Classification of Plants

Synopsis:

- Classification means grouping things together on the basis of certain common features.
- The classification helps us to identify the living organisms and to study them more easily and systematically.
- **The plants can be classified as follows on the basis of their size and shape as:**
    1. Herbs
    2. Shrubs
    3. Trees.
- The plants which have soft, green and perishable stems are called **herbs.**
  Example: maize, rice, mint etc.
- The plants with woody stems, with branches of almost equal size arising from the stem immediately above the soil are called **shrubs**.
  Example: Lemon, jasmine etc.
- The plants which are tall and have hard, woody stems and bear woody branches, twigs and leaves at some distance above the ground are called trees.
  Example: Coconut and palm.
  Non – flowering plants are called **Cryptogams**
- Flowering plants are called **Phanerogams.**
- **The non-flowering plants can be further classified as:**
    1. Thallophyta (Bacteria, Fungi and Algae)
    2. Bryophyta (Mosses)
    3. Pteridophyta (Ferns)
- Thallophyta do not bear-roots, stems or leaves.
- Mosses have stems and leaves but no roots rather have thread-like structures called **rhizoids.**
- Mosses are called Amphibians of the plant group as they need water to reproduce.
- **Spores** are not seeds.
- Spores are tiny structures capable of producing new plants.
- The flowering plants can be further classified into
    1. Gymno sperms.
    2. Angiosperms.
- The flowering plants that bear seeds but no fruit are called **Gymnosperms**. Their seeds are **thin** and **naked.**
- The characteristic feature of gymnosperms is that their roots are well developed, trunk is thick and woody and their leaves are long and pointed.
- The female part of the angiosperms plant is called **ovary.**
- **The plants can be classified on the basis of life span as:**
    1. Annuals
    2. Biennials

3. Perennials

- The plants which live for only one season in a year are called **annuals.**
  Example: Wheat, rice, pea, sunflower.
- The plants which complete their life cycle in two years, i.e. in the first year they bear the vegetative parts while in the second year they bear flowers, fruits and seeds are called
  biennials.
  Example: Carrot, potato, cabbage.
- The plants which live for more than two years and bear flowers, fruit and seeds every year.
  [They may even live for hundreds of years] are called
  perennials.
  Example: Banyan, pine.
- The perennial plants can be further divided as
  1. **Deciduous:** Shed their leaves once in a year usually before winter. • **Example:** Oak, mulberry.
  2. **Evergreen:** These never shed their leaves all at one time. They keep shedding their leaves throughout the year. **Example:** Mango, guava etc.
- The self – nourishing living beings are called **autotrophs**. Those nourishing on others are called **heterotrophs**.
- On the basis of habitat, the plants can be classified as.
  1. mesophytes
  2. xerophytes
  3. hydrophytes.
- **Mesophytes :** The plants which grow on land and need moderate amount of water for their survival.
  Example: Mango,apple.
- **Xerophytes:**

  1. The plants which grow is deserts and need minimum amount of water for their survival.
  2. These have thin and spiny leaves to minimise water loss.**Example:** Cactus, Babul etc.
- **Hydrophytes:**
  1. The plants need maximum amount of water and hence grow in water.
  2. They have either very small or no roots at all.
     Example: Lotus, water lily etc.

Activity 1

Visit a garden park with your teacher or parents and take along with you, a notebook and a pencil. In the park, you would see a large variety of plants some very small, some with average height and some very tall. These plants differ in their features like shape, size (small/medium/tall) and life span. Observe these features carefully (you may even take help from the Gardner) and note down in the table given below.
Classify these plants in their respective appearance and categories:

Answer:

S.N.	Name of the Plant	Height	Size	Stem	Herb/shrub/tree
1.	Mint	Very small	Small	Green and soft	Herb
2.	Jasmine	Medium	Average	Small and Woody	Shrub
3.	Rose	Medium	Average	Small and woody	Shrub
4.	Rice	Small	Small	Soft and green	Herb
5.	Papaya	Tall	Big	Long and woody	Tree
6.	Neem	Tall	Very big	Thick and woody	Tree
7.	Mango	Very tall	Very big	Thick and woody	Tree

Activity 2

Visit a nearby garden or park. Observe the different types of plants small and large, growing there. If permitted by the care-taker collect samples of as many types of plants as you can by plucking. Be sure that you do not damage the plant and collect only one specimen of each type. Take them to your school and record them according to their categories in your notebook

