

Isabgol: A potential medicinal plant with commercial and trade value

Isabgol (*Plantago ovata*) belonging to family *Plantaginaceae* is an important medicinal herb that has been used in health care for several years in India. It is now used all over the world for its medicinal properties. In India, it has been introduced and cultivated in North Gujarat and adjoining parts of Western Rajasthan and Madhya Pradesh. However, the crop is spreading in non-traditional parts of the country such as Punjab, Haryana, Uttar Pradesh and Karnataka. More than 90% of the Indian produce is exported all over the world and is an important foreign exchange earning commodity.

Traditionally, isabgol is known as Eshopgol in Bengali; Isapgol, ghoda jeeru, umto jeeru in Gujarati; Isubgal in Hindi; Isafgolu, visama golu in Kannad; Karkatasringi in Malyalam; Isabgala in Marathi; Isabghol in Persian; Tshad gala in Sanskrit; Iskolvirai in Tamil and Isapgola vitulu in Telugu. Commercially, it is known as Blond Psyllium. Isabgol is a Persian word indicating 'Isap' and 'Ghol' which means a horse ear referring to the characteristic shape of its seed. The genus *Plantago* Linn. comprises about 200 species, of which 10 mainly occur in India but *Plantago ovata* is the source of isabgol seed and husk for use in medicine. Isabgol is cultivated in many parts of the world. It is a native of the Mediterranean region and West Asia, extending up to Sutlej and Sindh in Pakistan. It is also distributed in Canary Islands across Southern Spain, North Africa, Middle East and North-Western Asia.

India is the major exporter in the international market. Its seed husk can imbibe water several times of its mass and swell, and because of this nature, it is extensively used against chronic constipation. It is also used against inflammation of gastro-intestinal tracts, diarrhoea, dysentery, etc. The fibre rich husk is also found effective in reducing blood serum cholesterol and has been included in many food items like ice-cream, sauce, jelly, bread, cookie, etc. The seeds are sweet, astringent, refrigerant, emollient, mucilaginous, diuretic, laxative, anti-inflammatory, antidysentery, expectorant, aphrodisiac, roborant and tonic.

Area, marketing and export

India dominates the world market in production and export of psyllium husk powder. It provides approximately 80% of psyllium husk powder in the world market. About 90-95% of India's isabgol production is exported. According to Department of Commerce, Ministry of Commerce and Industry, GoI (2023), India exported Isabgol husk worth ₹ 265.8 crores and seed worth ₹ 36.8



Isabgol field view

crores during 2022-23. The area under isabgol cultivation in India is 4.5 lakh hectare with a production of 4.32 lakh metric tonnes (2022-23).

Climate and soil condition

Isabgol is highly environmental sensitive crop. Its cultivation requires certain temperature, dry atmosphere, clear sky etc. More specifically, it requires a cool climate and dry sunny weather during maturation, even a mild dew, cloudy weather or light showers cause seed shedding. The papery seed husk can absorb water many times than its own weight and swell and drop off due to increase in weight. Hence, unseasonal rain or, even high dew deposition during the crop maturity is the major deterrent factor in isabgol cultivation and can cause total loss of the seed yield. Thus, regions receiving winter rains are not suitable for isabgol cultivation. The temperature requirement for maximum seed germination is reported as 20°C-25°C, whereas, at the time of maturity, it requires 30°C-35°C temperature. It requires 50-125 cm annual rainfall. Land selection for the cultivation of isabgol is the first and foremost step to produce safe and good

quality product. The land should be free from inherent contamination of any chemical pesticides and should be away from any potential source of contamination. The land should also have access to a clean and reliable source of irrigation water. Isabgol is most suitable to grow on well drained, light sandy to sandy loam soils. Soils with poor drainage are not conducive for good growth and successful cultivation of this crop. However, recently it has been successfully cultivated on clay loam, medium black, black cotton and heavy black soils. The crop can withstand a low level of soil salinity with a pH between 7.2-7.9.

Varietal development

With the efforts of ICAR-Directorate of Medicinal and Aromatic Plants Research (ICAR-DMAPR), Anand and ICAR-All India Coordinated Research Projects on Medicinal, Aromatic Plants and Betelvine (ICAR-AICRPMAPB), eight improved varieties (GI 1, GI 2, GI 3, HI-5, RI-1, VI-1, VI-2 and VI-3) have been released for commercial cultivation (Table 1). Besides, the CSIR-Central Institute of Medicinal and Aromatic Plants Research (CIMAP), Lucknow also released a variety called Niharika through mutation breeding. ICAR-DMAPR,

