

| WEEK<br>S | TOPICS                                                                                           | Learning Objectives: By the end of the lessons, students should be able to:                                                                                         |
|-----------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | Revision of last term's work / Reproductive system in flowering plant structure and functions    | Describe the structure of a flower with a well labelled diagram , match the parts with their function, justify the mechanism of flowering plants with examples      |
| 2         | Pollination in plants , types of pollination, features and cross pollinated                      | Meaning and describe the types of pollination, distinguish between wind and insect, explain the fertilization and process of development in flowering plants        |
| 3         | Fruits , types of fruits , classification , structures of fruits agents of dispersal , practical | Describe the structure of a typical fruit, explain the various classification of fruits, distinguish between fruits and seed name the different agents of dispersal |
| 4         | Habitat , definition, aquatic , marine, characteristics                                          | Define habitat, explain the various zones in marine habitat, construct food chain in the marine habitat                                                             |
| 5         | Estuarine habitat, characteristics , types, distribution of plant and animals                    | Describe Estuarine habitat, outline the characteristics, name the two types, explain the energy in the fresh water habitat,                                         |
| 6         | Terrestrial Habitat                                                                              | Recognise types of marshes, give examples, characteristics                                                                                                          |
| 7         | Mid-term break                                                                                   | Mid-term break and Test / OPEN DAY                                                                                                                                  |
| 8         | Grassland , characteristics, types , distribution of plant and animals in grassland              | Define grassland, state the adaptation of plant and animal in grassland communities, describe the characteristics of grassland                                      |
| 9         | Ecology of population , ecology of succession                                                    | Explain, describe process, outline the characteristics , discuss how living organisms adapt                                                                         |
| 10        | Food shortage , meaning, causes , effects                                                        | Define food shortage , outline the government efforts to reduce food shortage, explain the effect of food shortage                                                  |
| 11        | REVISIONS                                                                                        | REVISIONS                                                                                                                                                           |
| 12        | REVISION                                                                                         | REVISIONS AND FINAL EXAMINATION                                                                                                                                     |
| 23        | EXAMINATION                                                                                      | FINAL EXAMINATIONS                                                                                                                                                  |

**REFERENCES**

UNIFIED SCHEME OF WORK

**WEEK:** 1      **DAY:**      **SUBJECT:**  
**DATE:**      **TOPIC:**  
**SUBTOPIC:**      **PERIODS:**      **DURATIONS:**  
**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Structures and Functions of the Reproductive Organs in Plants
2. Arrangement of Reproductive Organs in Plants
3. Types of Flowers
4. Kinds of Placentations

**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: REPRODUCTIVE SYSTEM IN FLOWERING PLANT**

**STRUCTURES AND FUNCTIONS OF THE REPRODUCTIVE ORGANS IN PLANTS**

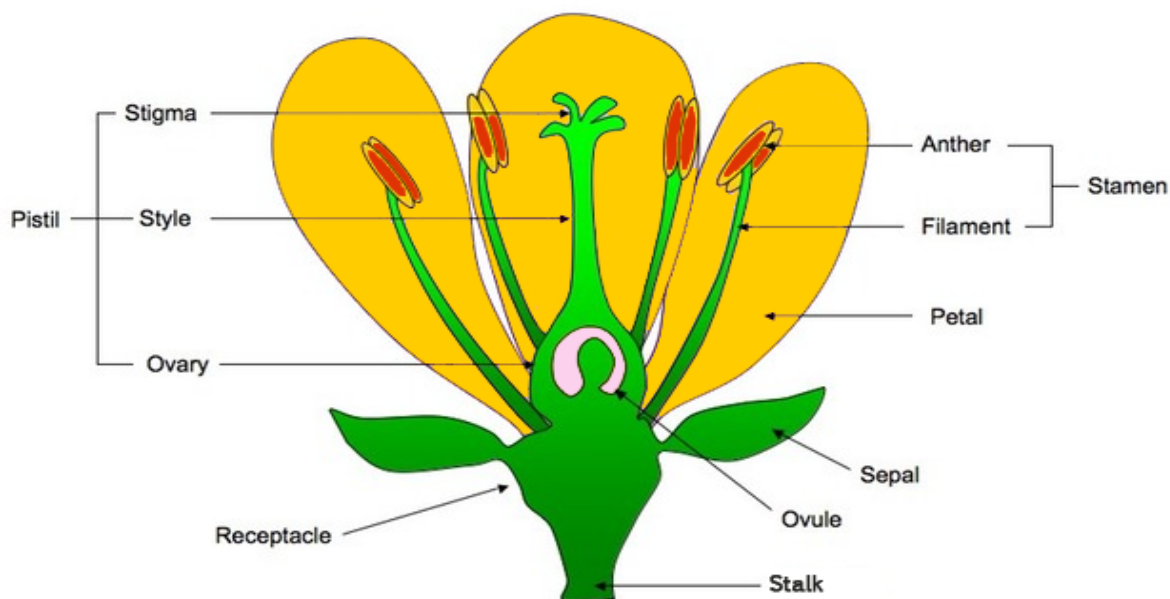
The flower is the reproductive structure of a flowering plant. It has both male and female sex organs hence it can carry out sexual reproduction. After fertilization has taken place in flowers, seeds are produced.

A flower has two major parts:

- ❖ The floral part (whorls)
- ❖ The flower stalk (pedicel).

The floral part of the flower is formed by

- ☐ calyx (sepals)
- ☐ corolla (petals)
- ☐ androecium (stamens)
- ☐ gynoecium (carpels)



**Parts of a flower**

## PARTS OF A TYPICAL FLOWER

### THE CALYX

The **calyx** consists of sepals which are usually small and green. They protect the flower present in the bud. Sepals are usually up to 3-5 in numbers and they may be separated (polysepalous) or joined to form a cup (gamosepalous). Epicalyx may be present e.g in hibiscus flower.

### THE COROLLA

The **corolla** consists of petals inside the sepals. Petals are the attractive part of the flower and could be up to 4-10 and may be separated (polypetalous) or joined to form a tube (gamopetalous). They are generally coloured and scented to attract pollinators (e.g insects)

### THE ANDROECIUM

The **androecium** is the male reproductive organs of a flower. It is a group of stamens which consist of two parts –the filament and anthers. Stamens could be up to 3 or more (free or joined together). The anther is a 2-4 lobed structure producing the pollen grains (fine yellowish particles) which in turn produce the male gamete in flowers. At maturity, the anther lobes open to release the pollen grains.

### THE GYNOECIUM

The **gynoecium** is the female reproductive organ of a flower. It is the inner most floral part of the flower. Gynoecium consists of carpels which may be one or many. Carpels may be separate (**monocarpous**) e.g flamboyant or may be fused (**polycarpous**) e.g. hibiscus. A Pistil or carpel consists of three parts, they are ovary, style and stigma.

The ovary contains ovule which produces the female gamete. After fertilization, the ovary develops into fruit while the ovule develops into seed.

## TYPES OF OVARY

1. Superior Ovary- when it is above other floral parts and such flower is called hypogynous flower e.g. hibiscus
2. Inferior Ovary- when it is below other floral parts such flower is referred to as epigynous flower e.g. sunflower.
3. Half inferior Ovary- when the ovary is at the same level with other floral parts, such is called perigynous ovary e.g. rose flower.

## EVALUATION

1. Describe the male reproductive parts of a flowering plant.
2. Explain the different types of ovary.

## TYPES OF FLOWER

Generally, flowers differ in the following

- ☐ number of floral parts
- ☐ colour of petals
- ☐ size and shape
- ☐ symmetry
- Flowers can be radially symmetrical/regular (actinomorphic) or irregular (zygomorphic).
- A complete or perfect flower, when all the four floral parts are present, or imperfect or incomplete flower if one or more of the floral parts are absent.
- Position of the ovary (hypogynous, epigynous or perigynous flowers).
- If flowers occur singly (solitary flower) or in group (inflorescence).
- If flowers are born in axils of leaves (axillary) or at the end of the stem or branches (terminal flowers).

## EVALUATION

1. Classify flowers based on a) number of floral parts b) position of the ovary
2. List the factors to consider when classifying flowers.

## SEXES IN PLANTS

Most flowers are bisexual i.e. they have both stamens and carpels while a few are unisexual (either male or female). Therefore, a plant can be **monoecious** (when both male and female flower occur on the same plant e. g. maize or **dioecious** (when male and female flower are found on different plant e. g. pawpaw).

