



# Isabgol: Package Practices for Cultivation

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## **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.*

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## **ABSTRACT**

Isabgol is a short-stemmed annual herb that grows up to 40 cm tall. A large number of flowering shoots emerge from the plant's base. The word isabgol derives from the Persian words "isap" and "ghol," which mean horse ear and describe the shape of the seed. Psyllium, which derives from the Greek word for a flea, refers to the size, shape, and whitish color of the seed, which is the most commercially important part of this plant. The seeds are encased in capsules that open when they reach maturity. The husk of the seed is thin, boat-shaped, white, translucent, odourless, and has a mucilaginous taste. The root system is well developed, with a well-developed tap root and a few fibrous secondary roots. Isabgol is widely grown in many parts of the world. It is native to the Mediterranean region and West Asia, reaching as far north as Sutlej and Sindh in Pakistan. It is also found in the Canary Islands, Southern Spain, North Africa, the Middle East, and North-Western Asia. It has been introduced and cultivated in North Gujarat, as well as adjoining parts of Western Rajasthan and Madhya Pradesh in India. However, the crop is spreading in previously unexplored areas of the country such as Punjab, Haryana, Uttar Pradesh, and Karnataka.

**Keywords:** *Package practices; Isabgol; herb; medicinal crop.*

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## 1. INTRODUCTION

In recent years, there has been a significant increase in the demand for medicinal plants, both within the country and for export. A growing number of farmers are venturing into this most promising sector [1,2]. The National Research Centre for Medicinal and Aromatic Plants (NRCMAP) in Anand Gujrat has developed a set of cultivation practises for Isabgol.

## 2. IMPORTANCE AND SIDE EFFECT

Isabgol (*Plantago ovata* Forsk.) is a valuable medicinal crop grown primarily in Gujarat, Madhya Pradesh, and Rajasthan during the rabi season. The seed coat, known as husk, has medicinal properties and is used to treat constipation, digestive tract irritation, and other ailments. It is also used in the food industry to make ice cream, candy, and biscuits, among other things. India is currently the sole exporter of isabgol husk and seed to the international market. Since the dawn of human civilisation, people have used plants as remedies. The WHO has prepared a list of 20,000 medicinal plants that are used in various regions of the world. India has a reputation for being a vast source of medicinal herbs. There are 67181 and 290 medicinal plant species described in the Rigveda Yasurveda and Suhrut Sanhita, respectively. Later, the "Charak Sanhita" and "Sushrut Sanhita" detailed the traits and applications of 1100 and 1270 plants, respectively, in drug compounding. These plants are still utilised in traditional Ayurvedic medicine composition. One of the most significant medicinal plants is blond psyllium (*Plantago ovata* Forsk.), also referred to as "Isabgol," and it is widely cultivated in India for the production of both conventional and modern medications [3,4]. It is currently a highly significant and potential factory for producing foreign exchange. Plantago seeds have been used in medicine since the time of the Arabian and Persian empires, and they were eventually included into the indigenous medical system (Karmick, 1976). So, Isabgol's seeds and husk have a variety of benefits, especially for the digestive system, diarrhoea, and intestinal irritations. Chronic diarrhoea and cough can both benefit from decoction [5,6].

When the seeds come into touch with water, they swell up and increase the bulk of the intestinal content. By mechanically promoting intestinal peristalsis, it therefore relieves chronic constipation. The most significant plant is

isabgol. Its usefulness as a medicine among conventional as well as scientific goods has been extensively proven [7,8]. When it comes to the production of energy from jell (liquid materials) of isabgol seeds, which is utilised extensively in In the tenth century, the Unani medical system gave rise to its application in Arab nations. It was then utilised in the main Ayurvedic medications. Isabgol is being exported to foreign nations for 100–120 crores of rupees annually. When it comes to the export of medicinal plants, it leads the world. Iran, Iraq, South Arabia Republic, Amirat, India, and the Philippines, among other countries, are the world's top producers. In terms of isabgol production, India is in the lead. Currently, agar, which costs Rs. 10,500 per kilogramme and whose import costs crores of rupees annually, is used to make the tissues. Isabgol-made tissues are twenty times less expensive to produce than agar-made tissues. The key biotechnology procedure is tissue culture. From a single plant, lakhs of plants are produced. The creation of the most rare plants currently on the market is significantly influenced by this process. Plant preparation from tissue culture is still quite expensive and does not benefit all socioeconomic levels because to the high cost of imported agar. Isabgol use has demonstrated that this is feasible.

Tissues made from In addition to being less expensive, isabgol also maintains the prepared medium's transparency, whereas agar does not. Transparency has made it simpler to observe plant roots. Isabgol is a polysaccharide with a colloidy structure that has enzyme resistance. The tissues from isabgol are regarded as the most significant in the world of vegetation for these particular reasons. Isabgol is the first of the medicinal plants to have experienced a notable growth in export from India over the previous ten years (1985–1995), according to a recently released Exim Bank research titled "Indian Medicinal Plant - A Sector Study." The husk and seeds of Isabgol have doubled in demand from India, reaching 16,000 tonnes.

About 50,000 hectares in main growing states including Gujrat, Punjab, Uttar Pradesh, Rajasthan, and Madhya Pradesh are used to produce isabgol in India. over the globe. The traditional home of "Isabgol" farming is North Gujarat. It was grown on 29891 hectares in 1989–1990, yielding 20564 tonnes of seeds (Anon, 1990). Later, it was grown in Southern Rajasthan and a few other Indian states, including Punjab, Haryana, and Madhya

Pradesh. It is a recently introduced commercial crop with significant medicinal value that is produced on vertisols in Madhya Pradesh's northwestern region. When it comes to the export of medicinal plants from India, Isabgol is in first place.

