

Advanced Production Techniques of Senna

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Abstract

Tirunelveli Senna (*Senna alexandrina* Mill.) is indigenous to South Africa. It is the major export oriented medicinal crop in India. The leaves and pods of this crop are widely utilized for manufacturing of laxative and purgatives. Leaves of senna are blended as ingredient of herbal tea in Europe. India reserves leading position in production and export of senna. Senna is 100% export-oriented crop in India. The cultivation of senna in rainfed and arid area of Indian subcontinent is a profitable agribusiness.

Introduction

Senna, which is popularly called Tinneveli senna or Tirunelveli senna, Sanai, Marknadi, Sonmuki in India is scientifically called *Senna alexandrina* Mill. (syn. *Cassia angustifolia*), a crop indigenous to South Africa. It is one of the major export oriented medicinal crop in India. The leaves and pods of this crop are widely utilized for manufacturing of laxative and purgatives all over the world. Leaves of senna are blended as ingredient of herbal tea in Europe.

India reserves leading position in production and export of senna. Senna is export oriented crop in India. The plant is found growing in a wild state in certain coastal parts of Gujarat especially in the Bhuj region of India. In India, commercial production is confined to the states such as Tamil Nadu, Andhra Pradesh, Rajasthan, Gujarat, Maharashtra, Karnataka, West Bengal and Tripura. In India it is cultivated under 3000 hectares of area (Paramasivam and Senthilkumar, 2020). The total annual production of senna herbage is estimated to be around 8600 tonnes. It is a drought tolerant crop grown in rainfed area of Tamil Nadu. The seeds are sown in winter to get yield during summer. In Tamil Nadu, Tirunelveli,



Ramanathapuram and Madurai districts are having area under senna.

It is an erect shrub of about 70 cm height belongs to Fabaceae family. Stem are smooth, erect, pale green with long spreading branches. The leaves are compound pinnate, petiolate about 10 cm long and bear 5-8 pairs of leaflets each on a small stalk. The flowers are small and yellow. The pods are broadly oblong, about 5-8 cm long and 2-3 cm broad and contain about 6 seeds.

Chemical constituents

The principal active constituents of senna are dimeric glycosides called Sennosides A, B, C, and D. The aglycones are composed of aloë-emodin + rhein for A and B and rhein + rhein for C and D. Eventhough all parts of the crop contain alkaloids, leaves and pods are harvested for processing. The alkaloid content ranges between 2.5 – 4 % in leaves and pods.

Medicinal uses

Senna is a therapeutic used in the treatment of constipation. Senna also used as an drun for wound dressing, dysentery, and for flatulence. It is useful in

the treatment of gonorrhea, skin diseases, dyspepsia, fevers and hemorrhoids. The herb is used in the form of crude plant material or powder as oral infusion or extracts (liquid or solid). The excess consumption of senna may have adverse effect leading to sudden and intense stomach pains and colic or abdominal pains.

Soil and Climatic requirement

Senna can thrive on a variety of soils, with preference in red loams and alluvial loams having sandy loam to loam texture with average pH from 7 to 8.5. Black cotton soils are heavier, more fertile best suit for successful cultivation. It is very sensitive to water logging.

Senna is a tropical crop requires bright sunshine for its successful growth. It can be cultivated during early summer (February - March) or a winter (October - November). Under North Indian conditions like Delhi and Gujarat, where the rainy season is short, it is reported to be the ideal time as the plants put on luxuriant growth and give the maximum growth. Heavy rains and cloudy weather during growth are harmful to the crop. Uniformly distributed average rainfall of 250-400 mm from June to October is sufficient to produce good crop.

Field preparation and planting

The land is ploughed deep and the soil is exposed to sun for 110-115 days to dryout roots of perennial weeds followed by two cross ploughing, harrowing and leveling. FYM is incorporated into the soil at the time of final cross ploughing. Then the land is laid out into plots of convenient size with irrigation channels.

Pre-planting operation

In western India, the sowing sinks with June-July and in southern states, during September - October, where the crop is grown after the harvest of paddy in which the residual moisture will be utilized for growth.

The crop is raised by seeds. The seeds have hard and tough seed coat. Soaking seeds for 10-12 hours before sowing was reported to give higher germination. It is found that the seed treatment with Thiram, Captain or Agrosan G. N. at 2.5 g/kg protect the seedlings from damping off and seedling blight

diseases which are very common. About 20 kg of seeds are required to cover a hectare of land. The seeds are broadcasted or preferably sown at 30 cm lines to 30 - 45 cm apart and 1.5 to 2.5 cm depth in a well-prepared land. About 6 kg of seeds are enough when sown by dibbling. A light irrigation immediately after sowing will improve germination. Germination commences on third day and completed within a fortnight.

Varieties

KKM 1 is released from Tamil Nadu Agricultural University, a tinneyvelley senna type with semi-spreading nature is popular in Tamil Nadu. Gujarat Agricultural University, Anand released a variety name ALFT - 2 through AICRP is a late flowering type, produces higher yield of foliage crop. Sona, another popular variety released from CIMAP, Lucknow is grown in some parts of Rajasthan.

Intercultural operation

The first weeding cum hoeing is done at 25-30 days of sowing, a second at 75-80 days and a third at 110 days to keep the crop free from weeds.

Manures, Fertilisers and Pesticides

The medicinal plants have to be grown without chemical fertilizers and use of pesticides to get international market value. Organic manures like, Farm Yard Manure (FYM), Vermicompost, Green Manure etc. may be used as per requirement of the species Apply 10 tonnes FYM per hectare at the time of land preparation. To prevent diseases, bio-pesticides could be prepared (either single or mixture) from Neem (kernel, seeds & leaves), Chitrakmool, Dhatura, Cow's urine etc.