## PLACENTATION

This is defined as the arrangement of the ovules within the ovary of a flower. The ovules are attached to the ovary by fleshy structures called placenta through short stalks called funicles.

## TYPES OF PLACENTATION;

1. **Marginal placentation:** Ovule are arranged at the margin of the ovaries e.g. beans, flamboyant flowers

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2. **Parietal placentation:** Ovules are arranged to the side of the ovary or within a single chamber or cavity e.g. pawpaw.
3. **Free central placentation:** Ovules are born on a knob projecting from the base of the ovary e. g. water lily.
4. **Axile placentation:** Carpels meet at the centre to form the placenta for attachment of ovules e.g. tomatoes
5. **Basal placentation:** Ovules are attached to the base of ovule e. g. sunflower.

## GENERAL EVALUATION

1. With a well labeled diagram describe the structural make up of a flower.
2. With an example each state and explain the types of ovary.
3. List the four floral parts of a flower and their functions.
4. Classify flower based on sexes.
5. What is placentation?
6. Describe five types of placentation and give one example in each case.

## READING ASSIGNMENT

College Biology, chapter 16, pages 305-324

## WEEKEND ASSIGNMENT

### SECTION A

1. The reproduction structural part of the flower include the following except A. corolla B. androecium C. gynoecium D. stigma
2. A flower having both male and female flowers on the same plant is referred to as A. monoecious flower B. dioecious flower C. hypogynous flower D. axillary flower.
3. An example of flower possessing half inferior ovary is A. hibiscus B. sun flower C. rose flower D. flamboyant
4. The arrangement of ovules in the ovaries is referred to as A. pollination B. placentation C. fertilization D. solitary
5. An example of axile placentation is found in A. sunflower B. lily C. pawpaw D. tomato

### SECTION B

1. With the aid of diagrams, distinguish between a monocarpous ovary and a syncarpous ovary.
2. Describe five types of placentation and give one example in each case.

**WEEK:** 2 **DAY:** **SUBJECT:**

**DATE:** **TOPIC:**

**SUBTOPIC:** **PERIODS:** **DURATIONS:**

**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Definition
2. Pollination in plants
3. Features of self and cross pollinated flowers
4. Agents of pollination

## KEY VOCABULARY WORDS:

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

## CONTENT: POLLINATION IN PLANTS

## DEFINITION

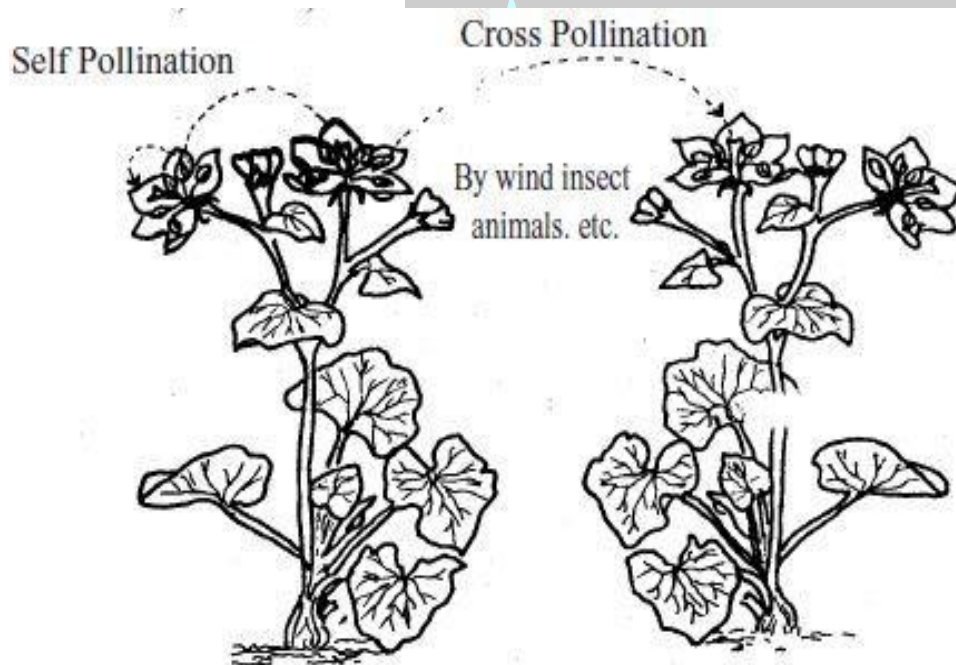
This is the transfer of mature pollen grains from the anther of one flower to the mature stigma of the same or another flower of the same plant or another plant of closely related species. Pollination usually precedes fertilization. There are two types of pollination namely; self pollination and cross pollination

## SELF POLLINATION

This is the transfer of mature pollen grain from the anther of a flower to the stigma of the same flower or to that of another flower of the same plant e.g. tomato and pear. Therefore, self pollination involves only one parent plant i.e. bisexual flowers or monoecious plants

## CROSS POLLINATION

This is the transfer of mature pollen grains from the anther of a flower to the stigma of a flower on another plant of the same or closely related species e.g. hibiscus, pawpaw. Therefore cross pollination involve two parent plants i.e. unisexual flowers or dioecious plants. Cross pollination depends on external agents like wind, insect etc



## ADVANTAGES OF SELF POLLINATION

1. It ensures effective pollination in bisexual flowers
2. It avoids wastage of pollen grains

## DISADVANTAGES OF SELF POLLINATION

1. Production of weak offspring due to continuous self pollination
2. The offspring are less adaptive to the environment.

## ADVANTAGES OF CROSS POLLINATION

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1. Production of healthier offspring.
2. Production of viable seeds
3. The offspring are more adapted to the environment
4. Formation of new varieties with good characteristics

### DISADVANTAGES OF CROSS POLLINATION

1. It depends on external agents e.g. wind and insect
2. It leads to wastage of pollen grain especially in wind pollination.

### EVALUATION

1. What is pollination?
2. Differentiate between self and cross pollination

### FEATURES OF SELF POLLINATED FLOWERS

Features favouring self pollination include

1. **Homogamy:** This is the ripening of anther and stigma of bisexual flower at the same time
2. **Cleistogamy:** This is when ripe pollen grains are deposited on the stigma which then becomes ripened at the same time.

### FEATURES OF CROSS POLLINATED FLOWERS

1. **Dioecious flowers:** When male and female flowers occur on separate plant e.g. pawpaw
2. **Dichogamy:** When male and female parts mature at different times. Dichogamy can be
  - (a) protandry : when anther matures or ripens before the stigma e.g. sunflower, okro and cotton
  - (b) protogyny when stigma matures before anther e.g. palms and figs.
3. Possession of brightly coloured petals to attract insect e.g. hibiscus.
4. Possession of sweet smell for attracting insects e.g. rose flower.
5. Unisexual flowers
6. Self incompatibility
7. Position of anthers and stigmas

### EVALUATION

1. What are the features of cross-pollinated flowers?
2. Define the terms (a)homogamy (b)cleistogamy (c)dichogamy.

### AGENTS OF POLLINATION

Agents of pollination (pollinators) are the organisms which help in the transfer of pollen grains from the anther to the stigma of flowers. This pollinator include: insects, birds, snails, bats and man and also physical factors like wind and water.

The two major agents of pollination are:

- ❖ insects
- ❖ wind

Flowers pollinated by them are marked with certain features that will be stated below

### CHARACTERISTICS OF INSECT POLLINATED FLOWERS (ENTOMOPHILOUS)

1. Large conspicuous petals and sepals
2. Bright colouration
3. Possession of scent
4. Presence of nectars.
5. Presence of rough, sticky and relatively few pollen grains

6. Flat, sticky stigma to receive pollen grains.  
Entomophilous flowers include hibiscus, crotolaria, pride of barbadous, etc.

### **CHARACTERISTICS OF WIND POLLINATED FLOWER (ANAEMOPHILOUS FLOWER)**

1. Small inconspicuous petals and sepals
2. Dull coloured flowers
3. Absence of scent
4. Absence of nectars
5. Large quantity of pollen grains
6. Pollen grains are small, lightened sticky
7. Elongated sticky stigma with large surface area.

Examples include cereals like maize, guinea corn and rice

### **GENERAL EVALUATION**

1. What is pollination
2. Explain what you understand by self and cross pollination.
3. What are the features of self and cross pollination?
4. State five characteristics of entomophilous and anaemophilous flowers.
5. What are the agents of pollination?

