

Response of Isabgol to rates of fertilizer under varying sowing times

M.M.PATEL² AND A.U. AMIN^{1*}

Agricultural Research Station
S. D. Agricultural University, Kholwada, Ta. Sidhpur, Dist.Patan (Gujarat)

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ABSTRACT

A field experiment was conducted during *Rabi* seasons of 2014-15 to 2016-17 at Agriculture Research Station, Sardarkrushinagar Dantiwada Agricultural University, Kholwada to study the effect of sowing time and fertilizer management on isabgol (*Plantago ovata*, Forsk.). The five sowing times viz, S_1 : 2nd week of November, S_2 : 3rd week of November, S_3 : 5th week of November, S_4 : 2nd week of December, S_5 : 4th week December and three fertilizer rates i.e. F_1 : 50%, F_2 : 100%, F_3 : 150% RDF levels were tested under factorial RBD with three replications. Pooled data of three years experimentation indicated that the crop sown during the second week of November produced significantly the higher growth and yield attributes which were at par with the treatment S_2 for plant height, number of tillers per plant and seeds per spike. Seed and stover yields of isabgol were reduced with each late in sowing during all the year and in pooled data. Crop sown during second week of November produced significantly higher seed and stover yields during all the years as well as in pooled results. Application of 150 % RDF recorded significantly maximum growth, yield attributes and yield. Maximum swelling percentage (11.0) was recorded with 100 % RDF and was at par with 150 % RDF. Crop sown during second week of November (S_1) secured maximum net realization as well BCR. Similarly, these values were higher when crop was fertilized with 150 % RDF.

Key word: Isabgol, Seed yield, Stover yield, Net return, Benefit: Cost Ratio.

Isabgol (*Plantago ovata*, Forsk.) is a medicinal crop, locally known as 'Ghodajiru' grown in *Rabi* season. Isabgol husk is used against constipation, irritation of digestive tract due to good sources of soluble fiber. Husk, gola, lali and khakho are separated from seed during processing.

In India, Isabgol is widely grown in semi arid to arid regions of Rajasthan and Gujarat. India ranks first in Isabgol production (around 1 lakh tones) in world than Pakistan. Gujarat grows 24199 hectares and produces about 26092 M.T. with a productivity of about 1078 kg/ha. The major area (95%) falls in Banaskantha, Kutch, Patan and Mehsana 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, therefore it is termed as dollar earning crop.

Time of sowing is known as non-monetary input and exerts a distinguish effect on growth and development as well as disease of crop, consequently on yield.

¹Research Scientist, ²Assistant Research Scientist

*Email : rsspices@sdau.edu.in

The time of sowing varies with cultivars, irrigation facilities and agroclimatic conditions.

Productivity of isabgol is poor of these regions due to light in texture soils which are poor in fertility and water holding capacity. Scientific information on these aspects is scanty, hence, present experiment was planned.

MATERIALS AND METHODS

A field experiment was conducted during *Rabi* season of 2014-15 to 2016-17 to study the effect of sowing times and fertilizer levels on isabgol at Agriculture Research Station, SDAU., Kholwada, Ta. Sidhpur, Dist. Patan.

The soil of experimental field was loamy sand in texture, neutral in reaction (pH 7.6), low in organic carbon (0.39%) and available nitrogen (150.8 kg ha⁻¹), medium in phosphorus (37.6.0 kg P₂O₅ ha⁻¹), and potassium (150.5 kg K₂O ha⁻¹). The treatment consisting of five sowing times viz. S_1 : 2nd week of

November, S_2 : 3rd week of November, S_3 : 5th week of November, S_4 : 2nd week of December, S_5 : 4th week of December and, three fertilizer rates viz, F_1 : 50% F_2 : 100%, F_3 : 150% recommended dose of fertilizer (RDF) levels were treated in FRBD with three replications. The RDF for isabgol is 40:20:0, N-P-K, kg/ha. The crop variety 'GI-3' was sown at 30 cm row spacing, with uniform seed rate of 4.00 kg/ha. Half nitrogen and full dose of phosphorus in forms of urea and super phosphate was applied as basal dose and remaining N was applied in two equal splits at 30 and 50 days after sowing. Five random plants were selected from each plot to record yield attributes. As per need of crop under different sowing times all the recommended cultural practices were applied.

