

Teacher Packs in Experimental Science

Bio Pack 8

Types of Fruits and Placentation

Pack contents:

- A. Teachers' Guide
- B. Students' Guide
- C. Assessment – Student's sheet
- D. Extensions to experiment
- E. Links to other packs
- F. Health and Safety
- G. Evaluation pack

Curriculum areas covered:

Year 1 Semester 1 Unit 4.2 of Diploma in Basic Education Biology Curriculum for designated Science and Mathematics Colleges of Education in Ghana.

Title: Types of fruits and their placentation

Target group: Diploma Students

Also suitable for: Senior high school students

Learning outcomes:

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

1. Knowledge and understanding

KN1 Explain what placentation is in a fruit

2. Cognitive skills

CS1 Identify different types of placentation in fruits

CS2 Differentiate types of fruits

3. Key Skills

KS1 Observing

KS2 Drawing

KS3 Comparing

KS4 Dissecting

4. Practical skills

PS1 Dissect different fruits to show their placentation.

PS2 Make labeled drawings of the types of placentation.

PS3 Examining floral parts and making comparisons

A. Teacher's Guide

This pack is to introduce students to different types of fruits and different types of placentation in fruits

- Provide a variety of fruits in class.
- Provide students with hand lens, if available
- Each student should have a sharp knife and a cutting board.
- They should also take into consideration the seed arrangements of the fruits they would work with. Some fruits have seed arrangements that can be clearly seen when cut longitudinally and others in transverse section. Use Fig 1 as a guide.

Sample Assessment Questions

- What are the recognizable differences between a seed and a fruit?
(Answer: A seed has one scar of attachment to the placenta while a fruit has two scars: the scar of attachment to the style and scar of attachment to the flower stalk.)
- Distinguish between simple fleshy fruits and simple dry fruits. Give an example of each type.
- What are aggregate and multiple fruits?
(Answer: Aggregate fruit composed of mature ovaries from separate pistils of one flower e.g. raspberry while a multiple fruit is one formed from a cluster of flowers (called an *inflorescence*) e.g. pineapple.)
- Classify the list of fruits below into various categories of fleshy fruit :
Tomato, Eggplant, Guava, Chili pepper, Banana, Avocado, Grape, Pumpkin, Gourd, Cucumber, Water melon, Lemon, Lime, Grapefruit, Green bean, Apple, Orange, Tangerine, Mango, Pawpaw, Pineapple.

(Use any literature or the internet to find information on the fruit which might not be familiar to you).

B. Students' Guide

Background Information

A fruit is a ripened ovary. The ovule in an ovary is fertilized after a process known as pollination. The ovule develops into a **seed** and the ovary wall, **pericarp**, may become **fleshy** (as in **berries** or **drupes**), or form a hard outer covering (as in **nuts**). In some cases, the sepals, petals and/or stamens and style of the flower fall off. Fruit development continues until the seeds have matured. With some multi-seeded fruits, the extent to which the flesh develops is proportional to the number of fertilized ovules. The wall of the fruit, developed from the ovary wall of the flower, is called the **pericarp**. The **pericarp** is often differentiated into two or three distinct layers called the **exocarp** (outer layer -also called epicarp), **mesocarp** (middle layer), and **endocarp** (inner layer).

