

Dr Nishi Kumar
 Bot Dept
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Organisms are affected by their environmental factors like climatic topographic, edaphic and biotic. It is natural to recall that the characteristics of organisms are determined by their genetic constitution (hereditary traits), but heredity is not able to work in the vacuum. Heredity in fact works only with the help of the environment. Thus environment plays important role in organism's life. Accordingly organisms chiefly plants are the measurement (indicator) of the environment.

Thus, organisms, species or even communities which serve as a measure or index of environment conditions are known as 'biological or ecological' indicators. It is thus evident that every plant is a product of the conditions under which it grows and is, therefore, a measurement of environment.

Some of the obvious cases where plants and animals serve as indicators of some characteristics of environmental conditions are as given below—

(1) **Indicators of potential productivity of Land**—Forests serve as good indicators of land productivity. For example, vegetative growth of trees like *Quercus* is comparatively poor on low land or sterile sandy soil than the normal soil in which they grow under natural conditions.

(2) **Indicators of agricultural possibilities**—Native vegetation of a particular region is the safe criterion of agricultural possibilities thus, plants growing under natural conditions provide information on capabilities of land for crop growth than those obtained through meteorological data or soil analysis.

(3) **Indicators of climate**—Plant communities characteristics of a particular region provide information on the climate of that area. For example, evergreen forest indicate high rainfall in winter as well as in summer; sclerophyllous vegetation indicates heavy rainfall in winter and during summer; grassland indicates heavy

rain during summer and low during winter; Xerophytic vegetation indicates a very low or no rainfall in the year.

(4) **Indicators of fire**—Some plants as *Agrostis hernalis*, *Epilobium spicatum*, *Pinus contorta*, *Pteris aquilina* etc. dominate in areas destructed by fires. *Pteridium* sps in particular indicate burnt and highly disturbed coniferous forests.

(5) **Indicators of soil type and other soil characteristics**—Luxuriant growth of some taller and deeply rooted grasses like *Psoralea* indicates a sandy loam type of soil, whereas the presence of grasses *Andropogon* indicates sandy soil. *Rumex acetosella* indicates an acid grassland soil; whereas *Spermaece stricta* the iron rich soil in the area. Plants like *Chrozophora rotleri*, *Heliotropium supinum* and *Polygonum plebejum* grow better in low lying lands. *Shorea robusta*, *Cassia obtusifolia*, *Geranium* sps and *gmpatiens* sps indicate proper aeration of soil. Grasses like *Suecharum spontaneum* prefer to grow in poorly drained soils. Plants as *Artemisia tridentata*, *Kochia vestita*, *Salicornia ulahensis* and *Salicornia rubra* indicate Saline soils. *Capparis spinosa* and *Cartssa spinarum* indicate intense soil erosion.

(6) **Indicators of petroleum deposits**—Some protozoans as *Fusillinds* indicate petroleum deposits in the area.

(7) **Indicators of adequate oxygen in water**—Plants like *Utricularia*, *Chara*, *Wolffia* prefer to grow in polluted water. Bacteria like *Escherichia coli* also indicates water pollution. Presence of diatoms in water indicates its pollution by sewage. Movement of fish like *Catla*, *Labeo gonius*, *Labeo bata*, *L. rohita* and *Nalapp-terus nakopterus* away from the water indicates industrial pollution of water.

practices. Long and uniform staples are for yarns of high counts required for fine fabrics. Yarns of varying size and fitness are needed in the production of fabrics. Cotton waste of good grade is applicable in making cotton blankets, sheets, flannelettes and towels. Cylindrical strips are used for twines, wraps, nets and ropes. The stalks of plants contain a fibre that can be used in paper, making or for fuel.

Soft or Bast fibres— *Linum usitatissimum*

(1) **Example—***Linum usitatissimum*

Eng—Flax

Hindi—Alsi

Family—Linaceae

Flax is extracted from the stalks of *Linum usitatissimum* especially grown for this purpose and harvested when the capsules are immature. They grow well in moist, well drained soils rich in organic matter. They mature in about 80-100 days.

Cultivation—In India, the crop is sown between August and November and harvested between January and April. The linseed crop is generally confined to sea level areas or low elevations.