Table 1. List of Isabgol varieties released for commercial cultivation in India

Name of the variety	Main characteristics	Centre where nucleus seed material is available	Recommended geographical region for cultivation	Any other Information
Gujarat Isabgol- 1	Dark green leaf, moderate tillers and medium spike length (4.0-4.5 cm). Height about 50 cm, matures in 110-115 days	AICRP-MAP&B Center, Anand Agricultural University, Anand	Gujarat, Rajasthan and parts of Madhya Pradesh and Maharashtra	Released in 1976. It is a selection from introduced material
Gujarat Isabgol-2	Medium broad and pale green leaf, medium long spike (3.8-4.6 cm), height 58-64 cm, matures in 110-115 days.	AICRP-MAP&B Center, Agricultural University, Anand	Gujarat, Rajasthan and parts of Madhya Pradesh and Maharashtra	Released in 1983
Haryana Isabgol-5	Maturity: 140-145 days Yield: 1000-1200 kg/ha Husk: 25-30%	AICRP-MAP&B Center, CCS Haryana Agricultural University, Hisar	Gujarat, Rajasthan and parts of Madhya Pradesh and Maharashtra	Released in 1989. It is a selection from GI 2
Jawahar Isabgol-4	Leaf: Narrow, dense lathery, dark green and hairy Ovary: Violet pink Seed: Boat shaped, hard, light pink Seed husk: Rosy white membrane like. Yield: 1300-1500 kg/ha	AICRP on M&AP, College of Horticulture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Mandsaur, Madhya Pradesh	Gujarat, Rajasthan and parts of Madhya Pradesh and Maharashtra	Released in 1996. It is a selection from germplasm
Vallabh Isabgol-1	Plant: Erect and compact Leaf: Dark green leaves and moderately hairy; Inflorescence: Spike compact and long Seed: Boat shaped, hard, light pink Seed husk: Rosy white membrane like. Yield: 1400 kg/ha	ICAR-DMAPR, Boriavi, Anand, Gujarat	All Isabgol growing areas Released in	Released in 2015
Vallabh Isabgol-2	Maturity range (Days): 100-105 Average yield: 916 to 1360 kg/ha Higher seed yield and early maturity	ICAR-DMAPR, Boriavi, Anand, Gujarat	Gujarat, Rajasthan, Madhya Pradesh, Delhi, Haryana, Uttar Pradesh	Released in 2016
Vallabh Isabgol-3	Maturity range (Days): 100-105 Average yield: 897 to 1440 kg/ha Higher seed yield and early maturity	ICAR-DMAPR, Boriavi, Anand, Gujarat	Gujarat, Rajasthan, Madhya Pradesh, Delhi, Haryana, Uttar Pradesh	Released in 2016



Vallabh Isabgol-1



Vallabh Isabgol-2

Anand has developed some high yielding varieties (Vallabh Isabgol -1, 2 and 3) with distinct morphological marker traits. The directorate is working on the improvement of this species through mutation breeding, ploidy breeding, recombination breeding and identification of QTLs for yield and downey mildew resistance, and the AICRP centres are trying to develop location specific varieties.

Production pockets of Isabgol in Gujarat, Rajasthan and Madhya Pradesh

Barmer, Jalore, Sirohi, Pali, Bikaner, Jaisalmer, Falaudi, Jodhpur, Udaipur and Nagor are the major areas of cultivation of Isabgol in Rajasthan. In Gujarat, major areas of cultivation are Patan, Palanpur, Siddhapur, Mehsana, Sabarkantha, Anand and Surendranagar. In Madhya Pradesh, major areas are Mandsaur, Neemuch, Rattlam. However, the crop is spreading in non-traditional parts of the country such as Punjab, Haryana, Uttar Pradesh and Karnataka.

Research issues from market point of view and product development

- Isabgol is an important cash crop in Gujarat, Rajasthan and Madhya Pradesh. The biosynthesis of the secondary metabolites of the medicinal plants is under genetic control, and environmental factors play an important role. Environmental factors such as cultivation practices (such as sowing date, fertilizer level and water supply) have marked effects on plant growth and the production of secondary metabolites. Isabgol is chilling sensitive, therefore, its seeds should not be sown in the early winter.
- Plant sensitivity to environment and management factors varies according to the developmental stage. To meet agricultural demands and growing competition for water, a more effective use of water in both irrigated and rainfed agriculture is essential. In regions where water scarcity is the principal limiting factor for cultivation, farmers are interested in growing crops that are able to adapt to drought conditions. Shortage of water in arid and semi-arid parts of this region where annual precipitation is less than 220 mm with almost no rainfall during the summer is a prominent limiting factor of crop production.
- There is a climatic risk due to unseasonal rains in winter to grow isabgol. Crop gets damaged in the unseasonal rain and hailstorms. It causes damage to the crop and loss to the farmers. Therefore, farmers gradually shift to other crops. Also, the price is less remunerative. However, there is a huge scope for value addition of the crop.
- A product contained *Plantago ovata* may be a useful supplement in weight control diets which is already taken traditionally by the people world-wide.
- It is used in the pharmaceutical as well as cosmetic industries. It is used for sizing purpose and as a base in cosmetics. The husk has been found to be served as a good binder and disintegrates in compressed tablets. The isolated mucilage powder of *P. ovata* exhibits faster drug dissolution and improves bioavailability,

and it is stated that the isolated mucilage powder can be effectively used as disintegrants and super disintegrant in tablet formulations.

- Isabgol seed has the richest fibre contents consumed as natural source of fibre with various health benefits. This is the important aspect for increasing interest for research work in this fibre into dietary food products with health protective effects.

