

SCIENCE



Semester 2

ZING

Asexual Reproduction in Plants



Aims and Objectives

At the end of the lesson, the students will be able to -

- Understand the term 'reproduction' and its importance.
- Identify different modes of reproduction in plants.
- Differentiate between sexual reproduction and asexual reproduction in plants.
- Learn about in natural methods of asexual reproduction in plants.
- Know about the artificial methods of asexual reproduction in plants.
- Acquire knowledge on advantages of asexual reproduction in plants.
- Gain knowledge on disadvantages of asexual reproduction in plants.

Lesson based Words to be Taught

- **Mode** : a way or manner in which something occurs or is done
- **Horticulturist** : an expert in garden cultivation and management
- **Propagation** : the breeding of specimens of a plant by natural processes from the parent plant
- **Buds** : a compact growth on a plant that develops into a leaf, a flower or a shoot
- **Node** : the part of the stem from which one or more leaves

emerge

- **Tissue** : specialized cells of which animals or plants are made
- **Stock** : the plant that is selected for its roots in grafting
- **Scion** : the plant that is selected for its stem in grafting
- **Endangered** : a species seriously at risk of extinction
- **Diversity** : a range of different things
- **Deficiency** : a lack or shortage of something
- **Elimination** : the complete removal of something
- **Auxin** : a plant hormone that regulates growth in plants
- **Agar** : a thick, clear substance that comes from seaweed, used for growing organisms such as bacteria in scientific work, and also for making liquids thicker

Stage 1: Recap of previous knowledge through the 'Reflect' segment given in the textbook

Make the children do the 'Reflect' activity on page no. 41. After completing this activity, the students will be able to recollect the different parts of the plant that store food.

Ask the students questions related to different vegetables and stored food in them.

- Give examples of plants that store food in leaves.
- Name some plants that store food in roots.
- Find out the plants that store food in the stems.
- Name few plants that store food in fruits.

Stage 2: Concepts-stepwise + Activities for teaching these concepts

Concept 1: Reproduction and its importance

Have a discussion with the students on how all living organisms (human beings, animals, birds and insects) reproduce and have young ones. Explain the term 'reproduction' in which new organisms are generated. Explain that, similarly, the plants also reproduce new baby plants. Then, introduce the types of reproduction in plants.

Give information on the two ways plants reproduce – Asexual reproduction and sexual reproduction. Explain them that asexual reproduction involves one parent plant only. Bring pictures of bryophyllum, potato and carrot plants and explain how they grow from leaves, stem or roots.

Explain the term 'flowering plants' and give information about how flowers help in producing fruits and seeds. Bring pictures of some plants like beans, tomato and watermelon to show them examples.

Conclude that, there are two types of reproduction in plants - Asexual reproduction and sexual reproduction.

Concept 2: Natural methods of asexual reproduction in plants:
Reproduction through roots

Begin the session by an activity 'Detached carrot'. Instruct the students to get a carrot to the class. Ask them to cut the top portion of the carrot (under the supervision of a teacher). Make them plant it in the school ground. Make them record their observations daily.



After a few days, a new plant will grow from the detached carrot. Conclude by informing that the carrot has reproduced through roots. It is a natural method of asexual reproduction through roots in plants.

Concept 3: Reproduction through underground stems

Begin the session by an activity 'Forgotten potato'. Instruct the students to get few potatoes. Ask them to place the potatoes in a paper bag and leave them in a cupboard. Inform them that in a few days time, the potatoes will begin sprouting roots.

Explain to the students that this is an example of asexual reproduction in plants.

Mention the three types of reproduction through underground stems.

- Tubers: Describe the process of reproduction in tubers with suitable examples.
- Rhizomes: Mention the process of reproduction in rhizomes with suitable examples.
- Bulbs: Explain the process of reproduction in bulbs with suitable examples.

Conclude by reinforcing asexual reproduction through underground stems and they are classified into 3 types.



Concept 4: Reproduction through sub-aerial stems

Bring grasses and mint plants with roots to the class. Show the node and buds in the grasses. Similarly show the horizontal roots of mint plants. Mention the differences between runners and suckers.



Ask the students to cite few more examples.

Conclude by reinforcing the two types of reproduction through sub-aerial stems.