### **READING ASSIGNMENT**

College Biology, chapter 16, page 333 – 348

### **WEEKEND ASSIGNMENT**

#### **SECTION A**

1. Which of these is not condition for cross pollination A. protandry B. protogyny C. homogamy D. self incompatibility
2. The following are entomophilous flowers except A. hibiscus B. crotolaria C. maize flower D. pride of Barbados
3. Courtship behaviours in animals include the following except A. display B. migration C. pairing D. adaptation
4. Which of these is not a type of courtship display in animals A. croaking in toad B. colour change in chameleon C. bright colour feather in peacock D. singing in human being
5. The following are advantages of cross pollination except A. wastage of pollen grains B. production of viable seeds C. leads to varieties of offspring D. offspring are more adapted to the environment

#### **SECTION B**

1. Differentiate between entomophilous and anaemophilous flower
2. Outline four features that favours cross pollination

**WEEK:** 3

**DAY:**

**SUBJECT:**

**DATE:**

**TOPIC:**

**SUBTOPIC:**

**PERIODS:**

**DURATIONS:**

**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Meaning of Fruit
2. Structure of a fruit
3. Types of fruits
4. Dispersal of fruits and seeds
5. Features that aids methods of dispersal

**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: FRUIT**

**The Fruit (Structure, Types, Dispersal of Fruits and Seeds)**

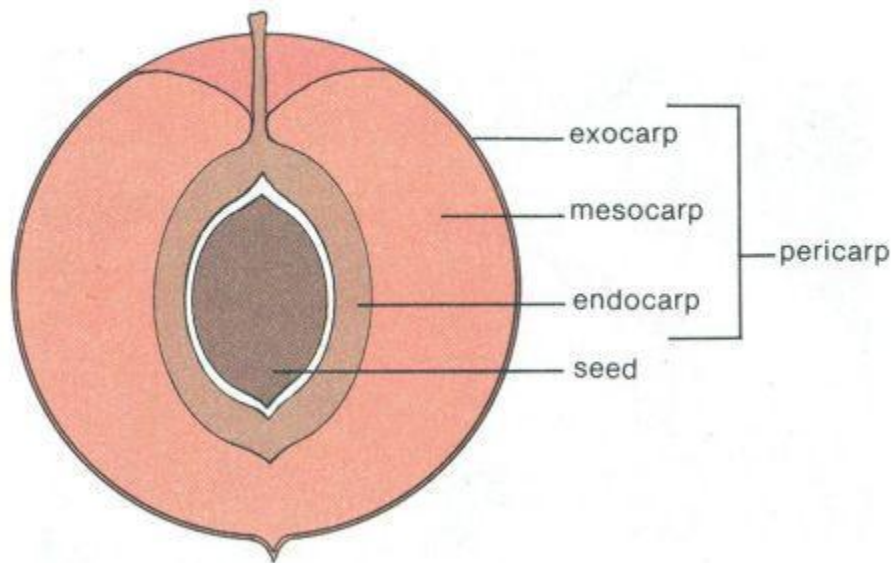


**CONTENT**

- Structure of a fruit
- Types of fruits
- Dispersal of fruits and seeds
- Features that aids methods of dispersal



# Fruit Structure



The fruit is a matured fertilized ovary of a flower containing one or more seeds. Contrary to this, some plants do not undergo fertilization for the formation of their fruit. Such fruits are called **parthenocarpic** fruits e.g. banana and pineapple. Such fruits are seedless.

A typical fruit has the following parts

1. The fruit wall called pericarp which is made up of three layers from the inside to the outside (epicarp, mesocarp and endocarp).
2. The seed or seeds.
3. The fruit stalk-the point of attraction between the fruit to the plant.

## Evaluation

1. What is a fruit?
2. Describe the structure of a typical fruit

## Types of fruits

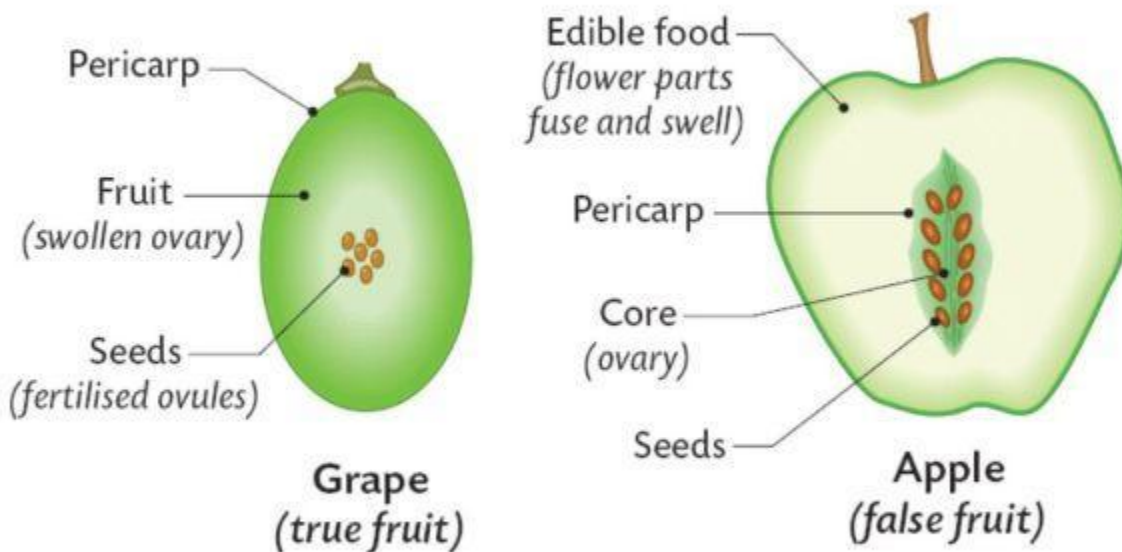
Fruits are classified based on their origin or structure. Common ways of classifying fruits are

1. True and false fruits
2. Simple, aggregate and composite fruits
3. Fleshy and dry fruits
4. Dehiscent and indehiscent fruits

True and false fruit:

A true fruit develops from a fertilized ovary and it contains a pericarp and seed(s) e. g. mango, cowpea while a false fruit develops from the ovary and other floral parts e. g. apple, cashew.

## Two types of fruit



### Simple, aggregate and composite fruits:

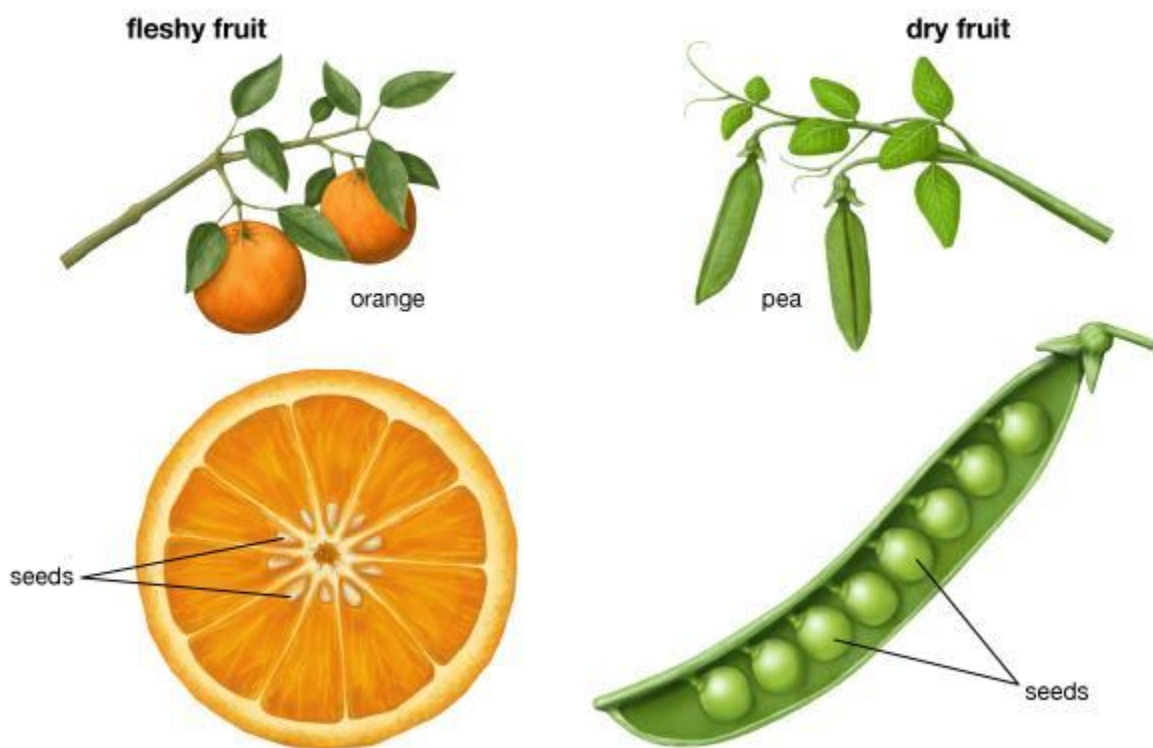
A simple fruit develops from a single flower with a single ovary e. g. cowpea, maize. An aggregate fruit develops from a single flower with several ovaries (each ovary develops into a fruitlet to form a cluster). The fruits have a common fruit stalk e. g. custard apple, strawberry. A composite fruit develops from an inflorescence e. g. fig, breadfruit.