Answer:

Category of the plants	Part collected	Examples
1. Flowering plants :	Flower	rose, dahlia
2. Non-Flowering plants :	leaves	ferns
3. Herbs :	soft stems	grass, mint
4. Shrubs :	woody stem	china rose, jasmine
5. Trees :	leaves	neem, palm

Activity 3

You will see two parts in gram seed. Each part of the seed in called cotyledon. In maize seed, you will see only one cotyledon. Can you tell which seed among them is monocotyledon and which is dicotyledon ?
Monocot : Dicot

Answer:

Monocot: maize seed Dicot: gram seed

Review Questions

1.Tick (✓) the appropriate answer :

(i) The two main categories of plants recognised on the basis of whether they produce fruits or not:
a) Biennials and annuals
b) Angiosperms and gymnosperms
c) Herbs and shrubs
d) Bryophyta and pteridophyta

(ii) Unicellular organisms with a proper nucleus are known as :
(a) Protista
(b) Monera
(c) Fungi
(d) Algae

(iii) Amoeba belongs to :
(a) Monera
b) Protista
(c) Fungi
(d) Algae

Short Answer Questions

1. Name the categories of the following:

1. Plants which do not have roots, stems, and leaves: **Thallophyta.**
2. Plants with no roots, but have stems and leaves: **Bryophyta or Mosses.**
3. Plants with roots, stems, and leaves, and which bear spore- producing bodies: **Pteridophyta or Ferns.**
4. The amphibians of the plant kingdom mosses **(Bryophytes)**

2. Give two characterists and one example of each of the following:

(i) Algae:
Ans. Example: Spirogyra
(a) these are found in stagnant water of ponds, growing as green scum
(b) they have chlorophyll

(**ii) Fungi:**
Ans. Example: Mushroom
(a) They cannot prepare their food
(b) Most fungi live on dead and decaying organic matter

(iii) Monocot:
Ans. Example: Maize
(a) They have seeds with one cotyledon
(b) Cotyledon usually becomes the embryonic first leaves of a seedling

(iv) Dicot
Ans. (a) They contain two cotyledons in their seed.
(b) They have network like (reticulate) venation in their leaves.
Examples : gram, rose, mango.

(v) Bryophyta
Ans. (a) They have stems and leaves but no roots.
(b) They are non-flowering plants.
Examples : mosses, liverworts.

(vi) Pteridophyta
Ans. (a) They are non-flowering plants i.e. do not produce flowers are seeds. They reproduce through spores
(b) They have feather like leaves divided into leaflets. Example : ferns

(vii) Thallophytes
Ans. (a) These plants do not have roots, stems or leaves.
(b) They are non-flowering plants.
Examples : Bacteria, fungi, algae

3. Differentiate between

(i) Algae and fungi

Algae

1. Usually green having chlorophyll
2. Found in stagnant water of ponds.
3. Are usually Autotrophs e.g. Spirogyra

Fungi

1. Do not have chlorophyll
2. Found on dead and decaying organic matter.
3. Are usually saprophytes. e.g. Bread mould

(ii) Monocot and dicot plants.

Monocot
The plants which contain only one cotyledon in their seeds.
example: Grass, Maize

Dicot
The plants which contain two cotyledons in their seeds.
example: Brinjal, Mango

(iii) Autotrophs and heterotrophs

Autotrophs

1. They can make their own food using solar energy.
2. These include green plants having chlorophyll.

3. They are also called producers.

Heterotrophs

1. They cannot make their own food and depend on autotrophs or other heterotrophs for food.
2. These include animals and non-green plants.
3. They are called consumers.