RESULTS AND DISCUSSION

Effect of sowing time

Crop sown at 2nd and 3rd week of November (S_1 and S_2) were at par and recorded significantly higher growth, yield attributes and yield than rest of the treatments except spikes per plant, 1000 seed weight and seed yield. (Table 1)

Seed yield of isabgol was reduced with each delay in sowing. Favorable climatic condition at initial growth stage and long crop duration due to early sowing might be increased growth and yield attributes ultimately higher yield. High temperature at reproductive phase in late sown condition and short crop duration which ultimately reduce the crop yield. Crop sown during second week of November (S_1) produced significantly

the highest seed yield 784 kg/ha¹ over the rest of the sowing times, except treatment crop sown during third week of November (S_2). Early sowing i.e. Crop sown during second week of November (S_1) produced significantly the highest stover yield (4335 kg/ha¹.) These findings are in conformity with Ram Chandra *et al.* (2006) and Ahirwar *et al.*, (2014).

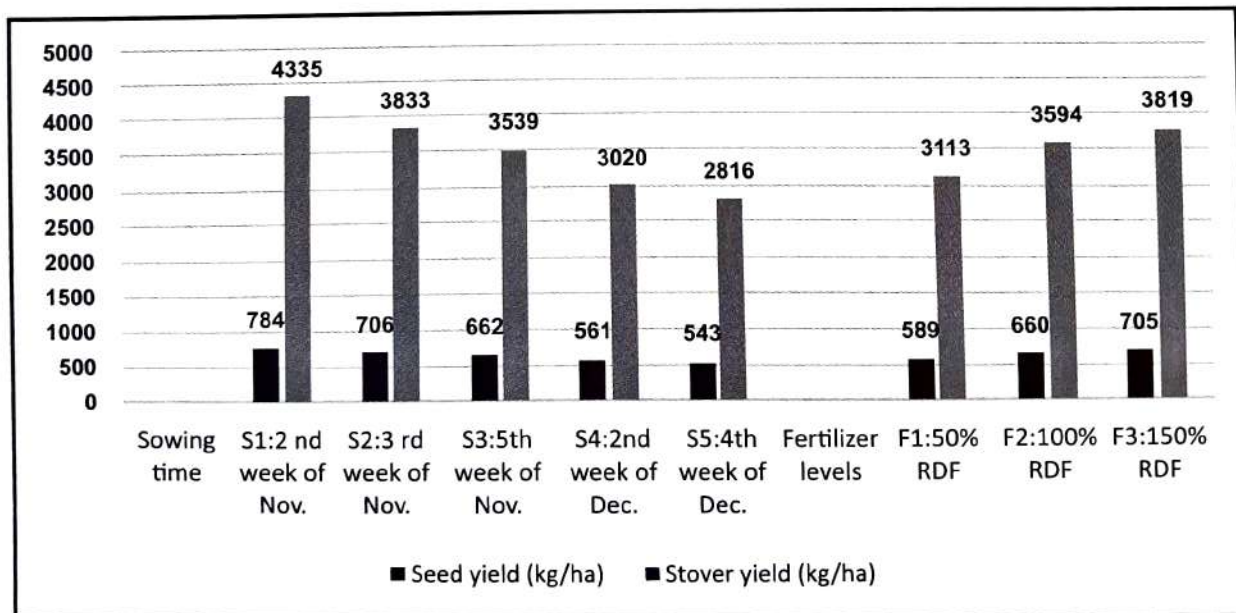
Effect of Fertilizer levels

Application of 150 % RDF recorded significantly the maximum growth and yield attributes except, spike length (4.47 cm) and test weight (1.39 gm) were recorded with application of 150 % RDF except of spike length (4.07 cm) seeds per spike (54.5) and 1000 seed weight. (Table 1).

