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Suitability of Isabgol (*Plantago ovata* Forsk) germplasms in Southern Rajasthan

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Abstract
Isabgol (*Plantago ovata* Forsk) is indeed a valuable medicinal plant and widely cultivated in India and other countries for its seeds. India is first rank in the trading of Isabgol seed as well as in husk. Isabgol is a Rabi season crop, with a maturity period of 120 to 140 days. The Isabgol plant produces white flowers. After the flowers are pollinated, they develop into seeds, which are brown-grey in color, small, and ovate-shaped. The seeds are relatively tiny, measuring about 1.8 to 3.8 mm in length. Each seed is covered with a translucent, gel-like membrane, which is commonly referred to as the "husk". The two major products of Isabgol are seed and husk. The husk is brown grey pink in colour and membranous covering seeds. It has hygroscopic nature as it absorbs and retain water 40-90 percent. Psyllium seeds and husk, derived from the Isabgol plant (*Plantago ovata* Forsk), possess various medicinal properties like mild laxative, emollient, demulcent, cooling and diuretic that make them useful in treating a range of gastrointestinal and urinary condition Scuring of chronic dysentery, diarrhea, duodenal ulcer, constipation and piles. Isabgol (*Plantago ovata* Forks) is known for its adaptability to a wide range of agro-climatic conditions. It can be cultivated in various regions with different temperature and weather conditions. It can be thrive in warm temperate regions as well as cool and dry weather conditions. This adaptability makes it suitable for cultivation in different geographical locations. The optimal soil pH for maximum seed production of Isabgol is in the range of 7 to 8. Neutral to slightly alkaline soils are favorable for the plant's growth. Isabgol requires a good amount of sunlight for healthy growth. In Rajasthan, Isabgol is mainly cultivated in western part, but cultural practices particularly identification of genotypes, it is also suitable for sub humid conditions. Isabgol plants are sensitive to certain weather conditions, especially during their flowering and seed-setting stages. Cloudy weather and mild to light rain can negatively impact the pollination and seed-setting process, leading to heavy shedding of flowers and seeds. This phenomenon can result in significant seed yield loss for Isabgol crops. As the cultural practices of Isabgol is suitable for sub humid conditions, an attempt has been in the present study to assess the performance of Isabgol genotype and to identify superior genotypes for seed yield under sub humid conditions.

Keywords: Germplasm, morphological characters

Introduction

Materials and Methods

The demonstration was undertaken at Techno park of Krishi Vigyan Kendra, Badgaon, Udaipur, Rajasthan during *Rabi* season (2021-22). Agro climatically the location of demonstration site represents the Subhumid climatic conditions. The soil texture of particular plot is sandy loam having pH 7.8 and EC0.5. The soil having medium levels of nitrogen (345 kg/ha) and phosphorous (32.31 kg/ha) and high in potassium (480 kg/ha). The healthy seeds of seven germplasms entries were taken from AICRP on Medicinal &Aromatic Plant, MPUAT, Udaipur, Rajasthan. The spacing used for sowing the seeds was 30 cm x 10 cm with the depth of 3 cm in the narrow furrow opened on 25th November, 2021 in the demonstration plot.

For the crop cultivation, recommended package of practices for the Isabgol was followed. The crop was matured at the end of the March, 2022 so it was harvested during that period. At the time of maturity, the spike (flowering structure) of the plants turned into a reddish-brown color. Additionally, the lower leaves of the plants dried up, and the upper leaves started to show yellowing. These changes in color and leaf condition are typical indicators of plant maturity and the approaching end of the growing season. During the cropping period, various morphological characters were observed to assess the performance of different genotypes (plant varieties) of the medicinal or aromatic plant. The observed morphological characters include: plant height, numbers of branches plant^{-1}, numbers of tillers plant^{-1} and spike length

were noted from five randomly selected plants from each genotype.

To determine the best genotype for the sub-humid region, the mean values of the morphological characters from the five randomly selected plants in each genotype were calculated.

Results and Discussion

An experiment involving seven germplasms of Isabgol (*Plantago ovata* Forsk). The experiment focused on various morphological characters of the plants, and the data was presented in Table 1. The mean performance data for all the morphological characters showed significant variation among the different germplasms of Isabgol. This indicates that each germplasm had distinct traits and characteristics that influenced its overall growth and development.

The data revealed that among the seven germplasms under demonstration, the germplasm UI-124 exhibited the maximum plant height of 38.6 cm, followed closely by UI-3 with a height of 38.4 cm. On the other hand, the germplasm NIHARIKA had the minimum plant height recorded at 36.7 cm. This suggests that there are genetic differences among the germplasms influencing plant height. The variation in plant height and other morphological characters among the germplasms may be attributed to the genetic makeup of each genotype. Each germplasm has its own unique combination of genes, leading to differences in growth and development. The mean performances between various genotypes in Isabgol for different characters have also been reported by (Shelud *et al*., 1990) [5].