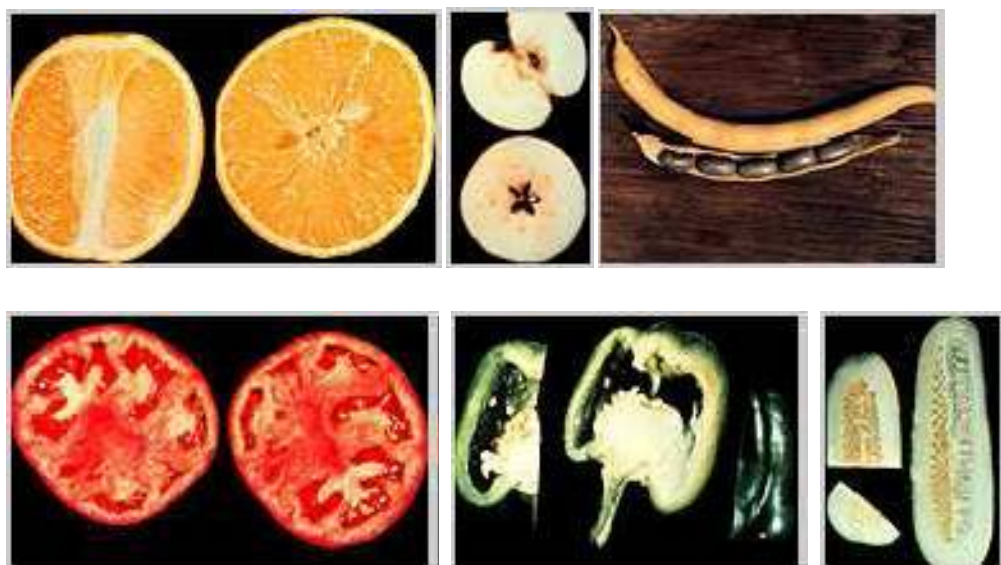


Fig 1. Different types of fruits showing various forms of seed arrangements.

There are three basic types of fruits:

- **Simple fruit**

Simple fruits can be either dry or fleshy and result from the ripening of a simple or compound ovary with only one pistil. Dry fruits may be either dehiscent (opening to discharge seeds), or indehiscent (not opening to discharge seeds).

- **Aggregate fruit**

Aggregate--fruit composed of mature ovaries from separate pistils of one flower.

- **Multiple fruit**

A multiple fruit is one formed from a cluster of flowers (called an *inflorescence*). Each flower produces a fruit, but these mature into a single mass.

Placentation Types

Placentation refers to the pattern of attachment of ovules within the ovary (see Fig. 2).

- Marginal--ovules arranged along the suture of a single, simple pistil (cross-section)
- Axile--a separate locule for each carpel and the ovules attached to placenta in the middle where the septa come together (cross-section)
- Parietal--ovules attached to the wall of a unilocular ovary (cross-section)
- Free-central--ovules attached to a peg or stalk that arises from the ovary floor but which does not reach the roof; ovules usually few to many (long-section)
- Apical--ovules attached to the roof of the ovary (long-section)
- Basal--ovules attached to the floor of the ovary (long-section)

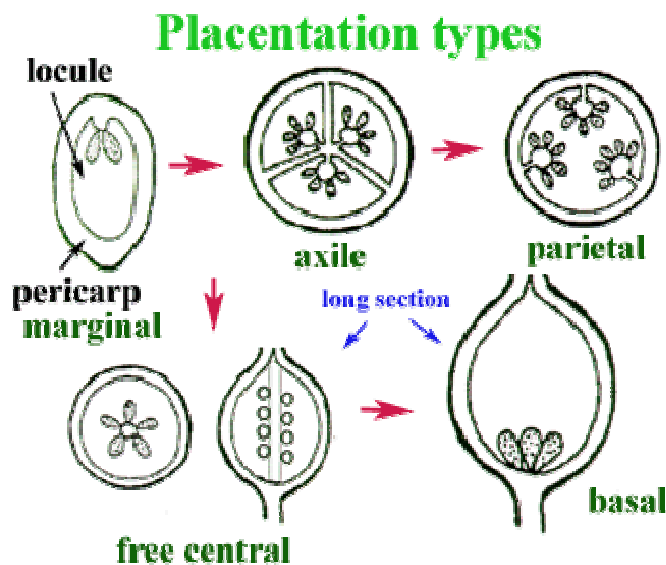


Fig 2. Different types of placentation in fruits.

Equipment/ Materials

- Razor blade/sharp knives
- Hand lens
- Cutting board
- Variety of fruits.

Other requirements

A sketch book, Notebook, Pens and pencils for drawing and taking notes, Eraser.

Experimental Procedure I

1. Collect different types of fruits common in your locality such as tomato, orange, pineapple, apple, groundnut, okro, pepper etc.
2. Examine them carefully.
3. Using a sharp knife, cut each fruit into two halves.
4. Classify the fruits according to the type of placentation they have. Use Fig 2 as a guide.
5. Draw and label one half of each fruit (ls or xs).