### Fleshy and dry fruits:

A fleshy fruit is a fruit that has the whole pericarp or at least one of the pericarp thick, soft and succulent is fleshy. There are six types of fleshy fruits:

1. **Drupe:** A true, simple fruit with a thin epicarp, fleshy or fibrous mesocarp and a hard and woody endocarp which encloses the seed(s) e. g. mango, coconut, oil palm fruits.
2. **Berry:** A true, simple fruit with a thin epicarp and succulent, edible mesocarp and endocarp e. g. tomatoes, guava etc.
3. **Hesperidium:** A special type of berry in which the epicarp and mesocarp are fused together and the endocarp forms distinct chambers filled with succulent hairs e. g. oranges, lemon, grapes etc.
4. **Pome:** A simple, false fruit in which the fleshy edible part is derived from the receptacle and the core enclosing the seeds from the ovary e. g. apple and pear
5. **Sorosis:** A composite, false fruit formed from a dense inflorescence e. g. breadfruit, pineapple
6. **Syconium:** A composite false fruit that develops from a cup-like inflorescence enclosing numerous tiny male and female flowers e. g. fig.

Dry fruit is a type of fruit in which the pericarp becomes dry, hard, woody or fibrous when the fruit ripens. Dry fruits can be grouped into dehiscent or indehiscent fruits



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#### Dehiscent fruits and indehiscent fruits:

Dehiscent fruits split open to release the seeds when ripe. Four main types are

1. **Legumes:** The pericarp split open longitudinally along both side to release the seeds e. g. cowpea. Flamboyant etc.
2. **Follicle:** The pericarp split open longitudinally on one side only to release the seeds e. g. silk cotton, kola
3. **Capsule:** The pericarp slit along many sides to release the seeds e. g. Okro, cotton, etc.
4. **Schizocarp:** Breaks up into units enclosing one seed each e. g. desmodium, cassia etc.

Indehiscent fruits fall to the ground when ripe, eventually decayed to release the seeds. Five main types are

1. Achene e.g. clematis
2. Cypsela e.g. Tridax, sunflower, marigold
3. Caryopsis e.g. maize, rice
4. Nut e.g. cashew nut
5. Samara e.g. combretum

#### Evaluation

1. Differentiate between a) true fruits and false fruits b) simple, aggregate and composite fruits
2. Mention five types of dry dehiscent fruits with one example each

#### Dispersal of seeds and fruits

This is the transfer of the seed or fruit from the parent plant to other places where such seed may germinate. The essence of dispersal includes the following:

1. To avoid undue competition for nutrients, light space and water
2. To prevent overcrowding of plants
3. To prevent the spread of disease
4. To encourage colonization of new area for such plants

### Agents of dispersal

These are how seeds and fruits are removed from parents to other places. These agents include:

1. wind
2. water
3. animals and man
4. explosive mechanism

### Features that aids methods of dispersal

1. **Wind:** (i) Fruits or seeds are light. (ii) Fruits or seeds may have floss, tuff or pappus e. g. tridax, cotton, combretum etc.
2. **Water:** (i) Light fruits or seeds that can float in water (ii) Waterproof epicarp (iii) Fibrous mesocarp that can trap air to keep it afloat e. g. coconut
3. **Animals and man:** (i) The fruits or seeds may have hooks or hairs to attach to the animal skin (ii) The fruits are edible and the seeds indigestible e. g. pepper, desmodium
4. **Explosive mechanism:** (i) Presence of one or more lines of fission or weakness e. g. cowpea, flamboyant, Okro etc.

### Evaluation

1. Mention five importance of fruits and seeds dispersal
2. State two features each that aids wind and water dispersal

### General evaluation

1. What is a fruit?
2. Describe the structure of a fruit
3. Differentiate between a simple, aggregate and a false fruit
4. Differentiate between a true and a false fruit
5. Classify fruits into dehiscent and indehiscent fruit giving one example in each case
6. Give two features each of fruits dispersed by water, wind and animals
7. Differentiate between a drupe and a berry

### Weekend assignment

1. A fruit that develops from the ovary and other floral parts is called a \_\_\_\_\_ fruit A. true B. aggregate C. false D. simple
2. A fruit that develops from an inflorescence is known as a \_\_\_\_\_ fruit A. aggregate B. simple C. composite D. true
3. Which of these is not a class of dry dehiscent fruits A. legumes B. follicle C. capsule D. cypsela
4. The following except one belong to the same class of fleshy fruits A. coconut B. apple C. oil palm fruit D. mango
5. The following are dispersed by explosive mechanism except for \_\_\_\_\_ A. tridax B. cowpea C. flamboyant D. Okro

## Theory

1. Differentiate between a fruit and a seed
2. With the aid of a labelled diagram, differentiate between a drupe and a berry.



**WEEK:** 4      **DAY:**      **SUBJECT:**  
**DATE:**      **TOPIC:**  
**SUBTOPIC:**      **PERIODS:**      **DURATIONS:**  
**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Meaning of Habitat
2. Types of habitat
3. Marshes
4. Forest and characteristics of forest
5. Estuarine and characteristics

**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: HABITAT**



## **AQUATIC HABITAT**

### **HABITAT (AQUATIC HABITAT)**

A habitat is a place where organisms (plants, microorganisms and animals) are naturally found e. g. the habitat of the tadpole is the bottom of freshwater ponds or streams.

There are three main types of habitats, namely; aquatic habitat (in or around water), terrestrial habitat (in or on land) and arboreal habitat (in or on trees)

There are three kinds of aquatic habitat;

1. marine/saltwater habitat e.g. ocean, seas
  2. brackish water habitat (where salt and freshwater mix) e.g. delta, lagoon, bay
- Freshwater habitat (contain little or no salt) e.g. lakes, rivers, streams.

### **MARINE HABITATS**

Characteristics of marine habitats are as follow:

1. The marine habitats constitute the largest habitat in the biosphere (70% of the earth's area)
2. They do not undergo sudden or rapid changes in physical factors such as temperature, PH and specific gravity. Hence they show the greatest stability of all habitats.
3. Chemical composition:- marine water consists of many kinds of dissolved ions including  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Pb}_4^{3-}$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$  t. c.
4. Hydrogen ( $\text{H}^+$ ) concentration (PH): – saltwater is alkaline in nature with a PH of about 8.0 – 9.0 near the surface.
5. Salinity (salt concentration of water). The seawater has high salinity. The average salinity of seawater is 35 parts per thousand.
6. The density of marine water is high. It is about 1.028 while that of freshwater is 1.0. This allows many organisms to float in it.
7. The temperature of the sea changes less quickly than that of the land. However, the temperature falls with an increase in the depth of the sea.
8. Oxygen concentration is highest at the surface where the atmospheric oxygen dissolved in water. The concentration of oxygen decreases with depth.
9. Waves are a temporary movement of surface water of the sea which occurs in any direction. They are caused by wind blowing against the surface of the water. They also bring about the mixing of seawater. Waves can also beat against the shore and sometimes caused it to be eroded.
10. Tides are alternate rise and fall of the surface of the sea at least twice daily. Tides are caused by water distribution resulting from the combined gravitational pull of the earth by the sun and moon.