The results indicated that, seed yield of isabgol increased significantly with each successive increase in fertilizer levels from 50 % RDF to 150 % RDF. Application of 150 % RDF to crop produced significantly the highest seed yield (705 kg/ha¹) and stover yield (3819 kg/ha¹). The favorable effect of nitrogen on growth and yield attributes and ultimately on seed yield could be attributed to the fact that nitrogen and phosphorus the most dispensable plant nutrients for improving growth and development. These findings are in accordance with Patel (2002), Utgikar *et al.* (2003), Patel (2006), Ram Chandra *et al.* (2006), Arunjothi (2007) and Ahirwar *et al.* (2014).

Economics:

Crop sown during second week of November (S_1) secured the maximum net realization as well as BCR (3.16). Similarly these values were higher when crop was fertilized with 150 % RDF (Table 1). Crop sown



during Second to third week of November and applied with 150% RDF recorded higher seed and stover yield which turned to higher BCR. These findings are in line

of work with Patel (2002), Patel 2006, Ram Chandra *et al.* (2006), Arunjyothi (2007) and Ahirwar, *et al.* (2014).

Table 1: Growth and yield attributes, yield and economics of isabgol as influenced by different sowing time and fertilizer levels (Pooled data of three years)

Treatments	Plant height (cm)	No of tillers/ plant	No of spikes/ plant	Spike length (cm)	No of seeds /spike	1000 seed weigh	Swelling factor	Stover yield (kg/ha)	Seed yield (kg/ha)	Net return (Rs/ha)	Benefit:cost ratio
A Sowing time											
S ₁ : 2 nd week of Nov.	33.7	6.32	26.73	4.75	58.1	1.48	11.4	4335	784	40767	3.16
S ₂ : 3 rd week of Nov.	32.5	5.44	23.00	4.59	57.3	1.40	10.9	3833	706	34817	2.84
S ₃ : 5 th week of Nov.	31.2	4.93	19.45	4.10	53.7	1.36	10.9	3539	662	31458	2.66
S ₄ : 2 nd week of Dec.	28.0	4.27	15.83	3.71	52.2	1.28	10.4	3020	561	23779	2.26
S ₅ : 4 th week of Dec.	25.9	3.81	13.92	3.41	50.3	1.27	10.2	2816	543	22388	2.18
S.E.m. ±	0.6	0.42	1.03	0.14	0.60	0.01	0.11	74	25	40767	3.16
C.D at 5%	1.8	1.37	3.70	0.45	1.69	0.05	0.30	209	82	34817	2.84
B Fertilizer levels											
F ₁ : 50% RDF	29.1	4.53	17.55	3.84	53.2	1.32	10.5	3113	589	25138	2.28
F ₂ : 100% RDF	30.3	4.99	19.90	4.07	54.5	1.35	11.0	3594	660	29800	2.46
F ₃ : 150% RDF	31.3	5.35	21.42	4.47	55.2	1.39	10.8	3819	705	32459	2.53
S.E.m. ±	0.3	0.10	0.42	0.16	0.46	0.02	0.08	57	11		
C.D at 5%	0.8	0.29	1.18	0.45	1.31	0.05	0.23	162	31		
Interaction											
S X F	NS	NS	s	NS	NS	NS	NS	NS	NS		
Y X S	S	S	NS	S	NS	S	NS	NS	S		
S.E.m. ±									25		
C.D at 5%									69		
Y X F	NS	NS	NS	NS	NS	NS	NS	NS	NS		
Y X S X F	NS	NS	NS	NS	NS	NS	NS	NS	NS		
CV %	6.36	13.76	14.32	11.50	5.73	8.16	5.10	10.98	11.34		

Thus, the crop sown during 2nd to 3rd week of November and fertilized with 60+30 kg N, P/ha (30 Kg N/ha+30 kg P/ha, as basal and remaining 30 Kg N/ha to be applied in two equal splits at 30 and 50 DAS) for obtaining higher yield and net return.

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