

Prospects of senna cultivation in India

The scenario of senna cultivation in the arid and semi-arid regions of India has been discussed in this article. Senna is a rainfed crop and it can tolerate drought conditions and requires low inputs for its cultivation. The requirement of soil and climatic conditions, available varieties to the farmers, land preparation, propagation, sowing season, cultural practices, pest and disease management, harvesting, post-harvest processing, yield, its medicinal properties, marketing and export potential of senna are detailed in this article.

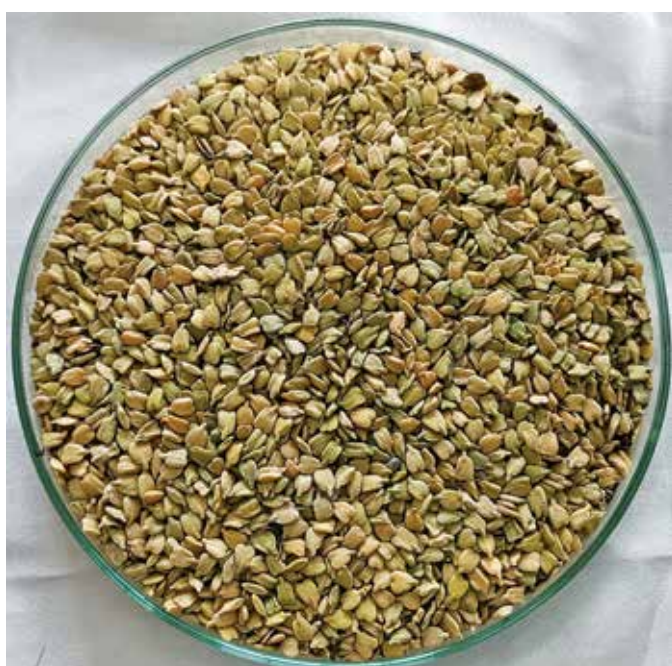
CASSIA *angustifolia* is commonly known as Senna and it belongs to the family Leguminosae. It is widely used in Ayurvedic medicine. The great demand for senna leaves and pods in Western countries is due to their laxative properties. Senna was first introduced in south India by Arabian physicians and traders during early 11th Century and the farmers started growing it in Tamil Nadu. Thereafter it was commercially cultivated in the Tinnevely and Ramanthapuram districts of Tamil Nadu, so it is commonly known as Tinnevely senna.

The demand for senna in the international market is a great opportunity for Indian farmers to cultivate senna on a commercial scale. It is commercially cultivated in the Tinnavelly, Madurai, Tiruchirapalli districts of Tamil Nadu, Andhra Pradesh, Karnataka (Mysore), Gujarat, Rajasthan, Maharashtra, West Bengal, and Tripura in 1 lakh ha area in the arid and semi-arid regions of India. The annual domestic consumption of senna leaves and pods in Indian herbal industries is estimated at 1285 tonnes. The annual production of senna is about 6000-7500 tonnes of leaves and pods, of which 80% of the produce is exported fetching ₹ 350-360 million annually. In India, most of the senna leaves are exported to the United States, China, Thailand, Germany, Italy, Netherlands, Canada, Mexico, Australia, Japan, etc. India is the largest producer and exporter of senna in the world market. Therefore, it provides a great opportunity to the farmers in the cultivation of senna easily with a low cost of production. The senna is a hardy crop in general though it can be grown as a rainfed crop.

It also tolerates drought conditions, if 2-4 supplement irrigations are provided, it gives a higher yield and net profit. Senna cultivation requires low input application, can be grown as a rainfed crop, and tolerates a certain level of salinity in the soil. Therefore, the cultivation of senna in problematic soils, waste, and marginal lands is a viable option to uplift livelihood of small and marginal farmers. In recent years, the demand for organic products is increasing in the global markets. Therefore, organic cultivation of senna is a golden opportunity for Indian farmers where pesticides are not required in senna cultivation and organic products of senna will fetch 30% higher price than the normal kind of products in the global market.

Medicinal uses

Senna leaves and pods consist of the sennosides A, B, C, and D, and these sennosides have laxative properties. It is used as a 'cleansing' herb due to its cathartic effect. In Europe, senna leaves are used in the preparation of herbal tea. Senna is used in the treatment of habitual constipation where it acts as a safe purgative and promotes the peristaltic movement in the colon. It is used after anal-rectal surgery to ensure soft stools and easy bowel movements. Senna leaves have antimicrobial, anti-cancer, and antioxidant properties, and are used in various drug formulations in the herbal industries. It is also used as an expectorant, antidiarrhetic, treating skin diseases such as ringworm,



Senna seed

scabies, eczema, and wounds and also used as a carminative. Senna leaves possess antidiabetic properties and they retard the complications that arise from chronic hyperglycemia. Senna leaves are being used in the treatment of loss of appetite, hepatomegaly, splenomegaly, indigestion, malaria, jaundice, obesity, and anemia. The leaves and pods are used in drug formulations for various household remedies. Leaves of senna have liver protective properties.