### **SELF EVALUATION**

1. What is a habitat?
2. With two examples each, state the three kinds of aquatic habitats.

### **ZONATION OF MARINE HABITAT**

#### **HORIZONTAL ZONATION**

The marine habitat is made up of the seashore and open sea. The major zones of the marine habitat are generally as follow

1. Supratidal or splash zone is the exposed zone with occasional moisture being the area where water splashes when waves break at the shore.
2. Intertidal or neritic zone is the planktonic zone which is exposed at low tide or covered by water at high tide. This zone has high photosynthetic activities because of abundant sunshine. Water temperature fluctuates.
3. Subtidal or littoral zone is about 200m deep, constantly underwater, with abundant sunlight and nutrient.
4. The benthic zone is about 500m deep with low light penetration and low nutrients. The water is dark, cold and with little oxygen. Hence, it is unfavourable for life.
5. The abyssal or pelagic zone is about 7000m deep with low light penetration, low temperature and high pressure. The low light leads to low photosynthetic activities. Hence food production is primarily by chemosynthesis.
6. The hadal or aphotic zone is the deepest, over 7000m deep. This forms the floor or the bed of the ocean. No light penetration or photosynthesis

## VERTICAL ZONATION

Based on light penetration or depth, the marine habitat can be zoned into three ;

1. Euphotic zone is the area in direct contact with sunshine. Hence, there is enough light penetration for photosynthesis. Therefore, producers, consumers and decomposer are all present.
2. Disphotic zone is a region of dim light. Light penetrates the water with low too intensity for photosynthesis to take place. Consumers and decomposers are found in this zone.
3. The aphotic zone is the bottom or bed of the seas and oceans. It is characterized by cold dark water without light penetration and very few living organisms.

## SELF EVALUATION

1. State the major zones of marine habitat
2. Differentiate between the splash and hadal zones

## DISTRIBUTION OF ORGANISMS AND ADAPTATION TO MARINE HABITAT

- Organisms of the splash zone include periwinkles; crustaceans e.g. ghost crab, seaweeds and sargassum (algae).
- Those of intertidal zone include starfish, sea anemones, sponges, sea urchin, annelids, Mollusca and barnacles.
- In the subtidal zone are snails, crabs, lobsters and crayfish.
- The benthic zone is unfavourable for life. The producers are absent, only a few saprophytic animals are present.
- The neritic zone house plankton (microscopic floating organisms e.g. diatom, algae, protozoa, crustacean and worms) and nekton (e.g. fishes, crabs, prawns and whales).
- Oceanic water house sharks, croaker, sea catfish, mackerel, Bonga fish e.t.c.



## ADAPTATION OF ANIMALS TO MARINE HABITAT

Animals including barnacles, fishes, crustaceans e.t.c. found surviving in marine habitat do so with the following adaptive features;

- Barnacles have
  - i. protection mantle for attachment to rock shore and water retention.
  - ii. Cilia for feeding.
  - iii. A shell that prevents desiccation (drying up)
- Fishes possess
  - i. reduced or no kidney to retain urea in their body to cope with high salinity e.g. cartilaginous fishes like shark, dogfish etc.
  - ii. Salt secreting glands in their gills or eyes for maintaining osmoregulation (salt balance) e.g. bony fishes like tilapia, herring etc.
  - iii. Tube feet which enable them to hold on to rocky shores and hard shell to prevent desiccation e.g. starfish, whales.
- Whale has
  - i. fins for stability in water.
  - ii. An organ in front of the nostril for detecting pressure changes in water.
  - iii. A thick layer of dermal fat insulation or food reservoir.
- Shrimps possess powerful claws for holding food or prey.
- Periwinkles possess lungs for breathing and foot for attachment.
- Crabs burrow fast into the mud to protect them against predators, strong waves or hide.



## ADAPTATION OF PLANTS TO MARINE HABITAT

Plants such as seaweeds, algae, sesuvium and diatoms are naturally found in marine habitat with the following adaptive features;

- Seaweeds have:
  - i. holdfast for attachment.
  - ii. mucilaginous cover to prevent desiccation.
  - iii. Divided leaves or floating devices for buoyancy.
- Algae (e.g. sargassum) have:
  - i. chlorophyll for photosynthesis.
  - ii. Small size or large surface area for floating in the water.

- Planktons (e.g. diatoms) possess:

- air space in their tissues.
- Rhizoid for attachment to rocks.
- Air bladder for buoyancy (floating).

Examples of the food chain in a marine habitat include

- Diatom → crabs → tilapia
- Diatom → zooplankton → tilapia → shark

## SELF EVALUATION

- Mention two organisms in the following zones: i. Splash, ii. Neritic, iii. Littoral, iv. Benthic
- Using 3 plants and 2 animals, explain adaptation in marine habitats.

## ESTUARINE HABITATS (BRACKISH WATER HABITATS)

An estuary is a body of water formed at the coast where freshwater flowing towards the sea mixes with the sea (salt water) flowing inland. Estuarine habitats include deltas, lagoons and bays.



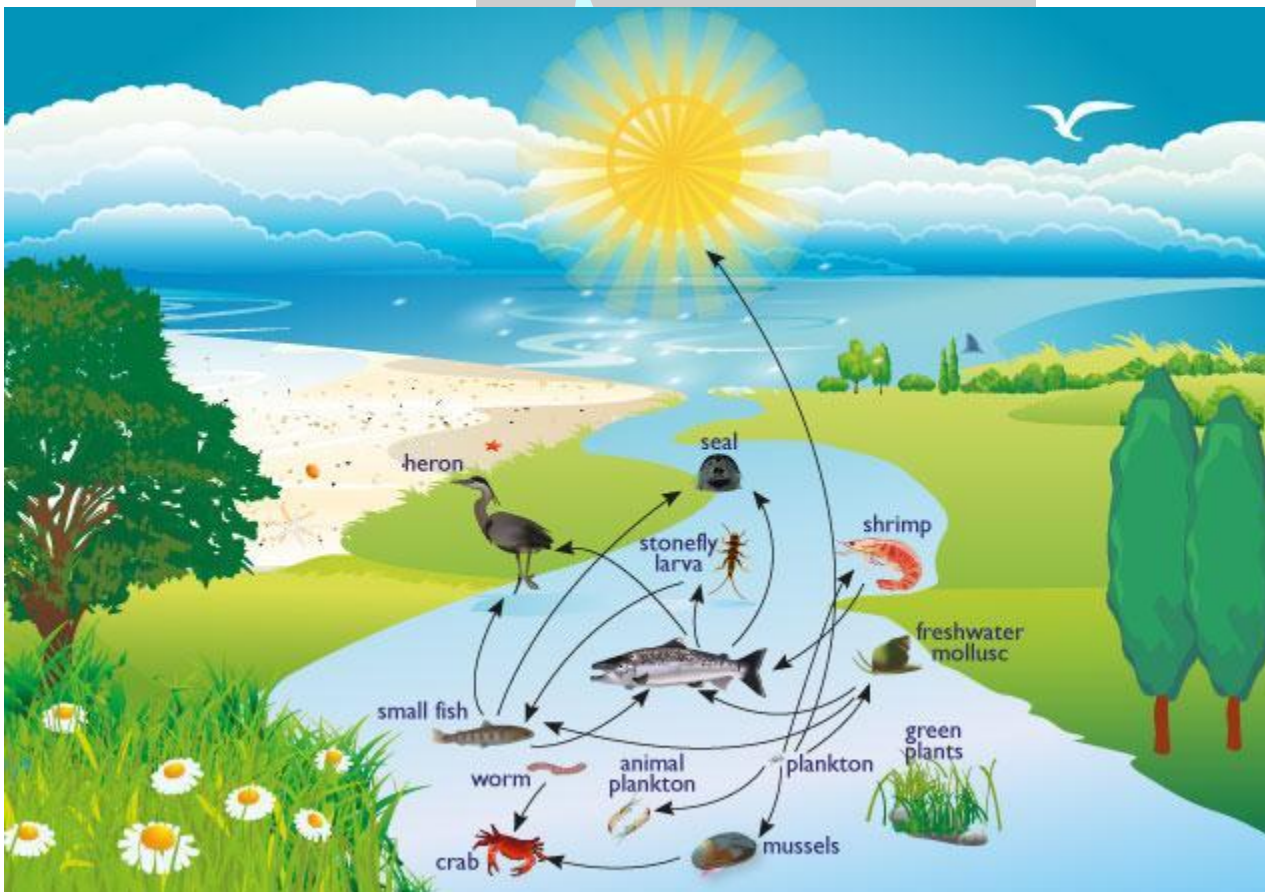
## CHARACTERISTICS OF ESTUARINES

- The salinity fluctuates.
- The specific gravity is less than that of the sea.
- They have high turbidity due to frequent disturbances. Hence the rate of photosynthesis and respiration by organisms reduces.
- The water is shallow.
- They have a low diversity of species compared to marine habitat.
- They have a high level of nutrients
- They have low oxygen content, hence anaerobic activities are common.

