

Effect of Date of Sowing and Planting Geometry on Growth and Yield of Isabgol cv Mayuri

Mahender Pal, Vijay Kumar, R. S. Singh
 A. P. Singh, P. K. Singh

Received 23 August 2016; Accepted 27 September 2016; Published online 13 October 2016

Abstract An investigation on Isabgol was conducted at Experimental farm, Nalanda College of Horticulture, Noorsarai, Nalanda (Bihar Agricultural University, Sabour) in the year 2013 -14 and 2014-15 in Factorial Randomized Block Design assigning time of sowing as (Factor A), Planting geometry (Factor B) with four replications. Factor A consisted of three time of sowing viz., 15th October 01st November and 15th November factor B consisted of two levels of spacing S₁ (30 × 10 cm) and S₂ (30 × 15 cm). Pooled data on different growth and yield characters revealed 15th November as best time of sowing

of Isabgol seeds and proclaimed highest values for plant height (40.56 cm), Plant girth (9.40 mm), no. of tillers/plant (15.43), no of spikes/plant (49.37), spike length (5.63 cm) and grain yield (1539.21 kg/ha). On the other hand spacing level of S₂ (30 × 15 cm) also recorded highest values for plant height (38.17 cm), plant girth (7.53 mm), no. of tillers/plant (13.16), no. of spikes/plant (40.62), spike length (4.74 cm) and seed yield (925.11 kg/ha). The treatment combination of 15th November as time of sowing of seeds and plant spacing of 30 × 15 cm was found best for sowing of Isabgol seeds in the growing conditions of the Nalanda. It was followed by sowing time as 15th November and plant spacing of 30 × 10 cm for higher growth and yield of Isabgol.

Keywords Isabgol, Sowing time, Plant spacing, Growth, Yield.

Mahender Pal*, Vijay Kumar, A. P. Singh, P. K. Singh
 Nalanda College of Horticulture, Noorsarai, Nalanda, Bihar
 Bihar Agricultural University, Sabour Bhagalpur, India

R. S. Singh
 Assistant Professor-cum-Jr. Scientist
 Mandan Bharti Agriculture College, Agwanpur, Sahrasa, Bihar
 Bihar Agricultural University, Sabour Bhagalpur, India
 e-mail : gangwar.mahender@rediffmail.com

* Correspondence : Dr. Mahender Pal, Assistant Professor-cum-Jr. Scientist (Horticulture-Fruit), Nalanda College of Horticulture, Noorsarai 803113, Nalanda, Bihar.

Introduction

Isabgol (*Plantago indica* L.) is an annual herb cultivated in India. The seed of Isabgol contains mucilage, fatty oil and large quantities of albuminous matter. This crop is one of the most important crops among the cultivated medicinal plants grown for husk and seeds [1]. The mucilage present in the husk of Isabgol has several medicinal properties and used in

Table 1. Effect of date of sowing and planting geometry on growth and yield attributes of Isabgol cv Mayuri (pooled data for the year 2013-14 and 2014-15)

Treatments	Plant height (cm)	Plant girth (mm)	No. of leaves/plant	No. tillers/plant	No. of spikes/plant	Spike length (cm)	No. of grains/spike	Grain yield (kg/ha)
Date of sowing								
15 th Oct	31.61	5.07	56.81	9.00	24.43	3.30	29.31	293.42
01 st Nov	37.03	6.43	71.25	11.43	36.31	4.44	37.93	719.02
15 th Nov	40.56	9.40	85.37	15.43	49.37	5.63	46.50	1,539.21
CD at 5%	1.07	6.40	4.02	1.55	4.47	0.39	5.05	179.02
Sem ±	0.35	0.41	1.32	0.51	1.47	0.12	1.66	58.85
Plant spacings								
30 × 10 cm-S ₁	34.63	6.40	67.75	10.75	32.79	4.17	35.20	775.99
30 × 15 cm-S ₂	38.17	7.53	74.54	13.16	40.62	4.74	40.62	925.11
CD at 5%	0.87	0.33	3.28	1.26	3.65	0.32	4.12	146.17
SEm ±	0.28	0.11	1.08	0.41	1.20	0.10	1.35	48.05

