

MODULE 28 - TYPHA: BIOREMEDIAL PLANT

OBJECTIVES

After the study of this e-content the learners will be able to:

1. Know about the habitat, habit, vegetative as well as reproductive organs and classification of Typha.
2. Know bioremedial importance of Typha in controlling water pollution by removing the impurities of heavy metals like Mercury and Arsenic from Industrial wastes.

SUMMARY

Industries are the parameter of progress of the countries. Practically all industries need water either for cooling the machines or as one of the reactants. After the industrial process, the water along with the industrial effluents is dump to near by water bodies such as lakes, ponds or rivers. The result is that the water gets polluted. Industrial effluents include heavy metals like mercury and arsenic, which are harmful to aquatic life as well as human being. Chemicals treatment disturbs the chemistry of water and involves heavy expenses. However, the cultivation of aquatic weeds like Typha absorbs the impurities of heavy metals without changing chemical structure of water. Typha is available free of cost and can be cultivated easily through its rhizomes as well as seeds. Thus, Typha acts as a bioremedial plant. Use of Typha as water purifier is an eco friendly approach.

TRANSCRIPTION

1. INTRODUCTION

The word pollution doesn't exist in the nature's dictionary. Natural activities do not cause pollution. If at all pollution does occur, it is in minute quantities and nature itself purifies it. Plants play a vital role in the purification of atmosphere. One such wild plant is Typha angustifolia.

2. HABITAT AND HABIT

Typha angustifolia is popularly known as aquatic grass or cat tail plant. It is known as aquatic grass because it grows in water and in marshy areas and cat tail plant because its inflorescence is in the form of dense spike which looks like

the tail of a cat. Typha is a perennial herb found in lakes, ponds, rain puddles and marshy areas. It exhibits luxuriant growth, if the depth of water is 20 to 40 centimeters.

Typha is a gregarious plant and grows dense by along the shores of lakes and ponds.

3. VEGETATIVE ORGANS

The Typha stem is an underground rhizome. The rhizome is branched. When the rhizome divides in pieces each grow into a new plant. That's why Typha become gregarious. Thus the rhizome of these plants serves not only as an organ of perennation but also helps in vegetative propagation. An aerial stem originates from the rhizome and bears the inflorescence.

Its leaves are found in two rows. They are flat ribbon shaped 2 to 3 meters long and 2 centimeter wide. The Leaf base acts as a sheath for the stem as in most of the monocots. The leaf of Typha is very good evidence of the fact that all inter cellular spaces are inter connected because whenever air is blown through one, it passes out through other end of the leaf lying in water. The leaves are spongy to touch.

4. REPRODUCTIVE ORGANS

Typha is a monoecious plant that means the male and female flowers are produced separately but on the same plant. Inflorescence is a spike. Sessile flowers grow on a long stalk. The female flowers are found at the base of the spike and the male flowers at the top. They are separated by some barren space. Female flowers are in brown color while the male flowers are yellow or pale in color.

The male flower is bracteates actinomorphic, but incomplete. The perianth is present in the form of hairy structures some botanists consider these hairs to be bracteoles. In that case the flower stands naked that is without a perianth. Anthers are basi fixed. The filaments are fused at the base resulting in monodelphaes condition. The connective is very long and clearly visible above the anthers.

The floral formula of male flower is as shown

Br

Bracteates, actinomorphic, male, perianth absent, the Androecium is made up to 3 stamens, monodelphaes. The floral diagram of the male flower is as under shown

Female flower is also bracteates and has bracteoles in the form of hairs. The Gynoecium is monocarpellary raised a gynophores ovary superior unilocular with marginal plantation. The floral formula of the female flower is as shown

Br +

Bracteates, actinomorphic, female, perianth absent, Gynoecium monocarpellary, ovary superior.

The floral diagram of the female flower is as under.

The fruit of the Typha is dry indehiscent achene's several female flowers after fertilization form several fruits which remain attached to the inflorescence axis where female flowers were present. Each fruit contains one seed which on germination forms a new plant.

Thus Typha regenerates through rhizomes as well as seeds that are why it grows luxuriantly within a short period at one place.

5. CLASSIFICATION

Typha is classified under the family typhaceae of monocots.

There are twelve species of Typha in the world out of which two are found in India. These are Typha angustifolia and Typha elephantina. Typha angustifolia is found throughout Madhya Pradesh.