## PLANTS DISTRIBUTION AND ADAPTATION IN ESTUARINES

Plants found in estuaries include planktons, algae, red and white mangrove and they have the following adaptive features;

- Planktons (diatoms) have;
  - i. air spaces in their tissues.
  - ii. Rhizoid for the attachment to rocky shores.
  - iii. Air bladder for buoyancy
- Algae have:
  - i. chlorophyll for photosynthesis.
  - ii. small size or large surface area for floating in the water
- Red mangrove has;
  - i. stilt roots with rootlets that have air-spaces for air conduction to the root tissues and support to prevent washing away of the plant by the tide.
  - ii. Seeds which germinate while they are still on the parent plant, thus preventing the carrying away of the seedlings by the water current.
- White mangrove has pneumatophores (breathing roots) for gaseous exchange.



## ANIMALS DISTRIBUTION AND ADAPTATION

Animals including mosquitoes, crustaceans, Mollusca, worms, fishes e.t.c. found in estuaries survive possessing the following features;

- Mosquito larvae and pupae possess breathing trumpets for gaseous exchange
- Crustaceans and water snails burrow into the mud against predators, strong waves or tides.
- Worms have strong protective and impermeable covering against high salinity.
- Mudskippers have fins for crawling on land and swimming in water.
- Fishes have fins for movement and swimming bladder for buoyancy.

## FOOD CHAIN IN ESTUARINE HABITATS

1. Detritus → worms → snails → birds
2. Diatoms → shrimps → fishes
3. Diatoms → small fish → sharks → man

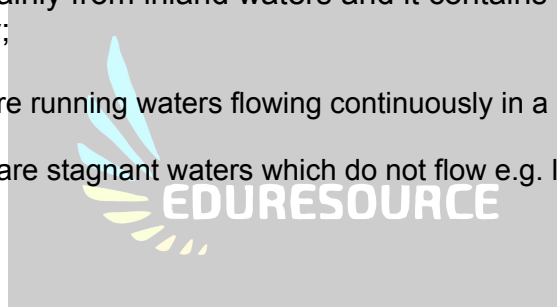
## SELF EVALUATION

1. What is estuarine?
2. List five characteristics of estuaries

## FRESHWATER HABITATS

This is a body of water formed mainly from inland waters and it contains very low or no salt. Freshwater is of two types based on its mobility;

1. Lotic freshwaters: – These are running waters flowing continuously in a specific direction e.g. rivers, springs, streams
2. Lentic freshwaters: – These are stagnant waters which do not flow e.g. lakes, ponds, puddles, swamps and dams



# Freshwater Biomes

## Rivers



## Almost All Lakes



## Swamps



## Ponds



## CHARACTERISTICS OF FRESHWATER HABITATS

1. It contains little or no salt. Salinity is 5 parts per thousand i.e. 0.5%.
2. It is small in size.
3. Oxygen concentration is high, being available in all parts of the water body, especially at the surface.
4. The water is shallow, hence sunlight penetrates to the bottom.
5. The temperature varies with seasons and depth.
6. It has seasonal variation; decreasing or drying up in the dry season and increasing in the rainy season
7. Water currents affect the distribution of organisms, salts and gases, especially in lotic freshwaters

## PLANTS DISTRIBUTION AND ADAPTATION IN FRESHWATER

Plants of freshwater include water lily, spirogyra, water lettuce, water weeds e.t.c. and they have the following adaptive features;

- Water lily has:

i. air bladder.

ii. Expanded tips and lightweight which keep it afloat.

- Spirogyra has mucillagenous cover for protection
- Water lettuce has hairs in leaves to trap air and keep it afloat
- Waterweed (elodea) has a long and flexible petiole for swinging with water currents.

## ANIMALS DISTRIBUTION AND ADAPTATION

Animals of freshwater habitats include protozoa, duck, pond skaters, hydra, fishes e.t.c. their adaptive features include

- Protozoa have contractile vacuole for osmoregulation in water.
- Duck has webbed feet for locomotion and serrated beak for sieving food in water into its mouth.
- Hydra has slippery surface, hooks and suckers for attachment to water particles.
- Pondskatters has long legs for skating on the water surface
- Fishes have swim bladders for buoyancy and gills for respiration

## FOOD CHAIN IN FRESHWATER HABITATS

1. Diatoms → fish fry → tilapia
2. Spirogyra → tadpoles → carps → kingfish
3. Algae → mosquito larva → small fish

## SELF EVALUATION

1. State five characteristics of freshwater habitats
2. With three examples each that describe plants and animals adaptation to freshwater habitats

## GENERAL SELF EVALUATION

1. Give two examples of the food chain in marine habitats
2. How do organisms adapt to life in an estuary?
3. What is a freshwater habitat?
4. Differentiate between lotic and lentic freshwater habitats
5. Differentiate between waves and tides.
6. According to light penetration, zone marine habitat.

## TERRESTRIAL HABITATS

Organisms of the land are called terrestrial organisms. They include plants and animals that are found living on the ground and under the ground.

Basically, terrestrial habitat is subdivided into four main parts, namely;

1. marsh
2. forest
3. grassland/ savanna
4. arid land/ desert

## EVALUATION

1. What are terrestrial organisms?
2. List four types of terrestrial habitats

## **MARSH**

A Marsh is low land, flooded in rainy season and usually waterlogged because of poor drainage. The vegetation is predominantly of grasses and shrubs. When trees grow in a marsh, it is called a swamp. Marsh is a transition between the aquatic habitat and terrestrial habitat.

### **FORMATION OF A MARSH**

Marshes develop as a result of water overflowing its banks to accumulate on the adjoining coastal or low land area such as flood plains of rivers. This can be enhanced with extensive rainfall.

When ponds and lakes are filled up with soil and organic debris of plants, marshes can also be formed. Marshes formation is, therefore, a gradual process. Marshes can either be freshwater or saltwater marshes.

### **CHARACTERISTICS OF A MARSH**

1. A marsh is a lowland.
2. It is always flooded, wet and waterlogged.
3. It sometimes has a pool of standing water.
4. It has a high relative humidity
5. Its water sometimes contain many decaying organisms
6. The water has a foul smell

### **ORGANISMS OF THE MARSH**

There are various plants and animals in this habitat. The plants include algae, grasses, water lettuce, water lilies, white and red mangrove, raphia palms e.t.c.

Animals found in the marsh include mangrove crabs, lagoon crabs, hermit crabs, mud-skipper, fishes, frogs, snakes, crocodiles, mammal e.t.c.

Adaptive features of organisms of the marsh include

1. They must be able to tolerate the salinity of the soil or water
2. They have to tolerate low oxygen concentration in the soil or water

Plants of freshwater marsh have other adaptive features similar to those of freshwater habitat. Likewise the plants of saltwater marsh.

Saprophytic organisms (e.g. bacteria) which live on dead organic matter in marshes have to adapt to the anaerobic condition.

## FOOD CHAINS IN MARSHES

1. Flowering plants → insects → frogs → crocodiles
2. Humus → earthworms → frogs → snakes

## EVALUATION

1. How is a marsh formed
2. State four characteristics of a marsh
3. List four plants and animals found in the marsh

## FORESTS

A forest is a community of plants in which trees species are dominant. There are different kinds of forests whose distribution is determined mainly by climatic factors such as temperature, rainfall and at times by soil elevation and man's activities such as farming, lumbering, bush burning, construction of roads and building.

The major type of forest in Nigeria is the rain forest



## CHARACTERISTICS OF A FOREST

1. The forest is rich in epiphytes and climbers

2. The interior of the forest has high humidity, low light intensity and damp floor.
3. Presence of tall trees with canopies and existing in layers (stratified).
4. Trees are mesophytes with broad leaves.
5. The trees have buttress roots to support their heavyweight and height.
6. The trees have thin barks for gaseous exchange and transpiration.