Concept 5: Reproduction through leaves

Stimulate students' curiosity by bringing leaves of bryophyllum to the class.

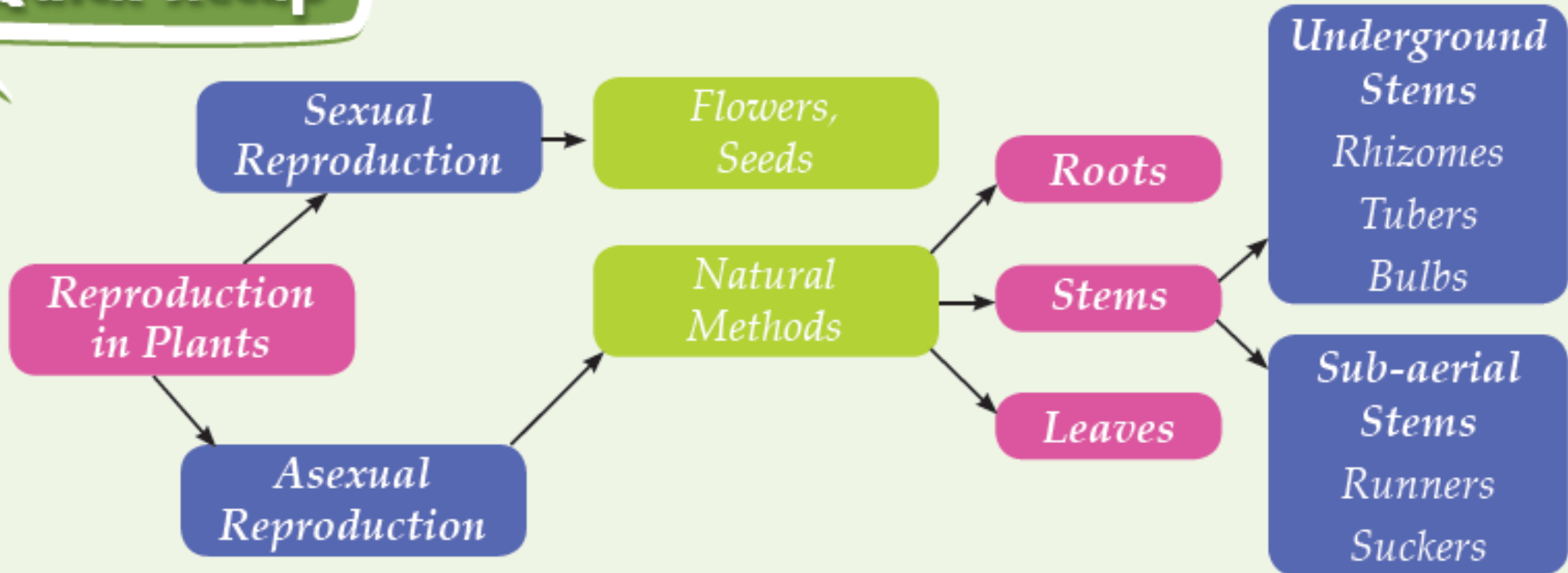
Ask them to observe the leaves and buds on the margin of the leaves.

Encourage them to discuss about the buds on the leaves that they have seen and inform them that when these buds fall on moist soil, they develop into small plantlets.

Conclude that plants are able to generate a new plant from just a small piece of leaf or leaf buds.



