

Subject-Botany

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Class- Bsc-1

Paper-II(Diversity of Algae, Lichen And Bryophytes)

Topic-Economic Importance of Lichens

Economic Importance of Lichen

A. Useful Aspects:

(a) Ecological significance:

(i) Pioneer colonizers:

Lichens are said to be the pioneers in establishing vegetation on bare rocky areas (lithosere). They are the first members to colonize the barren rocky area.

During development they bring about the disintegration of rock stones

(biological weathering) by forming acids e.g., oxalic acid, carbonic acid etc

Thus, they play an important role in nature in the formation of soil (a phenomenon called pedogenesis).

(ii) Role in environmental pollution:

Lichens are very sensitive to atmospheric pollutants such as sulphur dioxide. They are unable to grow in towns, cities and around industrial sites such as oil refineries and brickworks. So, the lichens can be used as reliable biological indicators of pollution. By studying lichens on trees, a qualitative scale has been devised for the estimation of mean SO₂ level in a given season. Thus lichens are used as pollution monitors.

(b) Food and Fodder:

The lichens serve as important source of food for invertebrates. A large number of animals for example, mites, caterpillars, termites, snails, slugs etc. feed partly or completely on lichens. Lichens as food have also been used by man during famines. They are rich in polysaccharides, certain enzymes and some vitamins.

Cetraria islandica (Iceland moss) is taken as food in Sweden, Norway, Scandinavian countries, Iceland etc. *Lecanora esculenta* is used as food in Israel and *Umbilicaria esculenta* in Japan. Species of *Parmelia* (known as rathapu or '**rock flower**' in Telugu) are used as curry powder in India. In France the lichens are used in confectionary for making chocolates and pastries.

Cladonia rangiferina (Reindeer moss) is the main food for reindeers (a kind of deer) in polar countries. *Cetraria islandica* is also used as fodder for horses. Species of *Stereocaulon*, *Evernia*, *Parmelia* and *Lecanora* are also used as fodder.

(c) Source of Medicines:

Since very early times the lichens are used to cure jaundice, fever, diarrhoea, epilepsy, hydrophobia and various skin diseases. Various lichens are of great medicinal

value:

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|--------|---|--|
| (i) | <i>Lobaria pulmonaria</i> and <i>Cetraria islandica</i> | In respiratory diseases particularly tuberculosis. |
| (ii) | <i>Usnea barbata</i> | For strengthening hair and for uterine ailments |
| (iii) | <i>Xanthoria parietina</i> | For jaundice |
| (iv) | <i>Cladonia</i> spp. | For whooping cough |
| (v) | <i>Peltigera canina</i> (dog lichen) | For hydrophobia |
| (vi) | <i>Roccella montagnei</i> | In angina, a serious heart disease |
| (vii) | <i>Parmelia saxatilis</i> | For epilepsy |
| (viii) | Species of <i>Evernia</i> , <i>Cladonia</i> and <i>Poccella</i> | To control fever |

A yellow substance usnic acid is obtained from species of *Usnea* and *Cladonia*. It is a broad spectrum antibiotic and is used in the treatment of various infections. It is effective against gram positive bacteria. Some lichen compounds e.g., lichenin, isolichenin have anti-tumour properties.

Protolichesterinic acid, a compound obtained from some lichens, is used in preparation of anti-cancer drugs. Erythrin obtained from *Roccella montagnei*, is used to cure angina. Many antiseptic creams such as Usno and Evosin are available in the market and are well known for their antitumour, spasmolytic and antiviral activities.

(d) In Industry:

(i) Tanning and dyeing:

Some lichens are used in leather industry. *Cetraria islandica* and *Lobaria pulmortaria* show the astringent property. This astringent substance is extracted from the thallus and is used in tannin industry. Lichens are also used in preparing natural dyes. Orchil, a blue dye obtained from *Roccella* and *Leconara*, is used to dye woollen articles and silk fabrics.

It is purified as orcum and used as a biological stain. A brown dye is obtained from *Parmelia* spp. whereas *Ochrolechia* spp. yield a red dye. Litmus used as an acid-base indicator, is also a dye and is obtained from *Roccella tinctoria* and *Lasallia pustulata*.

(ii) Cosmetics and perfumes:

Evernia, Ramalina, Pseudorina are reported to have perfumed volatile oils. Due to the aromatic substances present in the thallus, the lichens are used in the preparation of various cosmetic articles, perfumery goods, dhoop, hawan samagris etc.

(iii) Brewing and distillation:

Some species of lichen for example, Cetraria islandica contain carbohydrates in the form of lichenin. In Sweden and Russia alcohol is produced from these lichens. These lichens are also used in confectionary.

(iv) Minerals:

Lecanora esculenta is found in lime stone deserts and yields large amount of calcium oxalate crystals. These are 60% of its dry weight.

(e) Natural products:

Lichens are known to produce over 550 natural products. Some important natural products are:

Product	Produced From
Salazinic acid	Ramalina siliquosa
Squamatic Acid	Cladonia crispate
Lecanoric acid	Parmelia Subrudecta

(f) Poison from Lichens:

Some lichens are poisonous due to presence of various substances in them:

Lichen	Poisonous due to
Letharia vulphina (wolf moss)	Vulpinic acid (used as poison for Wolves)
Cetraria juniperina	Pinastrinic acid
Parmelia molliuscula	Selenium
Xanthoria parietina	Beryllium
Everina furfuracea	Chlorine

B. Harmful Aspects:

- (a) Lichens growing on young fruit trees and sandal trees are harmful to the plant.
- (b) During hot season some species of lichens (e.g., *Usnea barbarata*) become so dry and inflammable that they often help in spreading forest fire.
- (c) Some lichens act as allergens.
- (d) The commercial value of glass and marble stone is reduced because of itching of their surface by lichens.
- (e) Some lichens e.g., *Cladonia rangifera*, *Cetraria islandica* accumulate large quantities of radioactive strontium (Sr^{90}) and caesium (Cs^{137}) from atomic fall-outs. These may be incorporated in the food chain, lichen \rightarrow reindeer \rightarrow man, leading to their accumulation in human tissues.