The maximum number of branches plant^{-1} was recorded in the germplasmUI-89 (5.3) followed by UI 2-1 (4.6), UI-124 (4.6) and VI -1 (4.6) while minimum value was recorded in the germplasm UI-3 (4.0).

The findings of the experiment related to Isabgol germplasms and their mean performances for different morphological characters are supported by (Shelud *et al*., 1990) [5].

The maximum number of tillers per plant^{-1}was observed in the germplasm UI-89 (41.2) followed by NIHARIKA (28.9) while the minimum number of tillersplant^{-1} was observed for UI-124 (19.3).

The above result is supported by observation of Sharma *et al*., 2002 [4]. The maximum spike length was observed in the germplasm UI-89 (5.7 cm) followed by UI-3 (5.1 cm) whereas minimum spike length was observed in the germplasm GI-2 (3.5 cm).

The higher yield of favorable genotypes in Isabgol can be attributed to various factors, including the number of branches and spikes per plant, which directly influence seed yield. The same results on seed yield also supported by (Beniwal *et al*., 2007) [2]; (Jadhav *et al.*, 2008) [3].

Table 1: Morphological characters of Isabgol germplasm

SN	Germplasm	Morphological Character			
		Plant height (cm)	No. of branches plant^{-1}	No. of tillers plant^{-1}	Spike length (cm)
1	UI 2-1	37.2	4.6	22.5	4.7
2	UI-3	38.4	4.0	22.1	5.1
3	UI-89	37.4	*5.3*	*41.2*	*5.7*
4	UI-124	*38.6*	4.6	19.3	3.8
5	NIHARIKA	36.7	4.4	28.9	4.6
6	GI-2	37.5	4.3	23.1	3.5
7	VI-1	36.9	4.6	21.1	4.8

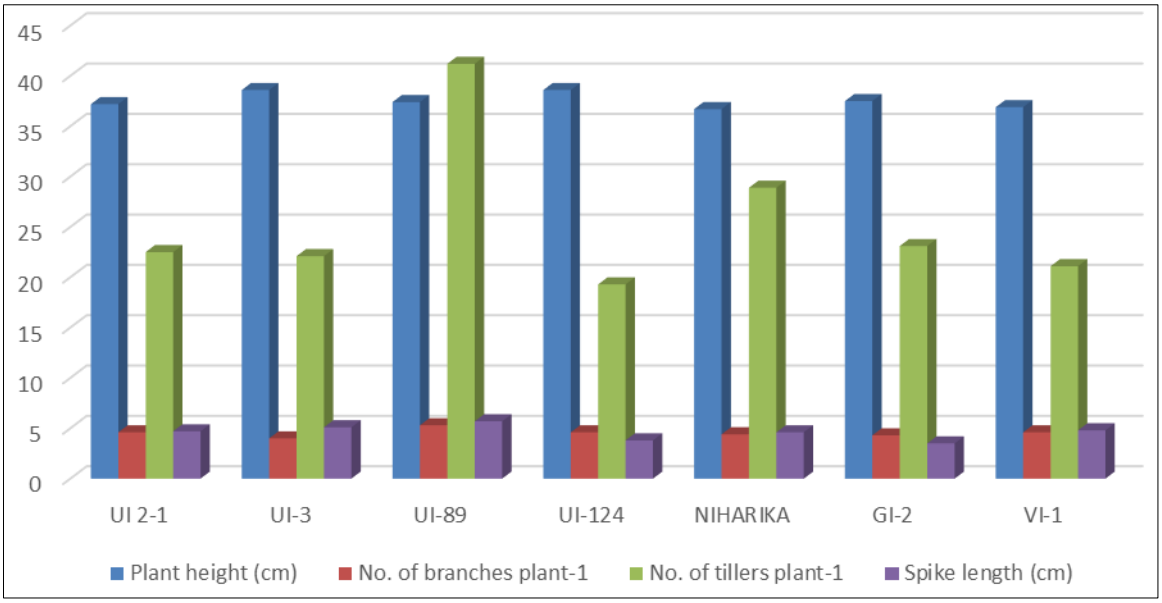

Fig 1: Morphological characters of different Isabgol germplasm

Conclusion

Isabgolis a dry weather crop but it can be cultivated in sub humid conditions with well-drained soil and low rainfall area. In all seven germplasm, UI-89 is best suitable for the area.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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