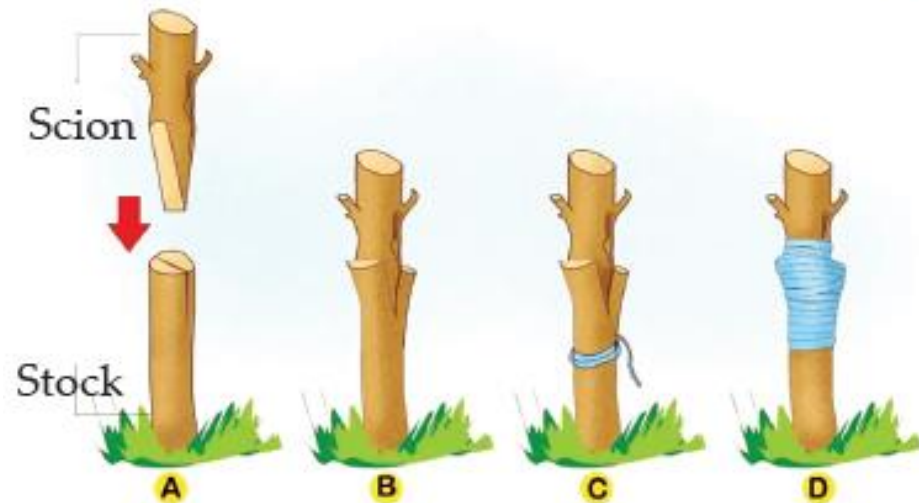
Quick Recap



Concept 6: Artificial methods of asexual reproduction in plants
Explain that artificial methods of asexual reproduction are used by farmers and horticulturists to produce healthier crops with more desirable qualities.

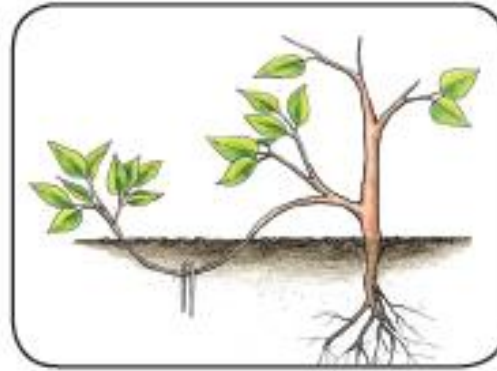
Mention the four types of artificial methods of asexual reproduction in plants.

- Cutting: Describe the process of cutting with suitable examples.

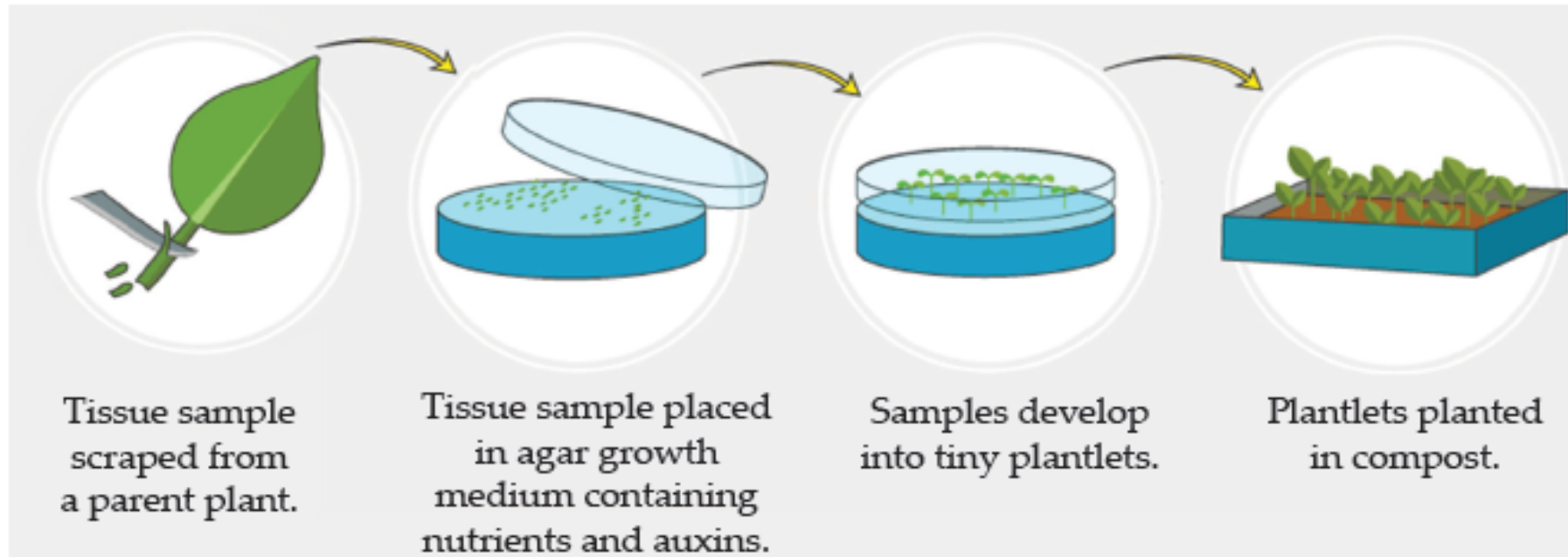


- Grafting: Brief the method of grafting with suitable examples.

