

Extension Bulletin

Cultivation of Isabgol



भारत सरकार
ICAR

**National Research Centre for Medicinal and
Aromatic Plants
Boriavi, Anand Gujarat**

Cultivation of Isabgol

by
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FOREWORD

India as the largest producer and exporter of Isabgol in the world brings an unmatched perspectives to the cultivation of this important medicinal crop. The crop is distributed under commercial cultivation in Gujarat, Madhya Pradesh and Rajasthan in about 50000 ha. The crop is usually cultivated under rainfed condition in marginal land. The farmers involved in cultivation of this crop need support in terms of new production technology developed for increasing the productivity. I am happy that the Director, National Research Centre for Medicinal and Aromatic Plants has taken the initiative in compiling and publishing a bulletin on Isabgol. Publication of this extension bulletin including the information on package of practices for cultivation of Isabgol would fulfill the requirement of the cultivators and will go in a long way.

I congratulate Dr. S. Maiti, Director, NRC for Medicinal & Aromatic Plants, Anand and his team for this endeavour and look forward to many more such publications from this new National Research Centre.

S. P. Ghosh
(S.P. GHOSH)

Preface

Isabgol (*Plantago ovata*) is an important medicinal crop grown in about 50000 ha distributed in North Gujarat and its adjoining part in Madhya Pradesh and Rajasthan. However, the crop is spreading to other non-traditional parts of the country such as Haryana, Uttar Pradesh and Karnataka. The Isabgol husk is used mainly for treatment of a number of stomach disorders. In addition, it is also used in food industries for preparation ice creams, candy, etc. Seeds are also used as animal feed. India is the leader in Isabgol production and largest exporter of husk. On an average export worth of about 30 millions are done annually. Research on Isabgol got priority in the country under the All India Coordinated Research Project on Medicinal and Aromatic Plants (AICRPMAP) started in 1973. There are some inherent problem of developing high yielding varieties. Even then centers of AICRPMAP have developed a good number of high yielding varieties which are gaining popularity among the farmers. Production technology has been standardized. Critical inputs have been identified. These information need to be transferred to the farmers for achieving the higher productivity. Publication of this Extension Bulletin is an attempt to disseminate the latest production technology among farmers. I shall feel satisfied if this bulletin becomes useful to the farmers as well as to the extension workers engaged in this crop.

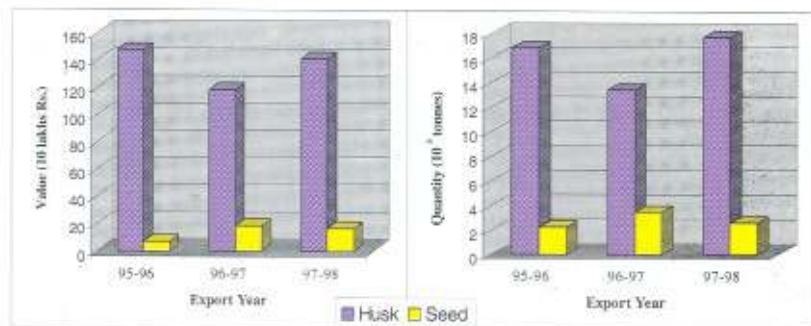
I take this opportunity to express my sincere gratitude to Dr. S. P. Ghosh, Deputy Director General (Horticulture) and Dr. R. N. Pal, Assistant Director General (Plantation Crops) for their encouragement for this publication. I am also thankful to those centers of AICRPMAP worked on Isabgol and generated some useful production technology which have been presented here. Secretarial assistance rendered by Mr. Suresh Patelia is also acknowledged.

Anand,
June 26, 2000

Satyabrata Maiti

Introduction

Isabgol (*Plantago ovata* Forsk.) is an important medicinal crop traditionally grown mostly in North Gujarat during *rabi* (winter) season. The isabgol husk (epicarp of seed) has medicinal properties and is used against constipation, irritation of digestive tract, etc. In addition these are also used in food industries for preparation of ice cream, candy, etc. India is the sole exporter of isabgol husk and seed to the world market. About Rs. 160 crores is earned annually through export. In the recent years, demand of isabgol has increased substantially in domestic as well as in international markets which initiated spread of the crop to some non traditional areas of Rajasthan and north-west Madhya Pradesh (Mandsaur-Ratlam). At present the crop is grown in an area over 50,000 ha.