6. ECONOMICAL IMPORTANCE

The most recent use of Typha is as a bioremedial plant in controlling water pollution. Industrial waste containing heavy metals like mercury and arsenic are dumped in water, polluting lakes, ponds and river. Typha planted along the margin of such water bodies absorbs the harmful impurities and purifies the water.

7. DISCUSSION

These impurities deposit in the inter cellular spaces of Typha without causing any harm to the plant. In this way the polluted water becomes clean. Bioremediation is preferred to the addition of chemical purifier because the latter involves expenditure and also disturbs the balance of water whereas Typha is available free of cost and it is eco-friendly.

8. CONCLUSION

It has been commonly observed that lakes, ponds that have the Typha plants growing around their edges contain clear, odorless water. This itself proves that Typha is a natural water purifier. Hence it can be seriously considered for effluent treatment by Industries. Today industrialization has become a serious threat to our environment-including the water bodies. In such circumstances making use of Nature's own water purifier, the Typha is the most correct and eco-friendly approach.

GLOSSARY

1. Bioremedial plant-Living plant used as remedy against pollution.
2. Pollution- The act of making dirty.
3. Spike- Inflorescence with sessile flowers.
4. Gregarious- Growing in-group.
5. Rhizome- Underground stem.
6. Perennation- Survival of a plant year after year.
7. Vegetative propagation- Multiplication through vegetative parts.
8. Intercellular spaces- Gap between adjacent cells.
9. Monoecious- Bearing male and female flowers on the same plant.
10. Bract- Leaf like structure subtending a flower.
11. Naked flower- Flower without perianth.
12. Sessile- Without stalk.
13. Monadelphous stamens- Stamens fused by filaments forming one tube.
14. Connective- Part of stamens which connects two anther lobes.
15. Gynophore- Part of thalamus forming a stalk on which gynoecium is present.
16. Achene fruit- Simple indehiscent fruit having fruit wall and seed coat free from each other.
17. Effluents- Waste products produced during industrial process.

F.A.Qs

- Q1. What is bioremediation?
Ans. Purification by using living organisms.
- Q2. Write two popular names of Typha?
Ans. Aquatic grass and Cat tail plant.

Q3. How many species of Typha are found in the world?

Ans. Twelve.

Q4. Name the species of Typha found in India?

Ans. Typha angustifolia and Typha elephantia.

Q5. What type of habitat is preferred by Typha?

Ans. Marshy and swampy areas near the margin of lakes, pond and other water bodies having stagnant water.

Q6. Is Typha a monocot or dicot?

Ans. Monocot.

Q7. Why Typha is considered as gregarious?

Ans. Because it grows in a group.

Q8. In what form stem is found in Typha?

Ans. Underground rhizome.

Q9. What are the peculiarities of the leaves of typha?

Ans. They are flat ribbon like with spongy texture and full of Inter cellular spaces.

Q10. What type of inflorescence is found in Typha?

Ans. Spike.

Q11. Why Typha is called monoecious plant?

Ans. Because the flowers are unisexual and both male and female flowers are borne separately but on the same plant. Female flowers are borne at the base of inflorescence axis and male towards the upper side.

Q12. Why flower of Typha is considered naked?

Ans. Because perianth is absent and Hair like structures present in the place of perianth are actually bracteoles.

Q13. How many stamens are found in male flower of Typha?

Ans. Three.

Q14. Why stamens of Typha are considered to be monadelphas?

Ans. Because they are fused by their filaments to form a single tube.

Q15. What is peculiar feature of the female flowers of Typha?

Ans. Ovary is raised on a stalk known as gynophore.

Q16. What type of fruit is found in Typha?

Ans. Dry indehiscent Achene.

Q17. How many seeds are found in the single fruit of Typha?

Ans. one.

Q18. Does Typha regenerate through seeds?

Ans. yes.

Q19. List two methods of regeneration of Typha?

Ans. One by rhizome another by seeds.

Q20. How seeds of Typha are dispersed?

Ans. By Wind.

Q21. How does Typha purify water?

Ans. It absorbs impurities like heavy metals through its root system and collect them in its inter cellular spaces.

Q22. Why cultivation of Typha is eco-friendly?

Ans. Because Typha removes impurities from industrial wastewater without causing any harm to the source of water where it grows, whereas chemical purifiers degrade the quality of water.

Q23. What is the economic importance of Typha?

Ans. Dried leaves used to prepare brooms and used to prepare the roof of huts. Female flowers are believed to cure wounds.