Teacher Packs in Experimental Science

Bio Pack 3

Asexual Reproduction in Plants

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Curriculum areas covered:

Year 1, Semester1, Unit 4.1 of Diploma in Basic Education Biology Curriculum for designated Colleges of Science and Mathematics in Ghana

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Title: Asexual Reproduction in Plants

Target Group: Diploma in Education Students

Also suitable for: Senior High School Students

Duration: 40 minutes plus discussion time

Learning outcomes:

These are the learning outcomes expected after students have gone through this Pack

1. **Knowledge and Understanding**:

   KN1 Identify vegetative parts of plants (bulbs, corms, rhizomes, tubers, runners, suckers, leaves, stem cuttings) with features that enable them to reproduce or multiply without the use of seeds.

2. **Cognitive skills:**

   CS1 Describe the features that make the vegetative part of the plant reproductive
   CS2 Explain how the vegetative part accounts for the survival of the plant
   CS3 Apply knowledge and understanding of this process in crop production

3. **Key skills:**

   KS1 Observing
   KS1 Describing
   KS3 Recording observations

4. **Practical skills:**

   PS1 Do critical observation and make a labelled drawing of a modified plant organ (e.g. corm, bulb, sucker etc.) that is used for vegetative reproduction.
   PS2 Propagate different vegetative parts of plants bulbs/suckers/rhizomes/tubers/stem cuttings.
   PS3 Record observations made in vegetative propagation of plants.

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A. Teachers' Guide

Introduction

This pack is to introduce students to a study of how plants reproduce asexually by vegetative propagation.

Equipment/ materials

Ensure that the following are made available for the activity to commence

- Rhizomes e.g.; ginger, canna lily
- Corm e.g.; cocoyam, *Colocasia* sp.
- Leaves of *Bryophyllum*
- Suckers e.g.; plantain, banana
- Bulb e.g.; onions, garlic, spider lily
- Soil sample / prepared field
- Knife
- Water

Experimental Procedure

1. Let students examine the external features of a bulb of onion, a rhizome of ginger, a corm of cocoyam and a sucker of plantain.
2. Let students display, draw and label each specimen to show the external features.
3. Instruct students to use a knife to cut an onion longitudinally into two halves and observe the internal features.
4. Let students:
    a. Break off pieces of a rhizome of ginger so that each piece has a number of buds.
    b. Prepare beds of fertile soil and bury the pieces 3-4 cm deep.
    c. Water beds them regularly and note how long it takes for buds to sprout.
    d. Do same for corms, suckers and bulbs.

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Sample Assessment Questions with Answers

1. Name the parts of the flowering plant that have been modified for reproduction.
   (Answer: the stem, roots and leaves)
2. Distinguish between a corm, a rhizome, a bulb and a runner
   (Answer: A corm is a short swollen underground stem which grows either vertically or diagonally in the ground. A rhizome is an underground stem that grows horizontally and parallel to the ground or the growing medium; a bulb is a reduced underground stem which has its leaves swollen with stored food; a runner is a horizontally growing stem near or on the surface of the ground/growing medium).
3. How are the modified plant parts adapted for vegetative reproduction?
   (Answer: In the case of corms, rhizomes, and bulbs, they have stored food in their stems and leaves that are used to nourish buds during favourable conditions. Adventitious roots also develop to conduct water to the newly developing young plant).
4. How will you propagate a stem of sugar cane?
   (Answer: The sugar cane has buds at the nodes and when the stem is cut in pieces, each piece must necessarily have a bud or two. Once the cutting is fully or partially buried in the ground, the buds sprout, under favourable conditions)

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B. Students' Guide

Background

Several flowering plants have adaptations that allow them carry out vegetative propagation. Most adaptations involve modifications of stems. Some of these are rhizomes, corms, bulbs and suckers. The modified plant parts possess features such as scaly leaves, buds and adventitious roots. The terminal and lateral buds of these plants sprout and produce new shoots under favourable conditions. The shoots formed from lateral buds develop adventitious roots and may eventually become detached from the parent.

Experimental Procedure

1. Examine the external features of a bulb of onion, a rhizome of ginger, a corm of cocoyam and a sucker of plantain.
2. Draw and label each specimen to show the external features.
3. Use a knife to cut an onion longitudinally into two halves and observe the internal features.
4. Break off pieces of a rhizome of ginger so that each piece has a number of buds. Prepare beds of fertile soil and bury the pieces 3-4 cm deep. Water regularly and note how long it takes for the buds to sprout. Do the same for corms, suckers and bulbs.

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C. Assessment – Students' Sheet

1. Name the parts of the flowering plant that have been modified for reproduction (KN1)

2. Distinguish between a corm, a rhizome, a bulb and a runner (KN1)

3. How are the modified plant parts adapted for vegetative reproduction? (CS1)

4. How will you propagate a stem of sugar cane? (CS3, PS2)

D. Extensions to the Experiment

This knowledge can be used for the propagation of plants, and also in food production.

E. Useful Links

Mensah, S. K. (1992) *Source Book for Science Teachers (Biology)*. Cape Coast: Institute of Education

F. Health and Safety

Wash your hands with soap after all the activity.

G. Evaluation

What is your impression about the pack?
What would you like to be changed or introduced into the activity?