## PLANTS DISTRIBUTION AND ADAPTATION

Forest plants (trees) include African walnut, mahogany, teak, obeche, iroko, oil palm, ferns (pteridophytes), bryophytes (mosses and liverwort), epiphytes (orchid), fungi and mistletoe e.t.c. these plants adapt to life in the forest in the following ways;

- Possession of strong taproot systems and buttress roots.
- Possession of tall unbranched trunks
- Possession of broad leaves
- Epiphytes have a mechanism (the aerial roots) storing water and absorbing moisture from the air while growing on tree branches.
- Mistletoe (plant parasite) develops a root system that can penetrate the stem of a plant withdrawing manufactured food directly from phloem vessels of the host plant.

## ANIMALS DISTRIBUTION AND ADAPTATION

Most forest animals are arboreal (living on trees) and these include bats, monkeys, snakes, squirrels, birds, tree frogs, chameleons. Some live in the soil e.g. earthworms and beetles while others live among the litters on the ground e.g. millipedes, ants, snails.

These animals adapt to the forest in the following ways

- Monkeys have prehensile tails and long limbs for climbing and jumping.
- Bats modify their limbs into wings for flight
- Green snakes have protective colouration to camouflage
- Chameleon has a prehensile tail and opposable digits for grasping as well as protective colouration to camouflage
- Apes move in groups for protection, with a high sense of sight
- Earthworms and snails have water permeable cuticle to reduce water loss and prevent desiccation.
- Birds have powerful wings for flight

## FOOD CHAINS IN A FOREST

1. Green plants → grasshoppers → toads → hawks
2. Green plants → monkeys → lions

## EVALUATION

1. Describe a forest habitat using its characteristics
2. Give two examples of a food chain in a forest

**WEEK: 7 MID-TERM BREAK / TEST / OPEN DAY**

**WEEK:** 8      **DAY:**      **SUBJECT:**  
**DATE:**      **TOPIC:**  
**SUBTOPIC:**      **PERIODS:**      **DURATIONS:**  
**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Meaning of Grassland
2. Characteristics of grassland
3. Types of savannah
4. Plants distribution and adaptation in grassland
5. Animal distribution and adaptation in forest
6. Food chain in grassland
7. Arid land deserts and characteristics of deserts
8. Plant distribution and adaptation in desert
9. Animal distribution and adaptation in desert
10. Food chain in arid land

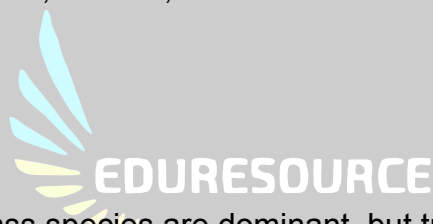
**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: GRASSLAND**

### **GRASSLAND [SAVANNA]**

This is a plant community in which grass species are dominant, but trees and shrubs may be present.



## CHARACTERISTICS OF GRASSLAND

1. Temperature is usually high and sunshine is intense.
2. The relative humidity is low and rainfall scanty (60 – 150cm annual rainfall).
3. Abundant grassland with few short trees sparsely distributed
4. Bush fire is frequent and trees are fire-resistant
5. Deciduous plants (plants that shed their leaves in dry seasons) are present.
6. Plants possess underground stems and deep roots to search out for water
7. Trees have modified leaves for adaptation to the environment

## TYPES OF SAVANNA

Basically, there are four major types of savanna in Nigeria, namely;

1. Southern Guinea savanna
2. Northern guinea savanna
3. Sudan savanna
4. Sahel savanna

Southern Guinea savanna is the largest biome in Nigeria

### PLANTS DISTRIBUTION AND ADAPTATION IN GRASSLANDS

The grassland plants include acacia, elephant grass, guinea grass, spear grass, palms, baobab trees e.t.c. their adaptive features include

- Trees have thick corky barks to resist severe fire
- Grasses with underground stems to escape fire and drought
- Leaves with a waxy surface in addition to cuticle covering to reduce transpiration
- Reduced or small leaves to reduce transpiration
- Presence of curly leaves to conserve water
- Leaves fall (deciduous) in drying season to conserve water
- Baobab trees have broad and succulent leaves to conserve water

### ANIMALS DISTRIBUTION AND ADAPTATION IN A FOREST

Animals found in the forest adapt to this habitat in the following ways

- Termites lived in air-conditioned nests called anthills for cooling the animals.
- Rats burrow into the soil to avoid excessive heat and fire
- Zebras and giraffes can camouflage using their colours.
- Lions, tigers and leopards have powerful claws and teeth for attacking animals.
- Kangaroos have long legs to help them escape from danger and also have a pocket of flesh to shield their young ones from hot weather and attack.
- Elephants and lion move in groups or herds to achieve strength in number

## FOOD CHAINS IN GRASSLAND

There are several food chains due to numerous animals

1. Grass → grasshoppers → lizards → snakes
2. Grass → grasshoppers → toads → birds
3. Grass → zebras → lions

## ARID LANDS [DESERTS]

These are areas of very low rainfall and high evaporation rate. They are the driest habitats, receiving less than 25cm annual rainfall. Arid lands are of two types;

- Hot deserts e.g. Sahara desert (North Africa), Kalahari desert (South Africa)
- Cold deserts e.g. desert in North America



## CHARACTERISTICS OF A DESERT

1. Water is very scarce
2. Temperature is very high by the day and very low by the night
3. Vegetation is very scanty
4. The soils are sandy or rocky
5. Strong winds occur frequently and sunshine very intense
6. Presence of drought resistance plants (xerophytes)

## PLANTS DISTRIBUTION AND ADAPTATION IN DESERTS

Deserts plants include thorny bushes, cacti, scattered dwarf acacia, date palm, wiring grasses, baobab trees and euphorbia species. They adapt to this habitat in the following ways;

- Plants have thin leaves to reduce transpiration
- Cacti leafless have thorns to reduce transpiration and thick succulent stem to store water
- Acacia (drought resistant) has deep roots which absorb underground water
- The baobab tree has waxy leaves which can be hairy or needle-shaped to reduce the rate of transpiration
- Wiring grass has narrow and slender leaves to reduce transpiration.

## ANIMAL DISTRIBUTION AND ADAPTATION IN DESERTS

The deserts animals include camel, rodents, lizards, snakes, zebras, desert tortoise, grasshoppers, wasps, ants e.t.c. They survive in the following ways;

- Most desert animals excrete solid wastes to conserve water.
- Kangaroos, rats remain in burrows during the day to avoid excessive heat
- Reptiles have scales to reduce water loss
- Camels can survive several days without drinking water. They can withstand a wide range of body temperature up to 40°

## FOOD CHAINS IN ARID LANDS

1. Plants → desert rats → snakes
2. Plants → ants → scorpions → snakes

**WEEK:** 9      **DAY:**      **SUBJECT:**

**DATE:**      **TOPIC:**

**SUBTOPIC:**      **PERIODS:**      **DURATIONS:**

**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Introduction
2. Types of Succession
3. Differences Between Successions
4. Characteristics of Succession
5. Outcome of Succession



**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: ECOLOGY OF POPULATION – ECOLOGY OF SUCCESSION**

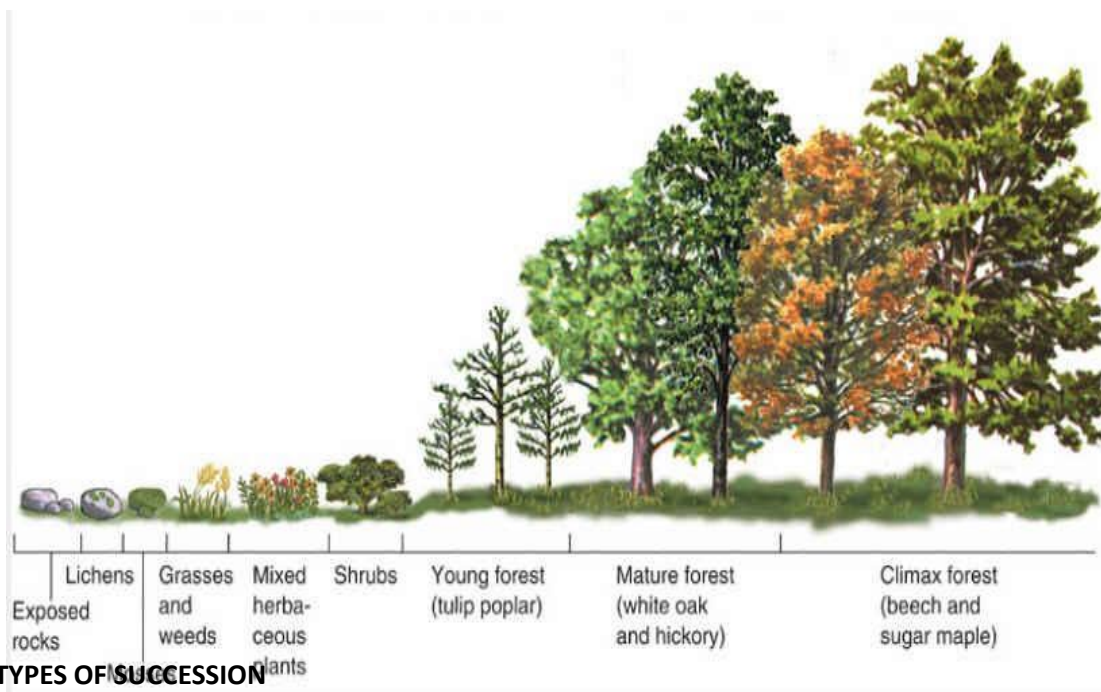
### ECOLOGICAL SUCCESSION

The orderly change in the inhabitants of an area over time is called succession. It can also be defined as the step by step orderly and gradual replacement of communities of organisms that leads to a climax community.