- Layering: Explain the process of layering with suitable examples.



- Tissue culture: Mention the process and benefits of tissue culture with suitable examples.



Conclude by reinforcing the important types of artificial methods of asexual reproduction in plants.

Concept 7: Advantages and disadvantages of asexual reproduction in plants

Conduct debate on the advantages and disadvantages of asexual reproduction in plants.

After the completion of the debate, instruct one group to mention the advantages of asexual reproduction in plants and the other group to mention the disadvantages of asexual reproduction in plants.

Conclude by encouraging the students to collect more information about asexual reproduction in plants and share the information to the class on a specified date.

Other Segments:

While explaining the lesson, ensure that the students –

- Go through the 'Quick recap' segments to revise what they have learnt.
- Know interesting additional information in the 'Fact Quest' segments.
- Try to think or research and answer the questions given in the 'Find out' segments.
- Learn about the relevant issue given in 'Ponder' segment, and discuss and share their views.
- Do the activities in the 'Real time activity' segments to gain practical knowledge.
- Go through the words and their meanings in the 'Word Wizard' segment to improve their vocabulary.
- Go through the 'Navigator' to recap what they have learnt in the lesson.

Stage 3: Evaluation

Ask the students the following questions to revise the information that they have learnt -

- Define the term reproduction.
- Differentiate between sexual reproduction and asexual reproduction in plants.
- What are the two types of asexual reproduction in plants?
- Name the different ways in which plants self propagate.
- Differentiate between runners and suckers.
- Explain asexual reproduction through roots in plants.
- What are the three main ways of reproduction through underground stems?
- Name the different methods of artificial asexual reproduction in plants.

- Describe the method of reproduction through leaves in plants.
- Mention the advantages and disadvantages of asexual reproduction in plants.

Ask the students to complete the exercises given behind the lesson.

Key

Find Out

Broccoli – flower

Beetroot – root

Spinach – leaves

Potato – Underground stems

Green peas – seeds

Cabbage – leaves

Find Out

A stolon is also called a runner. It is a slender stem that grows horizontally along the ground, giving rise to roots and aerial branches at specialized points called nodes.

Test Your Knowledge

I. Choose the correct option.

1. When parts of two different plants are joined together to grow as a single plant, the method is called _____. (b)
a) cutting b) grafting c) layering d) tissue culture
2. Mint is an example of a _____. (b)
a) tuber b) sucker c) rhizome d) bulb
3. Scion is a part of _____ method. (d)
a) tissue culture b) cutting c) layering d) grafting
4. _____ is an artificial method of asexual reproduction. (d)
a) Rhizome b) Tuber c) Bulb d) Tissue culture
5. When a leaf of a bryophyllum plant falls on moist soil, the _____ grow into new plants. (a)
a) leaf buds b) flowers c) fruits d) roots

II. Write 'T' for the true statements and 'F' for the false ones.

1. The process by which a plant reproduces through seeds is called asexual reproduction. (F)
2. In asexual reproduction, flowers are required. (F)
3. Ginger is a tuber. (F)
4. A fleshy underground stem that grows horizontally below the surface of the ground is called a rhizome. (T)
5. Runners have long stems which grow vertically. (F)

III. Give two examples for each of the following.

1. Rhizomes - **turmeric, bamboo**
2. Tubers - **potato, yam**
3. Bulbs - **onion, tulip**
4. Runners - **grass, strawberry**
5. Suckers - **mint, chrysanthemum**

IV. Fill in the blanks.

1. The roots of sweet potato can give rise to new plants.
2. Cutting method is used for propagation of rose plants.
3. Reproduction happens through leaves in a begonia plant.
4. A potato has buds on its surface called eyes.
5. In the process of grafting, two plants namely, a stock and a scion are used.

