Mesta: A Promising Bast Fibre Crop

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Introduction

Mesta is one of the commercial fibre crops producing bast fibre. This crop belongs to the family Malvaceae with two species explored commercially as Hibiscus cannabinus (Kenaf) and H. sabdariffa (Roselle) having the chromosome numbers of 2n=36 and 2n=72, respectively. The kenaf is also known as Vattapulichakeerai, Bimli, Deccan hemp, Gogu, Channa, Ambadi, Gongkura, Sunkura, and Sunbeeja etc. The other names of H. sabdariffa (roselle) are sempulichakeerai, java jute, Thai jute, Pusa hemp, Tengrapat, Lalambadi, Chukair, Yerragogu, Palechi and Pundibeeja etc. Some of the varieties of both kenaf and roselle are edible and used as green vegetables are having multiple uses besides serving as potential fibre crops.

Area, Production and Productivity of mesta:

Jute and Mesta (Kenaf) collectively known as Raw Jute are grown in many countries of the world and mainly concentrated in South-East Asian Countries and some African Countries. The major Jute/Mesta growing Countries are India, Bangladesh, Nepal, China, Zimbabwe and South Sudan. In india, the normal area under Mesta is about 0.40 lakh ha with a production of about 3.89 lakh bale. Bihar being the major Mesta growing state shared 32.6 % and 39.2 % of total area and production, respectively. The acreage under Mesta in the states i.e. West Bengal, Meghalaya, Odisha, and Assam was 30.1%, 11.1%, 7.8%, and 7.7%, respectively. The share of production of Mesta in the states i.e. West Bengal, Meghalaya, Assam and Andhra Pradesh was 37.1%, 6.8%, 5.1%, and 4.3%, respectively (https://jute.dac.gov.in/pdf/StatusPaper.pdf).

The distinct characteristics of the two major fibre yielding species of mesta i.e. H. cannabinus and H. sabdariffa are as follows:

Kenaf (H. cannabinus)

It is found to be grown generally, in the warmer regions ranging from 300N to 300 N. The crop can be grown up to the height of 3000 ft above sea level at a latitude of 450N to 48 N in Russia and to a latitude of 300S in South Africa. It requires a day length of 13 ½ hours and 500 to 650 mm of rainfall for its normal growth. It is well grown in sandy loam soils. The plant is annual, grows up to a height of 4 meters with fairly rigid stem having basal diameter of .5 cm to 2.5 cm, stems are generally green 1in colour, but some types are seen as red on exposure to sunlight after maturity. It possesses compound and simple leaves.

On the same stem, leaves of various forms may also emerge. They have a complete shape at the base, a trilobular shape at a somewhat higher point, and five to seven lobed tops. Different types also have different leaf configurations. In certain types, the petiole is perpendicular to the stem, but in others, it is at a 60° or 30° inclination. It is a hermaphroduct, producing large cream-colored flowers with reddish purple or scarlet throat. It is self-pollinated, sometimes cross pollination will be affected by honey bees and other insects to smaller extent. The seed capsules are cylindrical, pubescent bearing from 18 to 20 grey-coloured seeds per capsule.

Roselle (H. sabdariffa)

Roselle is found to be grown generally, in the humid regions ranging from 100N to 300 S. The plants in general are not responsive to photoperiodism but some types of sabdariffa act as short-day plants and require a uniform distribution of 250 mm of rainfall per month. It is well grown in soils with a pH of 4.4 to 7.8. The plant is annual, grows upto a height of 3-3.5 meters with flexible stem having a basal diameter of 1.0cm to 2.0 cm. here are four main groups of H.sabdariffa based on the pigmentation on the stem viz., full green, green pigmented, green light red and red.

The flowers of Roselle are comparatively smaller than those of kenaf It possesses generally palmate, deeply lobed leaves and alternately borne on the stem. The fleshy calyces of the wild types of roselle are used for preparing jam and gel. The commercial cultivated roselle varieties are belonging to H.sabdariffa var. altissima. It is self-pollinated, sometimes cross pollination will be affected by honey bees and other insects to smaller extent. The seed capsules are cylindrical, pubescent bearing from 18 to 20 grey-coloured seeds per capsule.

Cultivation of mesta for fibre production

The roselle (H.sabdariffa) and kenaf (H. cannabinus) both need a warm, humid climate with a consistent distribution of 100 mm of rainfall per month. Mesta types can be grown in a range of soil types, including as lateritic loam and both new and ancient alluvium. Larger regions of India, including Maharashtra, Andhra Pradesh, West Bengal, Bihar, Orissa, and Meghalaya, are often where sabdariffa mesta is cultivated. The mesta is grown in the highlands of Tripura and Meghalaya, either sole crop or as mixed crop with rice. It grows on sandy-to-sandy loam marginal areas in West Bengal and Bihar. It is cultivated in the hilly districts of Kalahandi and Koraput in Orissa. The largest area under Sabdariffa mesta is in Andhra Pradesh.