(iv) bacteria and amoeba

Bacteria

1. Bacteria are one of the smallest and structurally the simplest organisms.
2. Bacteria are unicellular cells
3. They are found every-where air, water, soil, the bodies of humans, plants and animals.
4. They are visible only under a high powered light microscope

Amoeba

1. Amoeba is one of the simplest animals.
2. It is made up of just one single cell.
3. Amoeba is found in ponds, ditches and other places with stagnating water.
4. They can be seen under the microscope only

(v) mosses and ferns
mosses

1. Mosses grow as green, velvety layers in moist places such as damp soil, on the bark of trees, and on damp walls.
2. These plants have stems and leaves, but no roots

ferns

1. Ferns are grown in most of the gardens for their beautiful leaves.
2. They bear well-formed leaves, stems and roots.

(vi) Angiosperms and gymnosperms
Angiosperms

1. These plants bear seeds inside a fruit.
2. Leaves are usually broad.

3. They usually shed their leaves every autumn.
4. Examples: rose, sunflower, sugarcane.

gymnosperms

1. These plants bear naked seeds called cones. Fruit is absent.
2. Leaves are usually needle like. They usually remain green throughout the year. . Examples: Pine, cedar, fir.

4. Match the items given under column I with those given under

Long Answer Questions
(Write the answers in your note book)

Question 1.
What name is given to bacteria found in the root nodules of pea plants ? State their importance.
Answer:
Rhizobium bacteria are found living in the root nodules (small swollen structures on roots) of leguminous plants like the pea, bean etc. These bacteria trap the nitrogen from the atmosphere and convert it into nitrates (mineral salts) which can be easily absorbed by the plants from the soil along with the water. It is observed here that the bacteria provide food to the host plant and the host plant in turn provides shelter for the bacteria. This kind of relationship wherein two organisms live in harmony each benefiting from such a relationship is called symbiosis. The organisms are called symbionts.

Question 2.
Briefly explain four types of bacteria on basis of their shape.
Answer:
There are four common forms of bacteria – coccus, bacillus, spirillum and vibrio.

1. **Coccus form:** These bacteria are spherical or ovoid in shape.
2. **Bacillus form (bacillus : rod)** These are rod-shaped. These may also occur singly or in group of two's or three's, joined end to end in long chains.
3. **Spirillum form:** These are spiral-shaped.
4. **Vibrio form:** These are short, curved, appearing comma- shaped. Chloera bacteria (Vibrio cholerae) are of vibrio type.

Question 3.
Give reasons for the following:
(i) Bryophytes are called amphibians of plant kingdom.
(ii) Amoeba does not have any regular shape.

Answer:

1. Since bryophytes grow on land but need water for reproduction (like frogs in animals), they are called the amphibians of plant kingdom.
2. The body of Amoeba is irregular in shape. The outer covering of the body is the cell membrane. A prominent nucleus lies in the center surrounded by cytoplasm.

Question 4.
What is a contractile vacoule ? State its function in amoeba.
Answer:
Excess of water from the body of the amoeba is collected in the contractile vacuole. Ammonia is soluble in water. Hence, sometimes ammonia is expelled out along with the water from the contractile vacuole.
Function: The contractile vacuole expands when there is water in it and shrinks when the water is released into the surrounding.

Question 5.
List out Jive uses each of bacteria and fungi in our lives.
Answer:
The uses of Bacteria are :

- Lactobacilus bacteria is used for curdling of milk (formation of curd from milk). It converts the milk sugar (lactose) into lactic acid, giving the sour taste to the curd.
- Certain bacteria like Acetobacter ferment fruit juices into vinegar (acetic acid).
- Tanning of leather: Certain bacteria are used in curing of animal hides and skin.
- Retting of fibres: Jute fibres are separated and made softer by the use of bacteria.
- Formation of compost and manure: Cow dung, horse dung and agricultural wastes are subjected to bacterial action which causes their decay and produce very useful manure.

The uses of Fungi are:

- Fungi are an important source of food. Some mushrooms such as Morechella and Agaricus are edible.
- Yeast, a unicellular fungus, is important in bakeries as it is used in the making of bread. It is also important in the breweries for making alcohol.
- Yeast also produces vitamin B.
- Fungi, like bacteria, are also good decomposes. They decompose dead organic matter and return the nutrients back into the soil.
- Penicillin an important antibiotic is obtained from a fungus called Penicillium notatum.

PRACTICE QUESTIONS

A. Select the most appropriate answer.

1. An example of a flowering plant is
a. fern.
b. yeast.
c. Spirogyra.
d. rice.

2. Well-developed roots, stem and leaves are present in
a. bryophytes and algae.
b. algae, bryophytes and angiosperms.
c. algae, bryophytes andgymnosperms.
d. ferns, gymnosperms and angiosperms.

