

## Gujarat Isabgol-3: a promising cultivar of Isabgol

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### ABSTRACT

Isabgol (*Plantago ovata* Forsk.) is cash crop, commercially known as 'Ghodajira' in Gujarat. Which is grown in *Rabi* season. In Gujarat, two varieties *viz.*, Gujarat Isabgol 1 and Gujarat Isabgol 2 have been released in 1975 and 1987, respectively and popular in the farmer's field. The productivity of Isabgol among the farmers was remained stagnant due to low yield potentiality of these varieties. The industrial demand of raw material *i.e.* Isabgol seeds is increasing day by day. To meet the demand of industry and increase in productivity, the varietal improvement programme of Isabgol was undertaken at Centre for Research on Seed Spices, S. D. Agricultural University, Jagudan. The promising genotypes of Isabgol were evaluated from germplasm and experiments were carried out during eight consecutive years. Based on the quality and yield potentiality the genotype JI 26 (GI3) recorded 1324 kg/ha yield and showed its superiority by producing 11.35 per cent higher than GI 2. The yield potential of JI 26 (GI 3) is 1632 kg/ha. The spikes of GI 3 are long, thin and dark green leaf, profuse tillers and has high stable yield. It possesses more number of seeds per spike and better grain quality. The GI 3 was recommended for commercial production in the 36<sup>th</sup> Gujarat State Seed Sub-Committee Meeting.

**KEY WORDS :** Isabgol (*Plantago ovata* Forsk.), Varietal improvement, Yield potentiality

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### INTRODUCTION

Isabgol (*Plantago ovata* Forsk.) is cash crop, vernacularly known as 'Ghodajira' grown in *Rabi* season. The seeds of which are valued for mucilaginous rosy white husk used against constipation, irritation of digestive tract due to good sources of soluble fibre and is supposed to help in controlling blood pressure and lowering cholesterol. In addition, it is used for food industries in various preparations. Isabgol seed is separated from husk, gola, lali and khakho during processing. The gola and lali have nutritional value which improve cattle food product. The khakho can be used for reducing the seepage losses (Singh *et al.*, 2005). India is the leader in Isabgol production and largest export of seeds and husk. India is the world's largest producer and exporter of Isabgol and considered as sole producer of isabgol in the world. In India, Isabgol having major belt spread from semi arid to arid covering larger area in Rajasthan and Gujarat. India ranks first in

Isabgol production (around 1 lakh tones) in world than Pakistan. Gujarat grows isabgol in 24199 hectares and produces about 26092 M.T. with a productivity of about 1078 kg/ha (Anonymous, 2010a). The major area (95%) falls in Banaskantha, Kutchh and Patan districts of North Gujarat. The share of Gujarat in an area and production in the country is about 30 to 35 per cent. About 90 % of the country's production is exported and India is earning more than 200 crores rupees foreign exchange (Anonymous, 2010b). In Gujarat, two varieties *viz.*, Gujarat Isabgol-1 and Gujarat Isabgol-2 have been released in 1975 and 1987, respectively and popular among farmers but productivity remained stagnant. So as to improve the productivity concerted efforts made at main spices research station, GAU led to identification of Gujarat Isabgol 3.

### MATERIALS AND METHODS

Low yield potential of present day varieties, Low yield potential is the major constraints in Isabgol crop. Keeping this in view, the breeding programme was concentrated on developing varieties with high yield potential and better seed quality. Selection plays a predominant role in crop improvement and most of the high yielding genotypes are selected from germplasm material. Chandra (1967)

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reported from single culture studies that Patan samples (Gujarat) had a high yielding potential. Similarly, the 130 germplasm lines were collected around Patan, Mehsana and Banaskantha districts were evaluated based on the yield and other ancillary traits and selected eight high yielding genotypes viz., JI-4, JI-5, JI-19, JI-26, JI-36, JI-37 and JI-38. They were tested in preliminary evaluation trial along with checks viz., GI-1 and GI-2, respectively and promoted to large scale trial. From these genotypes, the lines JI-26 has high yield potential when compared to checks GI 1 and GI 2. The trials were conducted in randomised block design with three replications during the year 2001-02 to 2004-05 in large scale varietal. The ancillary observations viz., days to flowering (50 %), days to maturity, plant height (cm), no. of tillers/plant, no. of spikes/plant, length of spike (cm), no. of seeds/spike, 1000 seeds wt. (g) were recorded. The swelling factors were (husk recovery) estimated as per the procedure using composite sample of seeds and was measured in ccg<sup>-1</sup>.

