

Economic Importance of Bryophytes

There are about 2500 species in Bryophytes found almost in all planes of the world. Most of the bryophytes are indirectly useful to man, however they play an important role in the economy of nature and management of ecosystem through being rock builders.

- **Bryophytes used as medicines:-**

Number of Bryophytes are used as medicines in homeopathy. Chinese medicines include 40 different kinds of Bryophytes that have been used to treat diseases of the cardiovascular system, tonsillitis, tympanitis, cystitis and bronchitis and to cure skin disease and burns.

Marchantia polymorpha

This is a liverwort which is used to cure pulmonary tuberculosis (Roigy Mera, 1945). It is also used for liver treatments. *M. polymorpha* has antitumour properties thus, its extract is used to cure tumor. It is also used as medicine for boil and abscesses.

Marchantia stellata

This is also used in tumor ailments. Watt had mentioned the medicinal uses of *Marchantia polymorpha*, *Fagetellaconcia*, species of Jungermaniales, *Anthoceros* and *Riccia*. These are used as an external application to cure ringworm. The Chinese and the native Americans have used Bryophytes for example *Mnium* sp; and *Philontis* in the form of paste to cure wounds.

In India the burnt ash of mosses along with little oil and honey is used as an ointment for burns, cuts and wounds in the Himalayan region. The extract of *Rhodobryum giganteum* can increase blood circulation in aorta upto 30% in animals.

The species of *Sphagnum* found in temperate countries is widely used for medicinal purposes. A healing ointment prepared by *Sphagnum* leaves mixed with grease is used in the treatment of cuts and wounds. The decoction prepared by boiling dried *Sphagnum* in water, is used in the treatment of acute haemorrhage. This decoction is used to cure diseases of eyes. The lakes where sphagnum grows are called as *Sphagnum* bogs. These are well known to produce peat in acidic water. The bog water is antiseptic and has astringent properties.

- **Antibiotics from Bryophytes:-**

The Bryophytes are delicate land plants and are devoid of thick cuticle and bark therefore they have biochemically active compounds which perform defense mechanism to protect them from enemies like fungi, bacteria and insects. Some

liverworts are known to have lunularic acid for example in the extracts of *Reboulia* spp. and *Pallavicinia* spp. It shows antimicrobial properties. Due to antimicrobial activity liverworts are not susceptible to fungal disease. Lunularic acid inhibits the growth of pathogenic fungi *Botrytis cinerea*, *Rhizoctonia solani* and *Pythium* spp. whereas petroleum ether extracts of *Barbula* and *Timmiella* species were found to be active against both gram negative and gram positive bacteria.

A number of unsaturated lipids, fatty acids, esters flavonoids, tripenoids and phenols have been reported from Bryophytes. Hayes reported that aqueous extract of *Conocephalum conicum* has antibiotic activity. It is found to contain Norpiguisonone. Bryophytes *Polytrichum* and *Sphagnum* exhibit strong antibacterial properties against *Gaffkeya tetragena* and *Staphylococcus aureus*.

- **Bryophytes as an indicator of Environmental Conditions:-**

Bryophytes are good indicators of environmental conditions. Mosses can be used as an indicator of calcium and nutrient content in water. Some Bryophytes can grow only in narrow and specific pH range and therefore their presence can be treated as an indicator of soil pH. *Merceya* sp. is indicator of the presence of copper rich soil. Such plants are used as indicator plants for copper rich soil.

Mosses do not possess a protective epidermis and thick cuticle to protect themselves, therefore they are good indicators of acid rain. In polluted areas, standard transplantation of certain mosses has been found to be quite useful for monitoring the intensity and trend of air pollution.

- **Bryophytes as an experimental material in Lab:-**

Bryophytes, both liverworts and mosses are utilized as an important tool for research in lab. It is used as a test material in a number of branches of botany such as ecology, experimental morphology, toxicology, genetics, physiology, reproduction biology, biochemistry and pharmacognosy. During green house experimental plants like tomato, pepper, cucumber and wheat treated with liverwort extract were found to be less infected with fungus infection by *Phytophthora infestans* than unrelated plants.

- **Bryophytes Prevent Soil Erosion:-**

Mosses like *Pogonatum*, *Nardia* and *Blasia* play a key role as inhibitors of soil erosion, Moss like as *Dicranum* and *Rhodobryum* prevent soil erosion on the slopes of hills. Besides, they provide excellent bed for seed germination.

- **Bryophytes used as Food Material:-**

Bryophytes are directly used as food material by those animals that are useful to man. *Polytrichum* and *Bryum* are used to make capsular food as a main diet of the chicks, Besides, some birds like field fare, song thrush and black bird use mosses as a regular food. Reindeer depends on *Polytrichum* and *Hylocomium alaskamum* for food.

- **Use of Bryophytes as fuel:-**

Liverworts and mosses have long been tried and utilized as a fuel in developed countries like West Germany, Sweden, Finland, Poland and Soviet Union. *Sphagnum* peat is suitable for production of low and intermediate BTU gas as well as hydrogen, ethylene, natural gas, methanol and gasoline.

Peat moss are most suitable for the production of methane. Peat is likely to become an important future source of fuel for production of heat and electricity besides methane as its heating value is superior to that of wood because of low sulphur content.

- **Rock Builders:-**

Mosses like *Bryum* and *Hynum* grow in water bodies rich in calcium and bicarbonate in association with aquatic plants perform a key role in rock builders. The bicarbonic ions are converted into the insoluble calcium carbonate by the plants which get precipitated and hardened forming calcareous rocks like deposition. These rock deposits can be used as building material.

- **Soil Formation and Preparation of Substratum Layer for Vegetation:-**

Bryophytes play an important role in soil formation. They germinate and grow in the cracks of the rock. After their death and decay, they add organic matter to almost sterile soil to make them fertile. Thus, they prepare suitable substratum with accumulation of organic matter for other plants to grow. Thus Bryophytes are pioneer plants for lithosphere i.e. succession on rocks.

- **Use of Bryophytes in Horticulture:—**

Bryophytes provide good absorbing material hence are of great use in horticulture. They improve soil quality, moisture content and increase mineral nutrients in the field if added to dry soil. They may be added to pots to hold moisture and mineral contents. They are extensively used for various purposes by the horticulturists.

- **Use of peat moss in Waste Water Treatment:-**

The peat is highly absorbent and permeable physically. It is known to absorb toxic metals, therefore, Sphagnum is used as an effective filtering and absorption agent for the treatment of waste water and effluent of factories with acid and toxic discharge consisting of heavy metals particularly Ag, Pb, Cu , Hg, Fe , Sb and organic substances like detergents , dyes , microorganisms and soils.