Quadrant II – Transcript and Related Materials

Programme	**:** Bachelor of Science (Third Year)
Subject	**:** Botany
Course Code	**:** BOD 103
Course Title	: Economic and medicinal Botany
Module Name	**:** Fibre yielding plants - Jute and Agave
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Notes

JUTE

Botanical name : *Corchorus capsularis* L.

Family : Tiliaceae

Common name : Jute

Description

The plants are herbaceous, annuals and 4.5 m high. The stem is cylindrical, branched and the leaves are glabrous, oblong, acuminate and toothed. Flowers are small, cymes in groups of 2-5 or more. Sepals are five, yellow, pale yellow or green in colour. The petals are 5- 6 yellow, entire or split. Stamens are many, 20-30 in number . The ovary is round or elongated, pentacarpellary, syncarpous showing axile placentation. The seeds are small. There are about 40 species of Jute distributed throughout the tropics. Only eight species occur in India. Both the species *Corchorus capsularis* & *C. olitorius* yield a bast fibre of great commercial importance - that is JUTE. The leaf of *C. olitorius* has a shinning upper surface & rougher undersurface, tasteless when chewed & has larger flowers. *C. capsularis* contain a bitter glucoside & smaller flowers. Jute is obtained from the bark of the plant. It is the secondary phloem fibre of the stem.

Cultivation practices

Tillage of land starts soon after first showers. Jute is a rainy season crop & sown from March to May. Compost, Phosphorus, Potash & Nitrogen are used as fertilizers. Ammonium sulphate is applied during active growth period. The seeds are sown by broadcast method. Jute requires a warm & humid climate with temperature (24 to 37°C). Constant rain or water logging is harmful. The grey alluvial soil is best. It is grown in sandy & clay loams. Jute is harvested from June to September before they are dead ripe.

Harvesting

Jute is harvested after 120-150 days when flowers shed . The plants (8-12 feet) are harvested with sickles close to the ground or above. In flooded lands they are uprooted. and left in the field for 3 days for shedding of leaves. The Jute stems are made into bundles for steeping into water

The Fibre extraction

The jute plant fibre lie beneath the bark and surround the woody central part of the stem. To extract the fibres from the stem, the process is carried out in the following stages, that is bundle stalk , retting, stripping, washing, squeezing excess, sun dry, bailing, kachcha packing, and finally the transport of bales.

Process of fibre extraction

Retting

The process in which the fibre in the bark get loosened & separated from stalk due to removal of pectins, gums & mucilagenous substances. This is due to combined action of water & microorganisms. The tied bundles of jute stalks are taken to the tank /ponds /streams. The fibre get loosened & separated from the woody stalk. The bundles are steeped in water at least 60-100 cm depth. The process is completed in 8-30 days. When the barks separate out easily from the stick or wood, the fibres are ready for extraction. Retting can also be done by chemical process.

Stripping

Removing the fibres from the stalk after retting. This is done by any one methods :- it involves removal of single plants & their fibres are taken off or a handful of stalk is taken & broken by to and fro motion in water. Washing the stalks first, by standing in waist deep water & then stripping. The extracted fibres are washed in clean water. The dark colour of fibres can be removed by dipping them in tamarind water for 15 - 20 minutes & again washed in clean water. After squeezing excess water the fibres are hanged on bamboo railing for sun drying (2-3 days).The Jute fibre is then graded and packed into kaccha bales about 250 pounds for use in home trade. They are transported to Jute market or direct to a Jute mill. Jute is a bast fibre obtained from the stem (secondary phloem). The fibre cells are longer in length & lignified, bearing a silky lustre.The longest fibre cells occur in stems of the longest internodes. The fibre cells of Jute are much shorter than those of hemp, flax or cotton. Spinning by ordinary method becomes difficult, since they are short , hence the use of Jute fibre is limited to coarse fabric only.

The fibre of *C. olitorius* is frequently finer, softer, stronger & more lustrous than that of *C. capsularis*. It has either a yellowish, reddish or greyish colour depending upon the nature of the retting water. The fibre of *C. capsularis* is whitish & called as white Jute by the trade.

Uses

Is an important textile fibre next to cotton. It is a cheap fibre. The jute fibre is spun into yarn & yarns of good quality are used for fabrics. It is used for coarse sacking & packing material.

Jute is also used to make twines, ropes, paper & as a filling material. Different types of cloth are made for upholstery, linoleum, tapestries & mats. The leaves are used as vegetable

Agave

Botanical name : *Agave sisalana* L.

Family : Asparagaceae

Common name : Sisal hemp

It is a tropical succulent perennial of 1.5-2 m height and evergreen.The Sisal agave has a short stem, thick, bearing a number of dark green thick, fleshy rigid leaves in a basal rosette of elongated sword-shape. The leaves have a terminal, dark brown, rigid, very sharp spine. A large panicle with flowers arranged on the terminal portion in dense clusters. The flowers do not produce seed, but form bulbils. The bulbils are borne in the axils of the bracteoles of the inflorescence after flowering. The flowers are yellowish green.

Cultivation practices

Agave sisalana is a tropical succulent plant that needs full sunlight & moderate water availability. It grows best in regions with an average annual rainfall of 800–1000 mm (or less). The maximum temperature should not exceed 32°C, with minimum temperatures of 5°C. It is damaged by frost & does not tolerate hail or water-logging. The plant grows well on a dry, permeable sandy loam, drought resistant. Propagation is usually carried out by bulbils or suckers. The bulbils are grown in nursery beds & seedlings are transplanted when 20-30 cm in height. The leaves are cut for fibre between the third and the fourth year after planting. The oldest leaves are cut close to the trunk. Each plant yields about 250-300 leaves during it life time (7-8 years). The fibre is strong,coarse, somewhat harder & more flexible than Manila hemp.

Fibre extraction

Fibre is extracted by a process known as decortication. Here the leaves are crushed, beaten, & brushed away by a rotating wheel set with blunt knives, so that only fibres remain. For the production on large estates, the leaves are transported to a central decortication plant, where water is used to wash away the waste parts of the leaf. The fibre is then dried, brushed and baled for export. Proper drying is important as fibre quality depends largely on moisture content. The artificial drying has been found to result in better grades of fibre than sun drying. The fibre is subsequently cleaned by brushing. Dry fibres are machine combed and sorted into various grades. The lustrous fibre strands,creamy white,100-125 cm in length are fairly coarse and inflexible. Sisal fibre is especially valued for cordage use because of its strength, durability, ability to stretch, affinity for certain dyes & resistance to deterioration in salt water.

Uses

The leaves of Agave yield a valuable fibre - a well known Sisal fibre. The fibre is mostly used for making ropes, cordage & twines.The shorter fibres and istles are used for making mops and brushes. In recent years it is also used for making coarse fabrics. Other products developed from sisal fibres include spa and cosmetic products, lumbar support belts, rugs, slippers & cloths

The flower stalk sap from A. *sisalana* can be used to make beer, a brandy-like spirit. The central buds are cooked & eaten as a vegetable. Sisal leaf waste has been used for cattle and rabbit feed. Leaf waste also has been used as a material to produce bio-fuel (methane). They are planted along railway embankments, road sides & suitable for hedging and fencing & to check soil erosion. Sisal wax is used in preparation of polishing compositions & in manufacturing of carbon papers.