Harvesting —The crop is harvested before the capsules are mature. When the lower part of the stalk turns yellow and bottom leaves begin to droop, the act of harvesting is done. In most places harvesting is generally done by pulling the plants by roots and by some other mechanical appliances.

Retting—Harvested stalks are partially or completely dried and seeds removed by rippling *i.e.*, drawing the heads through a coarse comb. Seeded stalks are then subjected to retting which involves water retting, dew or grass retting, mixed retting and snow retting. Stalks are bundled together and immersed in water after weighing. Fibres are separated from retted stack by scutching and drying.

Characteristics of Bast fibres

- The ultimate fibres have an average length of 25-30mm. and an average diameter of 15-18 μ .
- They are round to polygonal in cross-section, more or less cylindrical in shape.
- The colour of raw fibre varies from creamy white to grey.

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- The fibre is valued for its outstanding strength, fitness and durability.
- This fibre has low elasticity and is stronger when wet than when dry.
- The fibre does not reach to mordant.
- The fibre is less resistant to high temperature.

Uses of Bast or Soft fibres

- It is used for linen stitching, fishing twines, binding twines, ropes fishing nets.
- It is used in woven into fine fabrics such as lawns, cambrics, canvas and drills.
- It is used in carpet making, sails and wrapping cloth.

(2) Example—Jute (*Corchorus*)

Eng—Jute

Hindi—Patsan

Family—Tiliaceae

J. F. Duthie reported two species of *corchorus* namely *C. capsularis* and *C. olitorius*.

Cultivation —The crop is sown between March and May and harvested between July and September. In India, the time for harvesting the crop depends entirely on the date of sowing. The crop is harvested within three or four months after planting, while the flowers are still in bloom.

Jute is obtained from the secondary phloem.

Separation of fibre by retting—The fibre is separated from the stem in pools of stagnant water by a retting process. The crop is stacked in bundles for two or three days to give time for the decay of the leaves. The period of retting depends upon the nature of water, kind of fibre and condition of the atmosphere. The bundles are made to sink in water by placing the top of them on muds. Thereafter the washing is done to remove impurities, if any. As a result, the long yellow fibres, from six to ten feet in length and considerably lignified are obtained in a single unit. They possess a silky lustre. They are not particularly strong and tend to deteriorate rapidly when exposed to moisture. That's why the Jute is cheap.

Utilization of Jute

Jute is used for rough weaving.

Cloth made from jute fibre is used for making gunny-bags.

Somewhat fine cloth prepared from jute fibre is chiefly used a cloth to sleep on

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- Coarse cloth is largely used for making the sails of country boats and for bags to hold large seeds or fruits.
- Jute is extensively used in the manufacture of carpets, curtains, shirtings and is also mixed with silk or used for imitating silk fabrics.
- The fibre is used for making twine and ropes.
- Jute butts are used to some extent in paper making.

(3) Example—Sunn-Hemp

Crotalaria juncea

Eng—Sunn-hemp

Hindi—Sunn (san)

Family—Papilionaceae

Crotalaria juncea is not found in wild state anywhere in India, although it may sometime exist as an escape from cultivation.

Cultivation—Sunn is cultivated in strips or around the margins of fields. It is never cultivated as mixed crop. It is a Kharif crop. It is sown on the high sandy lands less suited for the more important crops.

Harvesting—The crop is harvested usually after the flowers have appeared, but in some locality, the plants are left on the field until the fruits have begun to form. The plants are pulled up by the roots and in others the stems are cut with a sickle close to the ground.

Separation of the fibre—After the removal of the crop from the ground, the stems are tied in bundles, each bundle consists of 20 to 100 stems, but the leaves are left until quite dry, the leaves either fall off naturally as are removed by the stems being beaten. The length of time required for retting depends longely on the temperature of both the temperature of both the atmosphere and water. Deep water, being cooler, requires more time for the operation.

Washing the fibre is very tedious. A worker will hardly clean 15 kg. a day, which represents the fibre obtained from two quintals of stem.

Cleaning process—When the fibre has been separated and thoroughly washed, it is the usual custom to hang it up over bamboos to be dried and bleached in the sun. When dry it is combed if required for textile purposes or for nets and lines, but if for ordinary use for example twine and ropes, it is merely separated and cleaned by the fingers.