Action plan for research activities (rainfed and irrigated both)

ICAR-DMAPR at Anand and other universities of the states are working on development of new varieties in isabgol having non-shattering seeds to withstand climatic adversity. Considering the importance of isabgol in the world market and its present status of research work, following areas of research are to be given importance in the coming years:

1. Development of early maturing, high-yielding and drought tolerant varieties so as to address the climate changes and that fit into suitable cropping system and to save water.
2. Development of variety having non-shattering seeds.
3. Development of high yielding varieties with resistance to downey mildew disease is to be given importance.
4. The possibility of exploitation of the male sterility for commercial hybrid seed production is another area of importance.
5. As the soluble fibre content in isabgol is playing a vital role in reducing the diabetes, the development of varieties with high proportion of soluble fibre content will make breakthrough in the reduction of diabetes. Hence, this line of research is also given top priority.
6. Development of qualitative standard for fixing the maximum support price of the isabgol.
7. Development of natural product from the Isabgol for pharmaceuticals and cosmetic industries.

Yield and economics

On an average, 800-1000 kg per hectare seed yield of isabgol is obtained. However, higher seed yield of about 1500 kg per hectare can be obtained from medium textured soils with better crop management practices. Isabgol straw yield is twice of the seed yield and about 1200-1600 kg per hectare is generally obtained. Following all the good cultivation practices, isabgol cultivation costs about ₹ 15,000 and gives net return of ₹ 20,000 from one hectare crop.

In a study in Madhya Pradesh, the cost of cultivation was estimated to be ₹ 49514, 32237 and 163384 for isabgol, wheat and garlic, respectively. Regarding cost of production, it was ₹ 4112.45, 978.95 and 8972.23 under isabgol, wheat and garlic crop, respectively. The data revealed that the net income was ₹ 45313, 20003 and 28506 for isabgol, wheat and garlic crop, respectively. The B:C ratio was 1:1.95, 1:1.62 and 1:1.17 for isabgol, wheat, and garlic crop, respectively, which indicates that the isabgol crop was more profitable than their competitive crops. On the basis of findings, it was suggested that more efforts are required to motivate the farmer to include more area of isabgol crop (seed and husk) in the existing



Isabgol husk



Isabgol seed

cropping pattern by the farmers so as to have more chance to improve economic condition of the farmers.

Market demand

The production of isabgol is demand driven but solely depends on the climatic conditions. Every year about 90,000 tonnes of isabgol is required to be produced in order to meet the domestic demand. From high fibre breakfast cereals, breads and ice cream to medicines, isabgol is now a popular ingredient with food product designers. Isabgol export is growing at 15% every year, and now India dominates the world market in the production and export of isabgol (80% share). Isabgol husks and industrial powders are exported to the countries like USA, UK, France, Germany, Japan, Indonesia, Canada, Mexico, Sweden, Spain, Norway, Italy, Australia, Denmark, Korea, Pakistan, Gulf countries and some other small countries.

Price trend

The prices are influenced by the demand and supply condition. However, the previous years' stock plays an important role in the determination of prices. The unbranded psyllium husk is highly sensitive to the demand-supply gap. However, branded and value-added processed husk are less price sensitive in international market due to the cartel of importers' pressure.

Export demand

India has the largest market share in the production, processing and export of psyllium husk among all the contributing countries. Isabgol seeds may be marketed as a whole, or the husks may be sold separately. Isabgol husk is brought by the pharma and drugs companies. India exports isabgol seeds and husk worth more than ₹ 35 million annually. Out of total production, 75% from Gujarat and about 90% from Rajasthan is exported with nearly 93% of being husk. There are around 70 organizations all over the country undertaking export of

isabgol husk and seed. Most of the leading exporters/processors are based in Sidhpur in Mehsana district and Palanpur in Banaskantha district of Gujarat. Farmers from Rajasthan and Madhya Pradesh also used to sale their produce in Gujarat. From high fibre breakfast cereals, breads and ice cream to medicines, isabgol is now a popular ingredient with food product designers. The main importers of psyllium husk and seeds are USA, Canada, Japan, Germany, Italy, France, Britain, China, Korea, Malaysia and Taiwan. Germany is the largest single importer of seed. The local demand for the psyllium is also increasing day-by-day. About 20 to 25% of total production of husk i.e. 3,000-4,000 MT is consumed in the domestic market. Indian pharmacy companies like Dabur, Baidynath, Dr. Reddy are also using psyllium husk for making various drugs. There are various local brands having good market size across the country.

SUMMARY

Isabgol husk has a significant export demand. It is meant for direct or indirect consumption and the market for such industries is growing rapidly. Scope for technology upgradation is tremendous. Key schemes of Central Govt. and State Govt. could be utilized to set up most modern plants. Export demand is on the higher side as compared to domestic consumption. Scope of forward linkage with industries is on business-to-business basis. Branding offers huge potential for product promotion. Increased interest in health and nutrition is creating demand for isabgol husk and other derivatives. FPOs can invest in mini versions of recommended technologies, which are developed by institutes & other reputed private players.

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