

Uses

Sisal has a wide variety of purposes, including:

Traditional

High grade sisal fibres are made into yarns (either on their own or in blends with wool or acrylic) and used in carpets. Medium grade fibres are made into cordage, ropes and baler twine for agricultural and industrial use. These are particularly useful in a marine environment as they are resistant to deterioration by salt water.

Sisal pulp and paper

Sisal biomass contains a high proportion of cellulose; its pulp is a substitute for wood fibres and adds bulk to paper and cardboard as well as being absorbent and having high fold endurance characteristics make it a high quality input for paper products. It can be used in cigarette paper filters and things like tea bags.

Textile

The fibre is mainly used in buffing cloth, because sisal is strong enough to polish steel and soft enough not to scratch it.

Sisal reinforcing composites: Sisal can substitute or enhance fibre-glass used to reinforce plastic in automobiles, boats, furniture, water tanks and pipes. Sisal can also be used to add strength in cement mixtures for the development of low cost housing and to replace asbestos in roofing and brake-pads. In addition, it is an insulation material and can be made into fibre-board as a wood substitute.

Plastic and rubber composites

Sisal has good potential as reinforcement in polymer (thermoplastics, thermosets and rubbers) composites due to the low density and good welding specific properties. The Sisal composites can be used in automotive components and other furniture. Sisal also continues to make the best material for dart boards.

Sisal waste products

By-products from Sisal extraction can be used for making biogas, pharmaceutical ingredients and building material. The waste produced by decortications such as sisal juice, particles of crushed parenchymatose tissue and fragments of leaves and fibres can be used as fertiliser or animal feed.

The juice of the plant is used to make pharmaceuticals like hecogenin, inulin and others.

Other uses

Bird breeders use the hollow trunks of the plant for nesting. Sisal can be used as a geotextile in land reclamation, stabilisation of slopes and road construction. It also develops good cat scratching posts, spa products, lumbar support belts, rugs, slippers, cloths, and disc buffers. Sisal is a valuable forage for honey bees because of its long flowering period.

Acknowledgement

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References

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Sisal



Scientific name: *Agave sisalana*

Common names: Sisal (English), Garingboom (Afrikaans)

Background

Sisal is a species of Agave native to southern Mexico but widely cultivated and naturalised in many other countries. It yields a stiff fibre that is used in making various products. The term sisal may refer either to the plant's common name or the fibre, depending on the context. Sisal is a member of the agave family. In the past, several species of Agave were used for fibre production, but presently *A. sisalana* is the commercially grown species. In South Africa, the production areas of sisal are the Limpopo (Mokopane, Polokwane, Giyani, Mhinga and the Phalaborwa corridor), KwaZulu-Natal (Hluhluwe, Mtubatuba and Port Shepstone) and North-West (Madikwe).



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Description

The plant

Sisal is a hardy plant that can grow well all year round. The plants grow for 7 to 12 years, producing from 180 to 240 leaves depending on the location, altitude, level of rainfall and variety of plant.

Stem

White, short (0,9 to 1,8 metres long), fleshy stems or rhizomes develop from underground buds at the base of the plant, first growing sideways and then upwards to form new plants.

Roots

The Sisal plant has a shallow, fibrous root system with a maximum of 60 cm deep. The roots that can be used for propagation develops mainly horizontally and they form suckers.

Leaves

The plant has stiff, heavy, persistent leaves of about 0,6 to 1,2 m long, 10,2 to 20,3 cm wide, and 2,5 to 10,2 cm thick when mature. The leaves of the Sisal plant consist of 3 % of fibre. The leaves are dagger shaped.

Flowers

The Sisal plant flowers only once at an age of about 12 years. Before flowering, the flower stalk of 4,5 to 6,0 m develops from the growth point. The flower stalk subdivides to form branches that bear the flowers. The flowers do not produce seed, but they form bulbills, which are used for reproduction.

Trunk

The base of the plant consists of a short trunk of about 30 cm x 150 cm. The leaves are spirally arranged around the trunk. The growth point from where the leaves develop and eventually the flower stalk is situated on top of the trunk.

Climatic requirements

Sisal grows well in hot climates with temperatures between 10 to 32 °C. The ideal maximum temperature should be 30 to 40 °C and the minimum 5 °C.

Soil requirements

It is not soil specific, but it grows best on well-drained loamy soil. Sisal can be cultivated in most soil types except clay, and has low tolerance to moist and saline soil conditions. The plant is not frost tolerant and produces the best in areas with an annual rainfall of 500 mm and higher. It can also grow in areas with less rainfall or with erratic rainfall. A soil pH level of between 4,0 and 6,0 is favourable.

Cultivation practices

Propagation

Propagation of the plant is mainly by bulbills or suckers.

Planting

The bulbills are placed in beds 10 cm x 10 cm apart, where they grow for six months. After that, they are placed in the secondary beds where they are grown 30 cm x 30 cm apart. Six months later, they are planted in the field in a tram track fashion. Distances between the rows should be 1,0 to 1,5 m and 4,0 m.

Fertilisation

Sisal is an environmentally friendly fibre and almost no fertilisers are used for its cultivation.

Weeds control

Most of the weeding is done by hand-hoeing.

Sisal is relatively free from pests and diseases, though sisal weevil is a major pest of economic importance. Sisal is an environmentally friendly fibre and almost no pesticides are used for its cultivation, because it is resilient to disease. Some common pests and diseases are:

Pest control

SISAL WEEVIL (*SCYPHOPHORUS INTERSTITIALIS* GYLH/*ACUPUNCTATUS*)

Symptoms: The presence of brownish-grey speckled patches, usually elliptical or rounded and infested plants grow slowly. The grub (larva stage) bores into the bole of the young plant making a tunnel. Rotting follows and the plant dies-off.

The adult weevil feeds at the axils of the upper most leaves, adjacent to the growing spike leading to staining of the fibre.

Control: Control can be done by the following measures:

- Cultural control: Use of non-infected planting materials, removal of dead boles and avoidance contaminated fields;
- Use of guard rows supported by placing split boles that have cut surfaces that are dusted with insecticides to reduce infestation;
- Chemical control: The application of registered insecticides;
- Plant sanitation and biological control, e.g. predator.

PIGS, BABOONS AND MONKEYS

Symptoms: The centre of the growing spike is damaged by stunting growth.

Control: Trapping and scaring.

Disease control

LEAF-SPOT

Symptoms: Tiny spots which develop into corky grey-brown circular scab-like spots on leaves of both upper and lower surfaces.

Control: Control is mainly done by proper cultural management, e.g. maintaining clean fields and soil fertility; and by using clean planting material. Recommended chemicals can be used.

BOLE ROT (*ASPERGILLUS NIGER* OR *PYTHIUM/PHYTOPHTHORA*)

Symptoms: Soft or yellowish rot at leaf bases which gradually girdle the bole. Affected leaves collapse and turn yellow, while the bole rots completely.

Control: Application of calcium-rich fertilisers and in water-logged or highly acidic soils, agricultural lime must be added.

Harvesting

The leaves of the plant may be harvested from its fifth years after establishment. At this stage, the plant already has 120 to 125 leaves and is about 1.5 m high. Harvesting is done at intervals of 10 to 12 months with 20 to 25 leaves being left on the plants after each cut. The plant is riped as soon as the colour of the thorn at the tip changes from dark brown to a light brown colour by hands. After 12 years, selected leaves might be harvested. The harvesting of the plants can be done annually from seven to eight years.