Land preparation

The land is ploughed and cross ploughed thrice to four times depending upon the type of soil followed by leveling. The recommended dose of 10-12 t/ha of organic manure has been applied before last ploughing. Recommended dose of initial part of inorganic fertilizer is also applied as a basal dose after the preparation of land.

Commonly cultivated varieties of mesta for fibre production

Kenaf: HC-583, AMC-108, HC-269

Roselle**:** HS-4288, HS-7910, AMV 1, AMV 2, AMV 3, AMV 4 and AMV 5.

Seeds and Sowing

A seed rate of 15 kgs of seeds /ha has to be followed. Line sowing has to be performed at a spacing of 30 cm x 10 cm at 2.5 to 3 cm deep. Thinning to maintain single seedling per hill and gap filling with seeds should be done on 10th day after sowing to maintain optimum plant population.

Nutrient management

A fertilizer dose of N, P and K at the rate of 60:13.5: 25 kg/ha is recommended for higher fibre yields. The inorganic fertilizer is applied in two split doses of N, P and K. The nitrogen is applied as a top dressing into two split doses one at the time of first weeding and another half after six weeks of sowing. The P and K are applied as basal dressing before sowing.

Weed management

About 40-45 days from sowing may very sensitive to protect both the species of mesta. The kenaf shows farster growth in the initial stage and slows down later, where as it is vice versa in roselle. Weed management shares about 25-30% of the total cost of cultivation in mesta. The first weeding is done at the age of three weeks of crop and the second weeding is done after five weeks of age of the crop. Pendimethalin 30 %Ec @ 0.5 lit./ha is recommended for mesta, as pre-emergence herbicide (3 days before sowing) to reduce labour cost for first weeding.

Irrigation

The water requirement of mesta is about 50 cm. Irrigation should be given at the time of sowing and on 3rd day after sowing as life irrigation. Thereafter, irrigations can be provided at an interval of 15 to 20 days.

Harvesting

Since mesta is a bast fibre, it is crucial to harvest it at the right time to produce a higher yield of higher-quality fibre.The plants should be harvested when the plants produced 10-12 flowers. The plants should be cut near the ground level by using sickles. The harvested plants should be bundled at a size of 25 to 30 cm in diameter. The bundles should be left in the field for two or three days for shedding of leaves.

Retting

Retting is the process by which fibre is extracted from the stems of mesta with the help of the action of chemicals or microbes present in the retting water. Two types of retting is followed in mesta (i) Chemical retting (ii) Biological retting. The Chemical retting is affected by certain chemicals like ammonium oxalate, sodium oxalate or 'Hiparal'. The chemicals remove gums, pectins, lignins without affecting the quality of fibre. Hiparal is a mixture of enzymes extracted from a tropical fungus named Thielaviopsis paradoxa. The Hiparal is mixed with pectinases developed from Bacillus caratavarius in equal proportion. Since chemical retting is quite costly biological retting is commonly followed. The bundles are maintained upright and between 50 and 60 cm deep in water during the biological retting process. This helps in retting of the hard lower portion of the bark. Few plants of dhaincha or sunnhemp are inserted in the bundles of mesta for activating the microbial process needed for retting. After 3 to 4 days the standing bundles are laid down in the retting water and slightly drowned (nearly 10cm) in water with the help of some weights made of cement or stones. After a few days a part of the submerged plant are tested for the loosening of fibre. If the fibre comes out from the wood,

retting process might have completed and the fibers should be extracted by handling single stem or a group of 10-12 stems taken together and the fiber is removed from the stem by using fingers. The fibre is then washed and gathered as wet bundles of fibres. Then, these bundles are opened and the wet fibres are dried on bamboo frames under the sun. After 3 or 4 days of drying the fibre is properly arranged and bundled in different grades. If the retting tank is maintained properly to hold water to the plant material at the ratio of 20:1, with a pH of water 6.5 to 7.0, the retting could be completed within 12-15 days.

Yield

The average fibre yield of kenaf type is 25 to 30 quintals/ha and that of roselle is 18-20 quintals/ha

Conclusion

Mesta can be cultivated as an alternate crop for jute to produce bast fibre where jute could not be grown owing to various agroclimatic reasons. It will serve as as better alternate crop to fit in the cropping systems with less water requirement and low inputs. It can be explored in many parts of India especially in the coastal area where natural water bodies and water streams are found for enabling the retting process.

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