Export trend of isabgol

Climate

Typically, Isabgol is a crop of cool and dry climate. Since, the papery husk can absorb water many times than its own weight and swell when in contact with moisture, such swelled seeds ultimately drop off. Hence, unseasonal rain or, even high dew deposition during crop maturity results to a total loss of seed yield. The areas receive winter rains are thus unsuitable for cultivation of this crop.

Soil

The crop is traditionally grown in light sandy to sandy loam soils. However, recently it has been cultivated successfully on clay loam, medium black, black cotton and heavy black soils. Good drainage is essential for its successful cultivation in heavy soils. The crop can withstand a low level of salinity.

Land preparation

Fine soil tilth is essential for proper germination of seeds. Hence, depending upon the soil condition, the land is ploughed and harrowed repeatedly to bring the soil in proper condition. The whole field is subdivided into small plots of suitable size depending upon soil types and slope to facilitate irrigation. A plot size of 8-12 m x 3 m is desirable in light soil.

Sowing time

Early seed sowing increases more vegetative growth resulting lodging and high downy mildew disease incidence. However, late seed sowing reduces total growth period and increases risk of seed shattering due to pre-monsoon rains towards maturity. Last week of October to second fortnight of November is ideal time of sowing for North Gujarat. Drastic yield loss occurs when seed sowing is delayed beyond first fortnight of December.

Recommended varieties

The recommended high yielding varieties and their source of availability:

Variety	Seed Yield (Kg per ha)	Source of availability
Gujarat Isabgol 2	900-1000	Head, AICRP on M&AP, Gujarat Agricultural University, Anand, Gujarat.
Jawahar Isabgol 4	1300-1500	Head, AICRP on M&AP, KNK college of Agriculture, JNKVV, Mandasaur, M.P.
Haryana Isabgol 5	1000-1200	Head, AICRP on M&AP, CCS University of Agriculture, Hissar, Haryana.

Seed rate

Bold, disease free seeds from previous year's crop are used for sowing. A seed rate of 4 kg per ha is optimum for good plant stand. Higher seed rate increases downy mildew disease severity.

Method of sowing

Direct sowing by broadcasting is practiced among the farmers since they do not get any advantage of line sowing over the direct sowing. However, line sowing with a spacing of 30 x 5 cm helps in better interculture operations. The seeds are mixed with fine sand or sieved FYM before sowing and after sowing, seeds are covered by light sweeping with a broom or tree twig having foliage. The sweeping should be done in one direction only. For uniform germination, care should be taken in placement of seeds in soil so that these do not get buried deep in the soil.

Fertilizers

The crop requires very low level of fertility. Hence, inorganic nitrogen should be applied when the soil is very low in available nitrogen (< 120 kg per ha). Experiments conducted by the All India Coordinated Research Project on Medicinal and Aromatic Plants and at different parts of the country showed that applications of 20-30 kg per ha nitrogen and 15-25 kg per ha phosphorous are optimum. Half of the nitrogen dose and full of phosphorous are applied at the land preparation. Remaining half of the nitrogen is applied as top dressing at 40 days after sowing.

Irrigation

A light irrigation with slow rate of flow is given immediately after sowing. With higher flow rate, the seeds are carried to one end of the field and/or get buried deep in the soil, resulting in poor plant stand and plant distribution. If germination is poor 6-7 days after sowing, a second irrigation is needed. In general three irrigations are required – first at

sowing, followed by one each at 30 and 70 days after sowing in sandy loam soil. The last irrigation should coincide with the milking stage of the maximum number of spikes. Irrigations should be scheduled when soil moisture level goes 20-25% below the field capacity. Since plant can withstand low level of salinity, slightly saline water (upto 4 $\text{ds}^{-\text{m}}$ electrical conductivity) can be used for irrigation purpose. Increase in salinity level beyond this level reduces seed yield significantly.

Interculture operations

Two-hand weeding is generally required. However, first weeding is very critical and must be completed within 20-25 days after sowing. In broadcasted field, hand weeding demands lots of investments. Pre-sowing application of isoproturone (Arelon, Tolkan, Isoguard) at the rate of 500-750 g active ingredient per ha in 500 l of water effectively controls weeds and increases the cost benefit ratio about three times over two-hand weeding.