3. Biennials complete their life cycle in
a. two years.
b. one year.
c. three years.
d.ten years.

4. Plants that grow and thrive in water are called
a. mesophytes.
b. hydrophytes.
c. xerophytes.
d. none of these

5. Parasites and saprophytes belong to group
a. autotrophs.
b. xerophytes.
c. heterotrophs.
d. mesophytes.

B. Fill in the blanks.

1. **Algae** are green plants that contain chlorophyll and usually live in stagnant water.
2. The leaves of ferns are called **fronds.**
3. In **gymmosperms**, the seeds are not enclosed in a fruit.
4. Cuscuta is a **parasitic plant.**

C. State if the following statements are true or false. Correct the statement if it is false.

1. Bryophytes grow in dry areas.
   False: Bryophytes grow in moist areas.
2. Pteridophytes grow in damp and shady areas.
   True.
3. Plants that have seeds in cones are called ferns.
   False: Plants that have seeds in cones are called gymnosperms.
4. Dicotyledonous plants have seeds with two cotyledons
   True.
5. Perennial plants continue to grow and produce seeds every year.
   True.

D. Differentiate between

Question 1.
1. gymnosperms and angiosperms
Answer:
Gymnosperms

1. These plants bear naked seeds called cones.
2. They usually have needle like leaves.
3. They usually remain green throughout the year.
4. e.g. Pine, Cycas cedar.

Angiosperms

1. These plants bear seeds enclosed inside a fruit.
2. They usually have normal flat leaves.
3. They usually shed then- leaves every autumn.
4. e.g. Rose, apple, mango.

Question 2.
annuals and perennials
Answer:
Annuals

1. These plants complete their life cycle in one year.
2. These plants germinate, flower and produce seeds within a season.
3. e.g. Maize, wheat, rice.

Perennials

1. These plants live for many years.
2. They continue to grow and produce flowers for many years.
3. e.g. Mango, banyan, neem.

Question 3.
xerophytes and hydrophytes
Answer:
Xerophytes

1. These are plants that grow on dry land like deserts where there is scarcity of water.
2. Leaves are reduced to spines to minimise the loss of water.
3. Roots are long and reach deep layers of the soil.
4. e.g. Cactus, babul

Hydrophytes

1. These plants need maximum water to grow and hence live in water.
2. Leaves have a waxy coating to protect themselves from water.
3. Roots are very reduced as water is available in plenty.
4. e.g. Hydrilla, lotus.

Question 4.
flowering plants and non-flowering plants
Answer:
Flowering plants

1. Flowering plants bear seeds and fruits.
2. They are also called as phanerogams.
3. They are further divided into gymnosperms and angiosperms.
4. e.g. Mango plant, wheat plant.

Non-flowering plants

1. Non-flowering plants do not produce flowers and seeds.
2. They are also called as cryptogams.
3. They are further divided into Bryophyta, Thallophyta and Pteridophyta
4. e.g. Ferns, mosses, mushroom.

E. Write short answers to the following questions.

Question 1.

1. What are cryptogams ?

Answer:

Cryptogams are non-flowering plants which do not produce seeds and flowers. They are further categorised into Thallphyta (Algae, Bacteria, Fungi), Bryophyta (Mosses) and Pteridophyrta (Ferns).

Question 2.

State the groups into which plants are classified on the basis of seed-bearing nature.

Answer:

1. Seed bearing plants are called phanerogams.
2. Non-seed bearing plants are called cryptogams.

Question 3.

What are bryophytes ?

Answer:

Bryophytes are those non-flowering plants which grow on moist land and need water to reproduce. They are also called
the amphibians of the Plant Kingdom, e.g. Mosses, liverworts.

Question 4.

What are characteristics of pteridophytes ?

Answer:

Characteristics of pteridophytes (ferns) are :

1. These are non-flowering plants which do not produce seeds.
2. These plants grow in damp and shady areas.
3. The leaves are feather like and called fronds. (Pteron means feather and phyton means plants). They are divided into leaflets.
4. They reproduce through spores bom on the lower side of fronds in small rounded brown structures called sori.
5. The plants either have underground stems called rhizome or stems above the ground.

Question 5.

Give two important features of angiosperms.

Answer:

Two important features of angiosperms are:

1. They are plants with well-developed roots, stem, leaves and flowers.
2. They produce seeds which are enclosed in a fruit.