Cultivation

Soil and climatic requirement: Senna is a hardy crop and can be grown in a wide range of soils. However, it grows well in sandy loam, red loam, and alluvial soils. It is also being grown in black cotton soils where adequate drainage facilities are provided. The soils having pH in the range of 7 to 8.5 is ideal for its cultivation. Moreover, problematic soils, wastelands, and even sand dunes-prone areas are also suitable for its cultivation without much effect on the yield and quality of senna leaves and pods. The best soils for its cultivation are red loam soils with adequate drainage. In general, senna is grown as a rainfed crop, and in some areas, it is also cultivated under irrigated conditions. Senna is a sun-loving crop. Senna is suitable for cultivation in the area of tropical and sub-tropical climates. It requires a warm and humid climate for its growth and development. The areas which receive less annual rainfall in the range of 300-400 mm are also suitable for its successful cultivation. It is tolerant to drought conditions but it is sensitive to water stagnation. Therefore, it is successfully cultivated in the arid and semi-arid regions of India.

Varieties: Few varieties are available to farmers for commercial cultivation. ICAR-DMAPR, Anand & CIMAP, Lucknow are working towards the development of new varieties to cater needs of farmers as well as industries. The description of the senna varieties is given in Table 1.

Land preparation, propagation, and sowing time: Cultivation of senna does not require much fine-tillth soil. However, the land should be ploughed twice; harrowing and levelling should be done by using tillage implements. The field should be free from weeds and stubbles. At the time of last ploughing, 10-15 t well-decomposed FYM should be applied and incorporated into the soil to enrich the nutrients. Later, the field is to be made into small plots with convenient sizes based on the availability of land and topography of the soils, and ensure that proper drainage should be provided. Senna is propagated through seed. In general, senna is grown as a rainfed crop based on onset of monsoons. In western India, June-July sowing is the



General view of senna cultivation

ideal time for sowing senna. Whereas in southern India, September-October sowing is ideal to utilize the residual moisture after paddy harvesting. Senna is grown either by the broadcasting of seed or line sowing. But line sowing is better than the broadcasting method where it facilitates the intercultural operation and optimum crop stand leads to higher yield. For growing 1 ha of land by broadcasting method, 25 kg of seed is required in rainfed areas, whereas 12-15 kg of seed is sufficient to raise one ha under irrigated conditions. About 6 kg seed is sufficient for 1 ha land area by seed dibbling method. The seed should be treated with Thiram 3g/kg of seed to avoid seedling diseases at the early stage of the crop. Care should be taken that the seed should be sown 1-2 cm deep into the soil to get good germination. Immediately after sowing, irrigation is to be provided to get maximum germination percentage and a good crop stand. The seed should be sown in the spacing of 45 × 30 cm in lines by seed dibbling method to obtain higher yields.

Crop management

Senna is cultivated as a rainfed crop but if irrigation is provided, it gives higher yields. About 2-4 irrigations are provided during the crop period based on the weather and soil moisture conditions. Two irrigations are important in crop critical stages, one is immediately after sowing and the second one is at 30 days after sowing if the soil moisture is inadequate. It can tolerate water scarcity but it is sensitive to continuous rainy days and water logging conditions. Prolonged rainy days in its growth period spoil the senna produce. However, light rains as drizzling during the crop period enhance crop growth and development. The crop should be kept free from weeds. The first weeding should be done at 25-30 days of sowing and also thinning is to be done to maintain the optimum plant population. Slow crop growth was observed in the initial stage of the crop, care should be taken at this stage for weed competition, once the crop attains 20-25 cm height in a later stage, it grows luxuriantly and suppresses

Table 1. Senna varieties

Variety	Description	Source of availability
ALFT-2	It is a late flowering type and produces high foliage yield. It is widely grown in Gujarat and Tamil Nadu.	AAU, Anand
KKM-Sel 1	It is suitable to Killikulam and Tuticorin districts of Tamil Nadu.	TNAU, Coimbatore
Tinnevelly Senna	It is semi-spreading type more popular in Tamil Nadu.	TNAU, Coimbatore
Sona	It is suitable for north Indian conditions. It gives yield about 1.1 tonnes dry herbage and 0.4 tonnes seed and it contains 3.51% sennoside.	CIMAP, Lucknow

the weed. The FYM @ 10-15 t should be applied at the time of land preparation. Application of N, P, and K in the ratio of 80:40:40 kg/ha is recommended for higher yields. The full dose of P, K, and half dose of N is to be applied at the time of sowing and the remaining half dose of N should be applied 90 days after sowing. The foliar application of micronutrients also increase the growth and sennosides content. Rock phosphate-charged compost increases the herbage yield and sennosides. The organic cultivation of senna with a minimum usage of pesticides/insecticides is required and is more feasible and beneficial in organic cultivation. The organic products of senna are fetching premium prices in the international markets.