### 3. CLIMATE AND SOIL

Isabgol is a cool and dry season crop. Unseasonable rain or dew deposition during crop maturity can result in total seed loss. As a result, it cannot be grown in areas that receive winter rains.

Traditionally, the crop is grown in light sandy to sandy loam soils. It can, however, be grown successfully on clay loam, medium black cotton, and heavy black soils. Its cultivation is dependent on proper drainage.

### 4. FIELD PREPARATION

Fine tilth is required for better seed germination. The land should be ploughed and harrowed depending on the soil condition. Depending on the soil type and slope, the entire field can be subdivided into small plots (8-12 m x 3 m).

### 5. SOWING TIME

Early sowing promotes more vegetative growth, whereas late sowing shortens the total growth period and increases the risk of seed shattering due to pre-monsoon rains as the seed matures. The second two weeks of November are ideal for sowing. When sowing is delayed past the first two weeks of December, a significant yield loss occurs.

### 6. RECOMMENDED VARIETIES

The varieties recommended and their sources of availability were made public.

### 7. RATE OF SEED

Sowing can be done with bold, disease-free seeds from the previous year's crop. The recommended seed rate is 3-4 kg/ha. A higher seed rate may aggravate downy mildew disease.

### 8. SOWING METHODOLOGY

Direct seeding (broadcasting) is followed by light sweeping with a broom/leafy tree twig. Sweeping

should be done with a one-way swing. To ensure uniform germination, avoid burying the seeds deeply in the soil.

### 9. IRRIGATION

After sowing, a light irrigation with a slow flow is applied. If germination is still poor after 6-7 days, a second irrigation should be performed. In sandy loam soils, three irrigations are generally recommended: one at sowing and one each at 30 and 70 days after sowing. The final irrigation should coincide with the milk stage of the most spikes. More irrigation is required in the drier regions with light soil. Because the plant can tolerate low salinity levels, slightly saline water (EC up to 4 dS/m) can also be used for irrigation. Any increase in salinity above 4 dS/m reduces seed yield.

### 10. OPERATIONS INTERCULTURALE

Two hand weedings are typically required within two months of sowing, with the first weeding occurring 20-25 days after sowing.

### 11. FERTILIZERS AND MANURES

The crop has a very low nitrogen requirement. As a result, inorganic nitrogen should be used only if the available nitrogen in the soil is less than 120 kg/ha. In general, nitrogen applications of 20-30 kg/ha and phosphorus applications of 15-25 kg/ha are optimal (from Urea and DAP). Half of the Nitrogen and the full Phosphorous dose should be applied with the last ploughing, and the remaining half should be top dressed 40 days after sowing.

### 12. DISEASE AND INSECT-PEST CONTROL

The main disease of isabgol is downy mildew. The crop is more susceptible to this disease if it receives more than the recommended dose of nitrogen, seed rate, and irrigation. Metalaxyl seed treatment (Apron SD @ 5 g/kg seed) and spraying Metalaxyl 0.2% (Ridomil MZ) on first occurrence of disease, followed by two sprayings at 12-14 days intervals can effectively control the disease. Effective disease management can boost seed yield by more than 40% compared to untreated crops. Spraying of fungicides and insecticides, on the other hand, must be discontinued at least 45 days before harvesting to avoid pesticide residue problems in the produce.

**Table 1. Recommended varieties and their sources of availability**

Varieties	Source of availability
Gujarat Isabgol 2	Head, AICRP on Medicinal and Aromatic Plants, Gujarat Agricultural University Anand, Gujara
Jawahar Isabgol 4 (MIB 4)	Head, AICRP on Medicinal and Aromatic Plants, KNK College of Agriculture. JNKWV, Mandasaur Madhya Pradesh
HIS	Head, MICRP on Medicinal and Aromatic Plants, CCS Haryana Agricultural University, Hisar, Haryana.

Aphids are the most common insect pests in this crop. Aphids typically appear 50-60 days after planting. Two sprays of 0.025% Oxydemeton methyl (Metasystox 25 EC) spaced 12-15 days apart can effectively check the PEST. The first spray should be applied during the first two weeks of February, as it increases seed yield by nearly 40% over an unsprayed crop. The crop matures in 110-120 days. When mature (by March-April), the leaves turn yellowish and the spikes brownish. If there is a chance of unseasonal rain, harvest slightly unripe spikes to avoid seed loss by shattering. The husk quality of such a crop, however, deteriorates

### 13. YIELDING AND HARVESTING

When the dew has dried, harvest the spikes (after 10 A.M.). When the soil is very loose, the plants are harvested at ground level or uprooted. Plants harvested should be piled on a clean threshing yard. After a few days, the seeds are separated by trampling them with a tractor or bullock. The seeds can also be threshed using a threshing machine powered by a tractor or motor (separating net of Bajra can be used). Gujarat typically produces a seed yield of 800-1000 kg/ha. Higher seed yield is possible, however, under favourable weather conditions and better management. Generally, a dry straw yield of twice the seed yield is harvested. Straw can be fed to farm animals as fodder.

### 14. MARKETING

There are still a limited number of organised markets. In many areas, groups of farmers band together to sell their produce at a profit. The selling price ranges between Rs 18-25 per kg, depending on demand and seed quality.

### 15. ECONOMICS

A net profit of Rs 10,000-12,000 per hectare is possible.

### 16. CONCLUSION

Isabgol is a valuable medicinal crop. India is the leading country in production of isabgol. The World Health Organisation has advocated integrating Isabgol into the current medical system due to its greater therapeutic relevance. Given that it is a crop of arid climate, India will continue to be dependent on other countries for its. The WHO has prepared a list of 20,000 medicinal plants that are used in various regions of the world. India has a reputation for being a vast source of medicinal herbs.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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