Question 6.
What is the basis of classification of plants into flowering plants and non-flowring plants ?
Answer:
The presence or absence of flowers and seeds in a plant forms the basis of classification of plants into flowering plants (Cryptogams) and non-flowering plants (Phanerogams).

Question 7.
Why bryophytes are called amphibians of plant kingdom?
Answer: Since bryophytes grow on land but need water for reproduction (like frogs in animals), they are called the amphibians of plant kingdom.

F. Answer the following in detail.

Question 1.
How are monocots different from each other ? Explain giving examples.
Answer:
Monocots

1. The angiosperms whose seeds have only one part or cotyledon are called an monocots.
2. e.g. Wheat, maize.

Dicots

1. The angiosperms whose seeds have two parts 01 cotyledons are called dicots.
2. e.g. Pea, bean.

Question 2.
Classify plants on the basis of (i) habitats in which they live, and
(ii) time taken to complete their life cycle.
Answer:
(i) On the basis of a place where a plant grows (its habitat), plants are classified into three groups :

1. **Mesophytes:** Plants which grow on land and need moderate amount of water, e.g. Potato, tomato.
2. **Hydrophytes:** Plants that need maximum water to grow and hence live in water. They may be floating or partially/completely submerged.
   e. g.Lotus, Hy dr ilia.
3. **Xerophytes:** Plants that grow on dry land like deserts and need minimum amount of water to live. They have thin and spiny leaves to reduce water loss.
   e.g. Cactus, babul.

(ii) On the basis of time taken to complete their life cycle, plants are divided into three groups :

1. **Annuals:** These plants complete their life cycle in one season in a year.
   e.g. Wheat, rice.
2. **Biennials:** These plants complete their life cycle in two years i.e. in the first year, they bear root, stem and leaves and in the second year, they produce flowers, fruits and seeds.
   e.g. Carrot, radish, turnip.
3. **Annuals:** These plants life for more than two years and bear flowers, fruits and seeds every year. e.g. Mango, Banyan.

Question 3.

Write a short note on gymnosperms.

Answer:

Gymnosperms are plants having naked seeds, i.e., seeds are not enclosed in fruits. The seeds are borne on woody structures called cones, and hence called conifers or coniferous trees. They produce male and female cones for reproduction instead of flowers. Gymnosperms are mostly tall trees growing on mountains. They have well developed roots, thick and woody stems and long needle-shaped leaves. They are evergreen plants.

Examples : Pine, cycas, cedar, Ginkgo, spruce, etc.

Question 4.

How are the herbs, shrubs and trees different ? Give examples.

Answer:

Depending on the size, plants are classified into three groups:

1. **Herbs:** They are very small plants with soft and green stems. Eg. Mint, spinach.
2. **Shrubs:** They are medium sized plants with woody stems. The branches are almost same size arising from the stem immediately above the soil. e.g. Rose, jasmine.
3. **Trees:** Tall plants with a thick, hard and woody stem are called trees. They bear woody branches and leaves at some distance above the ground. e.g. Coconut, mango.

G. Classify the given plants into different categories that are indicated.

Question 1.
Cedar, neem, banana, pine, Cycas, marigold, Petunia, Juniper, fig, orange, Ginkgo into gymnosperms and angiosperms.
Answer:

Gymnosperms	Angiosperms
Cedar, pine	Neem, banana
Cycas, juniper	Marigold, *Petunia*
Ginkgo	Fig, orange

Question 2.
Hydrilla, Opuntia, babul, rose, water lily, lotus, Vallisneria into mesophytes, hydrophytes, xerophytes.
Answer:

Mesophyte	Hydrophytes	Xerophytes
Rose	*Hydrilla*	Babul
	Water lily	*Opuntia*
	Lotus	
	Vallisneria	

Question 3.
Eucalyptus, mint, rose, spinach, neem, radish, tulsi, banana and china rose into herbs, shrubs and trees.
Answer:

Herbs	Shrubs	Trees
Mint	Rose	*Eucalyptus*
Spinach	China rose	Neem
Radish		Banana
Tulsi		

Question 4.
Mango, carrot, poppy, apple, oak, mint, cabbage, radish and turnip into annuals, biennials and perennials.
Answer:

Annuals	Biennials	Perennials
	Carrot	Mango
	Cabbage	Poppy
	Radish	Apple, oak
	Turnip	Mint