Insect pest and disease management

In north and western India, senna is affected by the damping off disease where it is grown in poorly drained soils. As preventive measures, an adequate slope should be provided to drain out the excess water. The seed should be treated with thiram 3g/kg of seed to prevent the damping off disease. Leaf spot caused by *Alternaria alternata* and leaf blight caused by *Phyllostica spp.* are occasionally serious diseases in this crop. The cloudy and humid weather conditions are congenial for the spread of the diseases. In severe infestation, the leaves start drying and fall, and cause severe yield loss. In the advanced stage, the pods are also affected. As a remedial measure to check the disease, 2-3 spraying of Ridomil at 0.15% is recommended at weekly intervals. If pesticides are applied, care should be taken that harvesting of the leaves should be done 25-30 days after the last spraying to avoid pesticide residues in the produce. Severe crop damage was observed occasionally due to *Catopsilla pyranthe* feeding the leaves and remaining active from July to October. It was observed that these are heavily parasitized by *Tichogramma chilonis* in natural conditions. For controlling this, release of *T. chilonis* @ 1.5 lakh/ha/week at the adult stage coinciding with the egg laying of the pest.

Harvesting, post-harvest management and yield

Harvesting time is important in senna because young leaves and pods contain high sennoside content but the farmer has to sell the produce on a weight basis. So care should be taken to balance between the weight of produce and sennoside content in the leaves while harvesting of Senna. In senna, first flowering is observed two months after sowing. The first flowering should be pinched to encourage branching and more vegetative growth. Harvesting of leaves should be done by hand picking. Harvesting is done when the leaves are fully grown, thick, and bluish green in colour. The first picking should be done between 50-70 days after sowing. The second picking is to be done between 90-100 days of sowing and the third picking should be done 130-150 days after sowing. When the entire plants are removed, the harvested produce consists of both leaves and pods. The harvested produce is to be kept in an open field for about 6-10 hours to reduce the moisture. Later the product should be dried on a clean floor or on a tarpaulin sheet under the shade for 10-12 days to complete the drying process.

The harvested produce should be turned frequently to



Senna crop at full flowering stage

avoid heat and ensure the light green to yellowish green in colour of the dried leaves and good quality produce. The collected pods are dried in the shade, and the seeds are separated by beating the pods with sticks. The leaves are stripped manually by beating on the floor and stems and stalks are separated. Rapid mechanical drying at 45- is also advantageous for obtaining quality produce. Later the grading is done based on the size and colour of the produce. Larger leaves and bold pods with yellowish green colour are of higher grade which fetch a premium price in the market while the next grade is leaves and pods with a brownish colour and lowest grade is small and broken leaves and pods. In general, the sennoside content of 2-2.5% in the leaves and 2.5 to 3.0% in pods is acceptable to the herbal industry. The seed is to be removed by threshing the pods and the seed does not contain sennosides. The produce is baled under hydraulic pressure as per the standards and wrapped in gunny bags, and kept in cool and dry ventilated sheds. Under the irrigated condition, 15 q/ha dry leaves and 7 q/ha pods of senna were obtained whereas, under the rainfed condition, the 10 q/ha dry leaves and 5 q/ha dry pods may be obtained under good management. The market price for the senna leaves is ₹ 70/kg and for pods ₹ 80/kg. The market price is unsteady and unorganized, and changes substantially and yearly.

SUMMARY

Senna is an important medicinal plant widely used in the traditional system of medicine for the treatment of habitual constipation due to its leaves and pods containing sennosides A, B, C, and D having laxative properties. It is a hardy crop and a low-input demand crop. Generally, it is grown as a rainfed crop and it can tolerate water scarcity. About 80% of the domestic production is exported to the United States and other countries like Germany, Italy, Netherlands, Canada, Mexico, Australia and Japan, etc. India is the largest producer and exporter of senna in the world market. Because of the non-availability of synthetic sennosides in the market, the demand for natural sennosides is increasing in Western countries. Therefore, it is a great opportunity for Indian growers to cultivate senna in the arid and semi-arid regions of India.

For further interaction, please write to

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