treatment of various disorders viz., constipation, irritation of digestive tract and is a diuretic, alleviates kidney and bladder problems, gonorrhoea, arthritis and hemorrhoids. The biosynthesis of the secondary metabolites is controlled genetically and affected strongly by various environmental and agronomical factors. Among the various factors influencing plant growth and development, sowing date and plant spacing are prerequisites for assuring optimal macro and micro ecological conditions for higher growth and yield of plants.

On the other hand late sowing of crop adversely affects seed yield due to a short growth period Galavi et al. [2] reported that seed yield of Isabgol decreased as planting date was retarded. Barzgaram [3] also reported that delay in sowing decreased WUE and biomass production. Singh et al. [4] while working on yield and nutrient uptake of Isabgol (*Plantago ovata*) in response to sowing dates and spacing noted numerically higher yield in 15 November sown crop as compared to 30 November sown crop during 2007-08. It was also mentioned that the closer row spacing of 22.5 cm gave significantly higher yield and N, P, K uptake as compared to wider spacing of 30 cm. This higher yield in 15 November sown crop may be due to more plant height, number of branches/

plant and more spikelet length. Keeping in view above facts and data, the present investigation was planned to be carried out in the growing conditions of Nalanda to draw a base line information with respect to date of sowing and planting geometry in Isabgol.

Materials and Methods

The present investigation was carried out at Experimental farm, Nalanda College of Horticulture, Noorsarai, Nalanda a unit of Bihar Agricultural University, Sabour in factorial randomized block design with three time of sowing viz., 15th October 01st November and 15th November designated as factor A and two levels of spacing S₁ (30 × 10 cm) and S₂ (30 × 15 cm) designated as Factor B in four replications in the year 2013-14 and 2014-15. The experimental soils are newly formed alluvial soil with pH 7.14 rich in organic matter. The seed of Isabgol cv Mayuri was sown in plot size of 3 × 3 meters on three different sowing time and two levels of spacing. All the standard recommended cultivation practices were followed for cultivation of the crop including manuring and fertilization. For better growth of the plants recommended dose of FYM @ 15 t/ha and Nitrogen 50 kg/ha, Phosphorus-40 kg/ha and potash 30 kg/ha was applied. 1/3rd Nitrogen + Full P, K and FYM was mixed in the soil at the time of final

Table 2. Interaction effect of date of sowing and planting geometry on growth and yield attributes of Isabgol cv Mayuri (Pooled data for the year 2013-14 and 2014-15).

Treatments	Seed yield (kg/ha)		
	S ₁ (30 × 10 cm)	S ₂ (30 × 15 cm)	Mean
Oct 15 th	310.13	276.71	293.42
Nov 1 st	703.26	734.79	719.02
Nov 15 th	1,314.59	1,763.83	1,539.21
Mean	775.99	925.11	

ANOVA

Factors	CD at 5%	SE (d)	SE (m)
Factor (A)-Time of sowing	179.02	83.23	58.85
Factor (B)-Plant spacings	146.17	67.99	48.05
Factor (A × B)-Interaction of sowing time and plant spacings	253.17	117.79	83.23

land preparation before sowing of seeds. remaining nitrogen was applied in 3 split doses, first one month after sowing and second one month later and third at the time of grain filling. The crop was irrigated just after sowing of seeds and further irrigation was given at 10-12 days intervals. All the growth parameters viz., plant height, plant girth, number of leaves per plant, seed yield were recorded at final harvest during 1st week of April. The obtained data was analyzed for factorial randomized block and result was interpreted for effects and interactions.