Irrigation

Senna could be economically grown under rainfed conditions. In most years, the crop needs no irrigations except under the conditions of prolonged drought. However, when it is grown as a semi-irrigated crop, the yield increased considerably. About 5- 8 light irrigations are enough to raise a good crop of Senna, however, heavy irrigations are injurious to the crop. Irrigation after sowing and 30 days after sowing is crucial for plant growth.

Pest and Disease management

Damping off is a major problem in soils with drainage problem. Improving soil drainage by slopping the land will reduce the disease. Seed treatment with fungicide or biocontrol agents will improves seedling growth by avoiding infection.

Leaf spot caused by *Alternaria alternata* will affect senna mainly during humid weather. Another disease is leaf blight caused by *Phyllostica* spp. needs similar climatic condition as that of leaf spot for spreading. When these organisms affect the plant, symptoms first appear on leaves as minute visible spots and later spreads all over the leaf. IN severe infection, leaves will dry and fall off. Pods get affected even in early stage. Foliar spray of Dithane M-45 at 7 days interval for 3 times will check the infection. Leaves must be harvested after 25 – 30 days after the spray.

Catopsilia pynanthe is a leaf eating caterpillar, occasionally cause infestation in the crop during monsoon period. *Trichogramma chilonis* is a parasitoid, can be released @ 1.5 lakh/ha/week in the adult stage and is to be coinciding with the egg laying stage of pest to check the pest.

Crop rotation

In Tamil Nadu, senna is sown after the harvest of paddy to utilize the moisture content in the field. In northwest part if India, senna is sown after mustard and coriander.

Harvesting/Post Harvesting Operation

Senna plant produces foliage containing higher sennosides between 50-90 days age, depending upon the total plant growth. Mature leaves containing 2.0 to 2.5 % and pods containing 2.5 to 3.0 % of sennosides are accepted in the industry. Leaf harvest should be done when bulk of leaves are fully grown.

The picking of leaves is done by hand so that most of the growing tops are removed at harvest this also induces the plants to produce more of branching which otherwise reduce foliage growth considerably. A second picking is taken at 90-100 days and the third picking between 130-150 days when the entire plants are removed so that the harvested material includes both leaves and pods together.

For seed harvest, pods should be in light brown colour. The maturity of pods will be coinciding with February and march month. The collected pods are dried and threshed to collect seeds.

Yield

A good average crop of Senna can give 1500 kg of dry leaves, 700 kg of pods and 300 kg of seeds per hectare under irrigated and good management conditions. The yield under rainfed conditions is about 1000 kg of leaves and 400 kg of pods.

Drying and Grading

The leaves and pods are dried in an open field a day for removing excess field moisture. After that, it is shifted to shade for drying, which takes 10 – 12 days for completion. The dried leaves and pods possess light green to yellow-green colour. Mechanical drying at 40°C also followed for uniform drying. If the moisture content of the produce reached less than 8 %, produces are baled under pressure and packed in gunny bags for export. The grades for the senna export are given as follows:

Table 1. Grades of Senna (Jnanesha and Ashish kumar, 2018)

S.No.	Grade	Length (cm)
1	Prime 1	>3.5 cm
2	Prime 2	2.5 – 3.5
3	Prime 3	1.5 – 2.5
4	Prime 4	0.5 – 1.5
5	Prime 5	<1.5

Value addition

The produces will undergo a supply chain from local traders, wholesale dealers and exporters in Tuticorin of Tamil Nadu state. The leaves are processed. They are cleaned to remove dust and stones; graded based on sizes.

The leaf grades of Prime 1, 2 and 3 are exported, 4 and 5 are traded in the internal market. Prime 5 grade is utilized within the country for extraction of sennosides and production of calcium sennosides. Retains kept after grading are sold as senna stem and leaf powder. Senna export firm provide employment for more than 1000 women a

day. This can become a flourishing rural industry with the village women processing the leaf cultivated in their villages. Flavored senna, Senna tea, Sennosides, Senna tablets and other drugs are manufactured from senna.

Conclusion

Over 80% of the senna produces are exported without any value addition except grading. Value addition should be India's main objective to compete globally since the raw material is produced within the country. There will be lot of opportunities are there for cultivation of senna the export earnings range from Rs. 35.0-36.0 crores.

References

Balaji, P., Fernando, N. L. M., Vidhyavathi, A., & Santhasheela, M. (2016). Production and marketing of Senna in Thoothukudi district of Tamil Nadu: problems and

prospects. *International Research Journal of Agricultural Economics and Statistics*, 7(1), 29-33.

Gotardo, A. T., Haraguchi, M., Raspantini, P. C., Dagli, M. L., & Górniak, S. L. (2017). Toxicity of Senna occidentalis seeds in laying hens and its effects on egg production. *Avian Pathology*, 46(3), 332-337.

Jnanesha, A. C., Kumar, A., Vanitha, T. K., & Verma, D. K. (2018). Opportunities and challenges in the cultivation of senna (*Cassia angustifolia* (Vahl.)). *International Journal of Herbal Medicine*, 6, 41-43.

Lal, R. K., Chanotiya, C. S., & Kumar, A. (2023). The prospects and potential of the horticultural and pharmacological medicinal herb senna (*Cassia angustifolia* Vahl.): A review. *Technology in Horticulture*, 3(1).

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