## RESULTS AND DISCUSSION

The evaluation and testing programme in trials was carried out during 1996-97 to 2004-05. The variety GI 3 (JI 26) along with other germplasm entries were evaluated for yield and other attributes with check and by virtue of its yield performance, plant type, spike quality, it was first promoted to large scale varietal trial. The plant type is semi erect, early maturing, bushy having profuse growth habit. The perusal of data revealed that the genotype JI-26 recorded superiority of 11.35 per cent (Table 1) over the years. GI 3 mainly better for its medicinal value due to husk because of its high recovery of husk and bold seeded grain with slightly higher swelling factor that is beneficial because as the swelling factors of seeds decreases as it directly related to proportion of husks (Singh, 1997). The swelling factor of GI 3 (13.0 cc/g) is higher than GI 2 (12.2 cc/g) The range of swelling factors in RI-89 was recorded 11.32 to 12.48 ccg<sup>-1</sup> in their studies (Chauhan *et al.*, 2006) which is lower than variety genotype GI 3. The GI 3 having the best quality and quantity attributes which are given in Table 2 and 3. The plant height, number of tillers, number of spike per plant, spikes length and 1000 seeds weight etc. for GI 3 were higher in values compared to GI 2. The data presented in Table 2 revealed that variety GI 3 was significantly superior in number of tillers, days to earliness, number of seeds per spikes, swelling factor and test weight etc. It possessed more number of seeds per spike and better grain quality. The detailed Salient features of GI 3 are presented in Table 3 for its identification. Variety GI 3 having high yield *i.e.*, 1632 kg/

Year	GI 3	Yield (q/ha)	CI 2(cc)	C.V.%	C.D.	Overall Mean (q/ha)
1996-97	135	1360	12.2	12.2	250	1396
1997-98	138*	1378	10.9	10.9	195	129
1998-99	137	1378	11.8	11.8	187	1262
1999-00	1366	1378	11.5	11.5	185	1271
2000-01	1351*	1332	10.6	10.6	123	1160
2001-02	1391	1399	11.3	11.3	190	1278
2003-04	1371*	1379	11.3	11.3	218	127
2004-05	1383*	137	11.7	11.7	175	1296
Overall Mean	137	1389				
% Superiority over GI-2	135					
Superiority over GI-1	138					
Superiority over GI-2	138					

**Table 2 : Statistical analysis of ancillary characters of GI-3 and GI-2 in large scale varietal trial**

Sr. No.	Entry	Mean of duration and ancillary observations recorded								
		1 DTF	2 DTM	3 PH	4 NS/P	5 LS	6 NS/SP	7 TW	8 NT/PL	9 SF
2001-02										
1	GI-3	55*	107	34.7	33.0	5.0	49.7*	1.85*	4.3	13.0*
2	GI-2	60	110	34.8	34.2	4.6	35.2	1.65	6.5	12.6
C.D.		N.S.	1.87	4.33	5.31	0.86	9.92	0.21	0.95	0.67
C.V.%		1.94	1.50	8.08	10.35	11.31	16.18	7.13	9.89	3.05
2002-03										
1	GI-3	54*	106	32.6	39.2	4.7	38.7	1.88*	5.8	12.6*
2	GI-2	58	112	33.2	35.2	4.2	36.3	1.67	6.6	12.0
C.D.		1.29	1.40	3.88	7.38	N.S.	N.S.	0.09	N.S	0.59
C.V.%		1.26	1.73	7.17	12.21	14.49	15.0	2.90	11.0	2.68
2003-04										
1	GI-3	61*	112	39.0	46.0	5.1	47.3*	1.82*	7.7	13.0*
2	GI-2	64	115	33.2	42.9	4.4	38.9	1.60	7.2	12.0
C.D.		2.19	N.S.	N.S.	10.95	0.77	7.75	0.16	1.14	0.60
C.V.%		2.57	2.19	8.15	16.43	9.08	10.86	3.92	9.21	3.00
Over all mean										
1	GI-3	57	108	35	39	4.9	42	1.86	6	12.9
2	GI-2	61	112	34	37	4.4	37	1.67	7	12.4
1.	Days to flowering (50 %) (DTF)			4. No. of spikes/plant (NS/P)			7. 1000 seeds wt. (gm)( TW)			
2.	Days to maturity (DTM)			5. Length of spike (cm)( LS)			8. NO. of Tillers/plant(NT/PL)			
3.	Plant height (cm)( PH)			6. No. of seeds/spike(NS/SP)			9. Swelling factor, cc/gm(SF)			

\* indicates significance of value at P=0.05

**Table 3 : Salient features of Isabgol variety GI-3**

Sr. No.	Qualitative character regarding plant growth		
1.	Growth habit	Semi erect	
2.	Growth pattern	Synchronous	
3.	Stem colour	Green	
4.	Tillers habit	Profuse	
5.	Leaf thickness	Thin	
6.	Leaf width	Narrow	
7.	Leaf length	Medium long	
8.	Leaf colour	Dark green	
9.	Leaf pubescence	Present	
10.	Spike shape	Parallel	
11.	Spike length	Medium long	
12.	Seed colour	Pinkish colour	
13.	Seed shape	Boat type	
14.	Luster on seed surface	Bright	
15.	Seed size	Bold	
16.	Plant height (cm)	32.6 - 39	
17.	Primary tillers per plant	4.3-7.7	
18.	Days to spike initiation	54-61	
19.	Number of spike per plant	33-46	
20.	1000 seeds weight(gm)	1.85-1.90	
Price and quality characters			
21.	Swelling factor (cc/g)	GI-3	GI-2
22.	Price @ of Rs./kg	13.0	12.2
23.	Total income Rs./ha	28.55	28.00
24.	Net profit (Rs /ha) over GI 2	37800	33292
		4508	-

ha was recommended for commercial cultivation by Gujarat state seed subcommittee.

Variety GI 3 with high yield and better grain quality as high husk recovery of husk will provide very good alternative to GI 2 that produce higher yield under varying environmental conditions and enhance the productivity and more profitable to the farmers. The farmers may earn more compared to GI 2.

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