Results and Discussion

Data presented in the Table 1 and 2 revealed significant effect of date of sowing and plant spacing on growth and seed yield of Isabgol. Among the different time of sowing November 15th sowing recorded highest values for plant height (40.56 cm), no. of tillers/plant (15.43), no. of spikes per plant (49.37), spike length (5.63 cm), no. of grains per spike (46.50) and seed yield (1539.21 kg/ha). The highest values were followed by sowing of seeds on November 1st and consecutive dates. Lowest plant height (31.61 cm), no. of tillers/plant (9.00), no. of spikes/plant (24.43), spike length (3.30 cm) and seed yield was obtained in sowing of seeds on October 15th. Plant spacing also evoked significant effect on

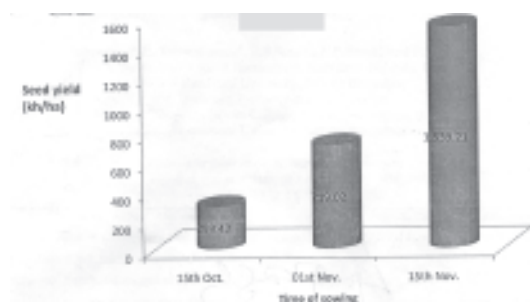


Fig. 1. Effect of date of sowing on seed yield (kg/ha) of Isabgol.

growth attributes and seed yield of Isabgol (Table 1 and 2) (Figure 1). Among sowing of seeds on different row to row and plant to plant spacing, sowing of seeds at S (30 × 15 cm) recorded highest plant height (38.17), no. of tillers /plant (13.16), no. of spikes/plant (40.62), spike length (4.74 cm) and seed yield (925.11 kg/ha). The highest values were followed by sowing of seeds at a spacing of 30 × 10 cm (S₁).

Interaction effect of time of sowing and spacing was also found significant (Table 2). Among the different treatment combinations, sowing of seeds on November 15th and spacing level of S₂ (30 × 15 cm) obtained seed yield of 1763.83 kg/ha. Followed by sowing of seed on November 15th at spacing of S₁ (30 × 10 cm) (1314.59 kg/ha). However lowest yield was proclaimed in sowing of seeds on October 15th with S₂ (30 × 15 cm) due to sparse germination of seed. Better results on 15th November planting might be due to optimum conducive temperature with sowing during November 15th and higher plant height, higher plant girth and more length of the spike. Higher growth and yield at wider sowing may be attributed to availability of more open space and optimum plant population at wider spacings. In close conformity to your findings Singh et al. [4] while working on yield and nutrient uptake of Isabgol (*Plantago ovate*) in response to sowing dates and spacing noted numerically higher yield in 15 November sown crop compared to 30 November sown crop during 2007-08. Das [5] also proclaimed 15-

30th november as the best time for sowing of *P. indica* and the suitable was either 50 or 60 × 15 cm. Swelling factor was not influenced by these factors, however, a positive trend was observed toward suitable date of sowing and spacing.

References

1. Aishwath OP, Ram C (2008) Response of blond psyllium (*Plantago ovata*) to split application of nitrogen on growth, yield and quality. *Ind J Agric Sci* 78 : 323—327.
2. Galavi M, Ramroodi M, Mansoori S (2006) Study of effect of planting date on yield and yield components of planago ovate in Sistan Region, Iran *Proc 9th Cong Agron Plant Breeding*, pp 141—142.
3. Barzgaran T (2010) Effects of Irrigation and planting date on agronomic traits and yield of Roselle. MSc thesis. Dept Agric Islamic Azad Univ Birjand Branch, Birjand, Iran, pp 98.
4. Singh S, Buttar GS, Singh P (2014) Yield and nutrient uptake of isabgol (*Plantago ovata*) in response to sowing dates and spacing . *Ind J of Agric Sci* 80 : 1102—1104.
5. Das M (2011) Growth, photosynthetic efficiency, yield and swelling factor in *Plantago indica* under semi-arid condition of Gujarat, India. *Int J Pl Physio biochem* 3 : 205—214.