	155	9.47
2013-14	LSVT-II	946	874	8.24	1/10	52	155	11.55
2014-15	LSVT-II	949	812	16.87	1/10	50	148	11.12
	Mean (5)	979	878	11.46	-	-	-	-
Kholwada								
2013-14	LSVT-II	878	769	14.17	1/10	52	154	13.78
2014-15	LSVT-II	852 *	759	12.25	1/10	31	91	9.56
	Mean (2)	865	764	13.22	-	-	-	-
Deesa								
2014-15	LSVT-II	799	722	10.66	3/10	73	215	14.79
Overall Mean (8 trials)....		928	830	11.78	-	-	-	-
Superiority over check....		8/8	-	-	-	-	-	-

Table 2. Stability Analysis for seed yield in Isabgol

Variety	Yi (mean seed yield)(kg plot ⁻¹)	bi(reg. coeff.)	S ² _{di} (mean Sq. dev.)
JI -09-21(GI 4)	0.82	0.94	0.00
GI-3 (Ch)	0.42	0.80	0.00
Mean	0.39	-	

Table 3. Comparative yield and quality attributes of JI -09-21 (GI 4)

Character	Mean	
	JI -09-21 (GI 4)	GI 3
Days to flowering	63	64
Days to maturity	102	104
Plant height (cm)	31.0	31.3
No. of tillers plant ⁻¹	6.0	5.0
No. of spikes plant ⁻¹	22.7	20.2
Spike length (cm)	4.7	4.5
No. of seeds spike ⁻¹	80.7	76.4
1000 grain weight (g)	1.579	1.542
Swelling factor (cc g ⁻¹)	11.4	9.1

Table 4. Effect of water dipping on shattering of isabgol seed

Variety	Without Dipping		H.I%	Dipping in Water (Average of four sample)			
	Dry wt. (kg)	Seed wt. (kg)		Dry wt. (initial) (kg)	Sun dry wt. (kg)	Seed wt. after threshing (kg)	Shattering of seeds (%)
GI 4 (JI-09-21)	1.027	0.175	17.03	0.894	0.731	0.115	7.25
GI 3	0.959	0.158	16.47	1.038	0.811	0.037	70.07

GI-4 recorded 89.67% less shattering than that of check variety, which revealed that Gujarat Isabgol 4 was non shattering in habit as compared to Gujarat Isabgol 3 which is prone to high seed shattering. The post dipped seed weight of GI 4, -was 0.115 kg threshed seeds, which was 96% higher than that of the post dipped seed yield of GI-3 (0.037 kg threshed seeds) (Table 4). Hence, Gujarat Isabgol 4 recommended for cultivation.

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