Reflection on the Experiment

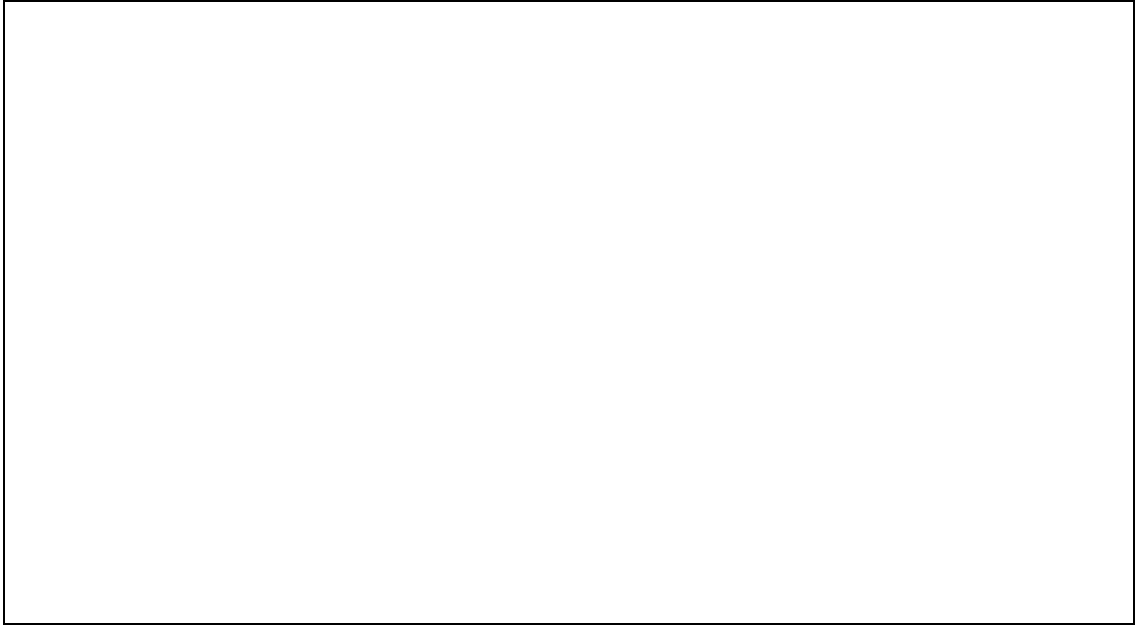
Take some time to reflect on the activity carried out.

What are the main functions of fruit?

C. Assessment – Student's sheet

On completion of the experiment, you should answer the following questions:

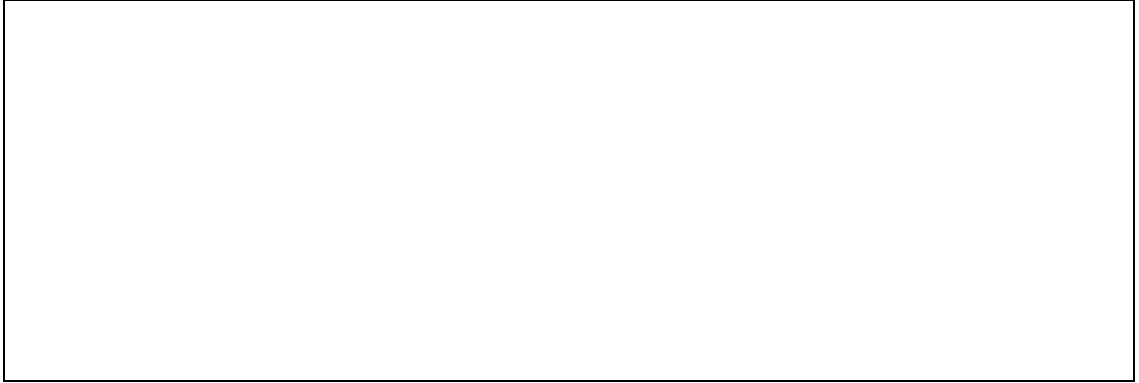
1. What are the recognizable differences between a seed and a fruit?



2. What are (a) an aggregate fruit and (b) a multiple fruit? (CS2)



3. Distinguish between simple fleshy fruits and simple dry fruits. Give an example of each type (CS2).



D. Extensions to experiment

Discuss fruit and seed dispersal

E. Useful links

Nyavor, C.B. and Seddoh, S. (2006). *Biology for Senior Secondary Schools*. Accra: Unimax Macmillan Publishers Ltd.

F. Health and Safety

Students should be careful in using sharp knife so that they don't hurt themselves.

Students who are allergic to pollen should wear a nose mask when handling flowers.

You are also responsible for your immediate working area! At the end of the activity, ensure that your bench space is clean and free of plant material.

G. Evaluation

What don't you like about the pack?

What would you like to be included to make the pack more interesting and useful?