Diseases

Downy mildew caused by *Peronospora plantaginis* is the



Leaf infection of downy mildew

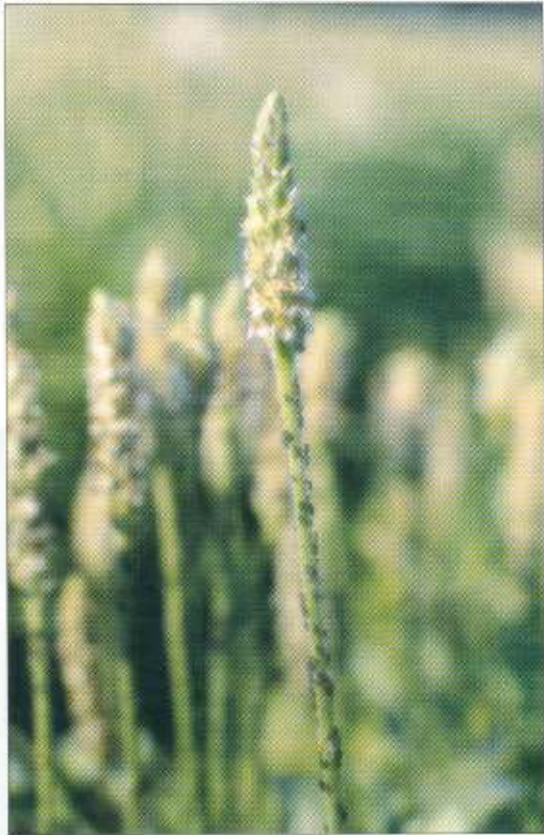
major disease problem of Isabgol. Early sowing, higher seed rate, frequent irrigations make the crop more susceptible to this disease. The disease can effectively be controlled by seed treatment with metalaxyl (Apron SD at 5g per kg seed) followed by three sprayings of combination product of metalaxyl and mancozeb (Ridomil MZ 0.2%) at a 10-day interval. First spraying must be done at first occurrence of disease. Effective disease management increases seed yield by more than 40% over the untreated diseased crop. Other disease such as damping off, leaf blight etc. do not cause much damage to the crop under normal cultivated condition.



Floral infection of downy mildew

Insect pest

Aphid, *Apis gossypii* is the major insect pest of this crop. Aphids generally appear 60-70 days after sowing. Two sprayings of 0.025% oxydemeton methyl (Metasystox 25EC) with an interval of 12-15 days effectively control the pest. The first spray is recommended during first fortnight of February. Cost: benefit ratio up to 1:16.88 can be obtained depending upon the severity of insect pest infestation.



Aphid infestation

Crop rotation

Application of nitrogenous fertilizer for cultivation of Isabgol is not needed if crop rotation with legumes like groundnut, black gram or green gram in *kharif* season is followed. About 15-25 kg nitrogen is supplemented by cultivation of legumes.

Harvesting and yield

The crop takes about 110-120 days to mature. At maturity (March-April) the leaves become yellowish and spikes turn brownish in colour. The crop is harvested when plants are

totally dried and seeds turn dark brown. The atmosphere should be dry at harvesting. Preferably it should be done after the dew dries out at about 10 a.m. To avoid the seed loss by shattering, slightly unripe spikes also can be harvested if there is possibility of unseasonal rain. However, the husk quality deteriorates from such harvest. Harvesting is done generally by cutting plants at the ground level or uprooting plants when soil is very loose. The harvested plants are transported and heaped on clean threshing yard. After a couple of days, seeds are threshed by trampling using tractor or bullocks. The seeds are also threshed by motor/tractor operated threshing machine. For winnowing, separating net of Bajra can be used efficiently.

On an average seed yield ranging between 600 and 800 kg per ha is generally harvested in Gujarat. However, higher seed yield of about 1500 kg per ha can be obtained from medium textured soil of nontraditional areas in Rajasthan and Madhya Pradesh. Dry straw yield of 1200-1600 kg per ha is generally obtained. Straw is used as fodder for the farm animals.

Marketing

Seeds are sold in the marketing yard of Jotana, Mehsana, Patan, Palanpur, Siddhpur, Unja and Vishnagar in Gujarat. Farmers from Rajasthan and Madhya Pradesh are also sending their produce in these markets. Alternatively the farmers sell their produce to the local dealers. The selling price of seed varies generally between Rs. 15 and 20 per kg depending upon the quality of seeds.

Processing

Processing is done in mills. About 25% of husk is obtained by weight basis. Husk is removed by grinding pressure and separated out by fans and sieve.