V. Match the following.

- | | | |
|-----------------|-------|--------------|
| 1. Bryophyllum | (b) | a) Runner |
| 2. Strawberry | (a) | b) Leaf buds |
| 3. Turmeric | (e) | c) Root |
| 4. Sweet Potato | (c) | d) Bulb |
| 5. Onion | (d) | e) Rhizome |

VI. Answer the following questions in brief.

1. What is vegetative propagation?

A. The process by which plants produce new plants through their vegetative parts, like roots, stems and leaves is known as vegetative propagation.

2. What are the types of underground stems? Give one example for each.

A. There are three types of underground stems -

Tubers: They are fleshy enlarged structures in some plants.

Example: Potato.

Rhizomes: They are fleshy underground stems in some plants. Example: Ginger.

Bulbs: They are thick and short underground stems that contain abundant reserve food. Example: Onion.

VI. Answer the following questions in brief.

3. How does bryophyllum reproduce?

A. In bryophyllum plants, buds develop in the margins of their leaves. When the leaf falls on moist soil, these leaf buds develop into small plants.

4. Define the terms - scion and stock.

A. The plant that is selected for its roots in grafting is called the stock.

The plant that is selected for its stems, leaves, flowers or fruits in grafting is called the scion.

5. List any two advantages of asexual reproduction in plants.

A. The advantages of asexual reproduction in plants are

- A large number of plants can be produced within a short period.
- We can facilitate the growth of rare and endangered plant species.

VII. Answer the following questions in detail.

1. What are the natural methods by which plants reproduce asexually?

A. The natural methods by which plants reproduce asexually are - **Reproduction through roots, underground stems, sub-aerial stems and leaves.**

- Some roots when detached from the parent plant can grow into new plants.
E.g. Sweet potato, dahlia.
- Underground stems like tubers, rhizomes and bulbs reproduce asexually.
- Sub-aerial stems like runners and suckers also reproduce asexually. Runners have buds in their nodes which grow into new plants. E.g. Strawberry. Suckers grow horizontally below the surface of the ground and then turn upwards to produce new plants. E.g. Mint plant.
- In some plants, buds develop in the margins of their leaves that form new plants.
E.g. Begonia.

VII. Answer the following questions in detail.

2. What are the artificial methods by which plants reproduce asexually?

A. The artificial methods of asexual reproduction in plants are –

Cutting: A part of a plant is cut along with a node and is buried in the soil. E.g. Rose and sugarcane.

Grafting: Healthy parts of two different plants are joined together in such a way that they continue to grow as a single plant. It is mostly used for trees and shrubs.

Layering: A stem still attached to the parent plant is placed in contact with moist soil, it to grow roots. E.g. Grapes and jasmine.

Tissue Culture: A new plant is grown from a single cell from any part of a plant.

Explore

Research and find out what type of propagation is used for the following plants.

Banana: It is propagated by rhizomes and suckers. Now-a-days banana plants are also propagated through tissue culture.

Cactus: Cactus are propagated by stem cuttings

Money plant: Money plant is propagated through stem cuttings.

Aloe vera: Aloe vera propagates from offsets or “pups”.

Curry leaves: Curry leaves grow from cuttings or seeds.

Science in Action

Instruct the students about the procedure of growing kitchen garden. Make them note down their daily observations.

Life Skills

Conduct a group discussion on the topic ‘Benefits of planting trees’. Create awareness about the importance of plants and trees.

Assessment Spot

I. Use the words given in the help box to name the type of root or stem.



runner



rhizome



bulb



tuber

II. Unscramble the letters given in the brackets to fill in the blanks.

1. Bulbs are found in tulips. (lutpis)
2. Asexual reproduction through roots is found in dahlia. (dlihaa)
3. Bamboos are rhizomes. (hirmoezs)
4. Leaf buds are found in begonia. (ongbiae)
5. Stem cuttings are found in sugarcane. (cgunasaer)

III. Rewrite the given statements correctly by replacing the words underlined.

1. A potato is a rhizome that grows below the surface of the ground.

A potato is a tuber that grows below the surface of the ground.

2. In asexual reproduction, flowers are required.

In sexual reproduction, flowers are required.

3. Suckers are thin, long stems which usually grow horizontally above the ground.

Runners are thin, long stems which usually grow horizontally above the ground.

4. The stock is the upper part in grafting method.

The scion is the upper part in grafting method.

5. A ginger is a bulb that grows horizontally.

A ginger is a rhizome that grows horizontally.

