Enhancing the Income of the Farmers by Cultivating Senna in Low Rainfall Areas

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Arabian physicians as early as in the 9th century A.D. were using senna as medicine and presently it is used in Allopathic, Ayurvedic and Unani system of medicines. Primarily, senna leaves are used as natural laxative to treat constipation. Senna also used as an expectorant, a wound dressing, an antidysenteric and a carminative agent. 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). It is always advised to use the drug under the supervision of physician, because the excess use of senna may have adverse effect leading to sudden and intense stomach pains and colic or abdominal pains. Senna is India's second largest medicinal plant earner of foreign exchange with annual export earnings to the tune of Rs.35.0 to 36.0 crores.

Introduction

*Cassia angustifolia* (Family: Caesalpiniaceae), popularly known as Indian or Tinnevelly senna is cultivated for leaves and immature pods, which are used as laxative. The strong laxative properties of leaves and pods are due to the presence of dianthone glycosides, sennosides A and B in them. Senna is a perennial 1-2 m height undershrub. The leaves are large, compound and pinnate. The plants that can be grown in absolute wasteland and composting do not require much water. In India, Tinnevelly Senna (*C. angustifolia*) is cultivated in Gujarat, Rajasthan, Maharashtra, Telangana, Andhra Pradesh and Tamilnadu states. The total annual production of senna herbage is estimated to be around 7500 tonnes. The leaves and pods of a few other species of Cassia also possess laxative properties similar to those of *C. angustifolia*, the most important being *Cassinangustifolia* or Alexandrian senna. Alexandrian senna is found growing in the wild in North African countries, including Ethiopia and Sudan.
Cultivation
Soil and Climate
The crop thrives well on a variety of soils but, largely cultivated on sandy loam, red loam and alluvial soils. The soil pH suited for cultivation is 7.0-8.5. But, the most suitable to sandy loam to loam soils which are more friable and well drained. Senna is also cultivated successfully on black cotton soils. Senna is usually cultivated as rain fed dry crop and very rarely as irrigated crop in certain areas.

Varieties
In India two types are available for cultivation they are Local and ALFT2. Recently a variety by the name CIM-Sona was released by CIMP.
ALFT2: This is a late flowering and higher foliage yielding variety has major area in the country under senna cultivation. This variety is widely grown in Gujarat and Tamil Nadu.
CIM-Sona: Sharon plains of North India are suitable for this variety and are recommended for growing. The yield potential of this variety is around 1.1 t dry leaves, 0.4 t seed and 3.51% Sennosides.

Season and Sowing
Senna is mostly cultivated as a rain-fed crop. Under limited irrigation conditions, the land is ploughed twice during February to March. It is divided into beds for facilitating irrigation. Under rain-fed conditions, in black soils, a first crop of cotton or sorghum or coriander is grown and senna is sown as a second crop on residual moisture at the end of the rainy season from end of September to November. The crop is propagated by seeds and about 15 kg seeds are required per hectare. The seed is drilled in rows 30-45 cm apart. After germination, the crop is thinned to give a spacing of 30 cm with in rows and 30 cm between plants.

Crop Rotation and Inter cropping
Senna fits well in crop rotation as kharif crop in commercially cultivated areas. In Southern India, senna is grown after the paddy and intercrop cultivation in between rows of cotton, sesame, chillies, brinjal, okra and tomatoes is popular. In North as well as in Western India, senna is followed by mustard, chickpea or coriander.

Weeding
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 and Fertilizer
In most cases, the crop is grown economically by utilizing residual nutrients of previous crop. However, application of FYM at 10 ton per hectare at the time of land preparation, under
irrigated condition, fertilizers (N: P: K in the ratio of 40:40:40 Kg/ha) are applied at the time of sowing. It is advisable to grow senna using organic farming practices.

Irrigation

Senna can be economically grown under rain fed conditions and in some areas it is grown under residual soil moisture conditions. Therefore, in majority of areas senna is grown without irrigation or with limited irrigation facilities.

Insect Pests and Disease Management

Severe damage of foliage has been observed due to white butterfly, which can be minimized by sowing the crop in the month of March to April. The larvae of several leaf-eating caterpillars feed on the green senna leaves in Month of July to October. Release of parasitized *Trichogramma chilonis* at 150 thousand populations per hectare per week at the adult stage coinciding with the egg laying of the pest is a very effective method of pest management. *Leaf spot* caused by *Alternaria alternata* and leaf blight caused by *Phyllosticta spp.* cause severe damage to the crop through leaf drop. Spraying of Carbandazim (0.05%) or Dithiocarbamate (0.03%) at fortnightly intervals for 3 times is recommended. To control damping off of seedlings seed treatment with Thiram or Captan (2.5 g/kg. seed) before sowing is advocated.

Harvesting and Drying

The plants start flowering 60 days after sowing and the first flush is removed to encourage vegetative growth. About 90-100 days after sowing, fully-grown bluish colored leaves and golden yellow colored immature pods are stripped manually. A second harvest is taken 30-45 days after the first harvest. The leaves and pods are shade dried for 10-15 days before packing. For seed production, pods are collected during the month of February-March when the color of the pods turns brown. Seeds from such harvest have high germination percentage.

Yield

The yield, under rain fed conditions is about 8-10 q/ha of leaves and 2 q/ha of pods. Under irrigated conditions, 1.0 to 1.5 tons of leaves and about 300 kg of pods can be obtained per hectare.

Processing of the Leaves and Value Addition

The leaves are stripped from the branches and dried in shade for 10-15 days to a moisture content of 8-10 %. Thereafter, shade drying is suggested in well ventilated room with regular stirring to maintain light green to yellowish green colour of dry leaves. Pods are collected and dried, and seeds are separated by beating pods with sticks. They are winnowed to remove dust and stones and then passed through sieves of different sizes to sort them into different grades. The different grades are given in Table 1.
**Table 1. Different grade of senna leaves (Shastry et al. 2007)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Grade</th>
<th>Length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prime No 1</td>
<td>&gt; 3.50 cm</td>
</tr>
<tr>
<td>2.</td>
<td>Prime No 2</td>
<td>2.50-3.50 cm</td>
</tr>
<tr>
<td>3.</td>
<td>Prime No 3</td>
<td>1.50-2.50 cm</td>
</tr>
<tr>
<td>4.</td>
<td>Prime No 4</td>
<td>0.50-1.50 cm</td>
</tr>
<tr>
<td>5.</td>
<td>Prime No 5</td>
<td>0.50 cm and less</td>
</tr>
</tbody>
</table>

**Conclusion**

Senna is an important medicinal crop grown for the extraction of Sennosides which is having laxative property and senna is drought tolerant crop thrive well in less water and require less management practices as compared to other crops and suited well to waste and low rainfall area. In India about 6000-7500 tonnes of senna leaves and pods are produced and about 80% of the production is exported. The export earnings range from Rs. 35.0-36.0 crores. As synthetic sennosides are not available in the market, the demand for natural sennosides will continue to increase and provide an excellent opportunity for India to earning foreign exchange. As synthetic sennosides are not available in the market, the demand for natural sennosides will continue to increase and provide an excellent opportunity for India to earning foreign exchange and also because of the simple cultivation practices and grading techniques, rural industries can be setup based on senna leaves and pods and also there is an urgent need is required to develop cost-effective processes for value-added products in order to export them instead of exporting crude drugs (leaves and pods).

**Reference**