An illustration of succession is that of a pond. Rain carries sediment from surrounding land into the pond, filling it and making it shallower. Algae that live in the pond die and eventually fall to the bottom, adding organic materials to the sediment.

Some plants such as pond weeds grow at the bottom. These plants make up the pioneer community. The pioneer plants are the first to inhabit the changing environment. The roots of these underwater plants hold much silt, quickly building up the bottom cover of the pond. As they die, their organic matter accumulates at the bottom. The water along the edges becomes so shallow that water lilies and other floating plants replace the pioneer plants.

The final stage of succession in a particular area is called climax community. The species that constitute the climax community differs from biome to biome. A climax community is also a stable community because its appearance and species composition are stable. To become climax, the community would have gone through a sequence of species.



## TYPES OF SUCCESSION

Basically, there are two types of succession; these are

- ❖ Primary succession
- ❖ Secondary succession

### PRIMARY SUCCESSION

This is a type of succession that begins from bare ground, bare rock or bare body of water.

Primary succession on land may be studied on a building site where a heap of sub-soil, stones or cement block is left over after construction. In an aquatic habitat, primary succession may be observed in a new artificial pond.

The first in any succession are called primary colonizers and are usually autotrophic plants. These have simple requirements for life and can withstand exposures. By the second year of the primary succession in addition to more algae and lichens, mosses may begin to grow. As they grow, they wear out some soil and some of them die and decay, creating more soil for their successor.

By the third year, small herbaceous plants may be present. These in turn help to change the habitat by overshadowing the smaller plants, causing them to die out and dropping their leaves, and thus making the soil suitable for other organisms. As years pass by, more species come into the habitat, while some face out. Succession of species continues till the climax is reached. Then, bigger life forms like shrubs and trees are found growing.

### SECONDARY SUCCESSION

Secondary succession is a succession that occurs when an area has not been totally stripped of soil and vegetation. It occurs more rapidly than primary succession because soil has already been formed. It also occurs when a farmer abandon old field. Secondary succession begins from an existing community which has been interfered with by man and other factors. Fire, drought and floods can cause secondary succession.

## EVALUATION

1. Define pioneer community.
2. How is a stable community reached?

## DIFFERENCES BETWEEN PRIMARY AND SECONDARY SUCCESSION

|   | PRIMARY SUCCESSION                                            | SECONDARY SUCCESSION                                             |
|---|---------------------------------------------------------------|------------------------------------------------------------------|
| 1 | Starts on a bare surface                                      | Starts on already colonized surface                              |
| 2 | It is slower or takes longer time to reach a climax community | It is faster or takes a shorter time to reach a climax community |
| 3 | Starts with lower organisms                                   | Starts with fairly complex organisms                             |

## CHARACTERISTICS OF SUCCESSION

- ☐ Plants form pioneer organisms being the producers
- ☐ The number of organisms is usually increased from year to year until a climax is reached.
- ☐ Diversity of organisms species increase from year to year.
- ☐ Succession is orderly and progressive starting with microscopic green plants and ending with big trees.
- ☐ Each generation of species alters the habitat by making more soil, and when they die the soil becomes more fertile.
- ☐ There is competition among organisms in that the various species present compete for the available resources such water, CO<sub>2</sub>, O<sub>2</sub>, light and space. The plants that are more able to compete displace other.
- ☐ Changes in species composition as the fittest survive and the unfit fade out.

## OUTCOME OF SUCCESSION

- ☐ Changes in the physical environment due to structural changes of the species and the activities in the community.
- ☐ Simple organisms which start the succession are usually replaced by more complex ones in an evolutionary trend
- ☐ Equilibrium point is attained through colonization of abandoned farmland by a wide variety of organisms
- ☐ The final outcome of succession is the climax or stable community.

## GENERAL EVALUATION

1. What is ecological succession?
2. Write short note on primary succession
3. Differentiate between primary and secondary succession.
4. Define stable community.
5. State the outcome of succession.

### READING ASSIGNMENT

College Biology, chapter 23, pages 537-540

### WEEKEND ASSIGNMENT

#### SECTION A

1. The change which occurs during ecological succession is A. sudden B. rapid C. gradual D. no change
2. The pioneer community include any of the following except A. spirogyra B. water weeds C. trees D. lichen
3. All these except one serves as the basis of primary succession A. already colonized habitat B. bare ground C. bare body of water D. bare rock
4. The following except one are false about secondary succession A. starts on a bare surface B. It is slow C. starts with fairly complex organism D. takes longer time to reach climax community
5. One of these is a pioneer organism. A. Lichen B. liverwort C. Conifer D. Grass

#### SECTION B

1. State five characteristics of ecological succession.
2. (a) State the two types of ecological succession  
(c) Differentiate between the two successions.

### LESSON TWO- CONTENT

- Overcrowding
- Factors Causing Overcrowding
- Effects of Overcrowding
- Adaptation to Overcrowding
- Food Shortage

### OVERCROWDING

This is a situation in which a population increases beyond a point called the carrying capacity where the resources (e.g. food and space) are not enough to support all the individuals in the population. Therefore, overcrowding reduces the food and space available for individual species in the population.

### FACTORS CAUSING OVERCROWDING

1. Natality: An increase in the rate at which a particular species gives birth in a restricted area results in overcrowding.
2. Increase in food supply
3. Decrease in mortality: Overcrowding results when the rate of death of organisms in a habitat is lower than the rate of birth.
4. Immigration: Inflow of individuals into a habitat increases the population which later causes overcrowding.
5. Lack of dispersal of fruits or seeds of plants.

6. Social habits of animals like termites, ants and bees lead to their multiplication in the colony.
7. Inadequate space

## **EFFECTS OF OVERCROWDING**

These include:

1. Shortage of food since the available food in the habitat is rapidly eaten up due to overcrowding.
2. Shortage of space due to increasing population of species.
3. Competition occurs as the organisms struggle for scarce resources e.g. food, space. The stronger ones get the resources while the weaker ones are deprived i.e. survival of the fittest.
4. Anti-social behaviours like fighting or cannibalism can result from the stress of overcrowding.
5. Easy spread of diseases e.g. tuberculosis in human (air-borne).
6. Preying or feeding on each other when food is in short supply.
7. Death of organisms as weaker organisms in overcrowding area easily dies off due to lack of food and space.

## **ADAPTATION TO AVOID OVERCROWDING**

In order to survive overcrowding, plants and animals have developed the following adaptive features:

### **1. TERRITORIAL BEHAVIOUR**

Animals like mammals, lizards, birds etc establish territories which they are possessive of. They fight for and defend the territories against any intruders. A successful claim of the territory ensures sufficient food, space mating partners and parental care for the organisms.

### **2. SWARMING**

This is exhibited by some social animals such as termite and bees when some of them move out from an old colony to a new one. Hence, overcrowding is avoided.

### **3. EMIGRATION**

This is the outward movement of animals out of their locality to another place of settlement. This prevents overcrowding.

### **4. DISPERSAL OF SEEDS AND FRUITS**

This could be by water, wind, animals, insects and explosive mechanism. The seeds and fruits are carried far away from the parent plants. Hence, overcrowding is prevented.

### **5. FORMATION OF CANOPIES**

This is an attribute of forest trees. This helps the plants to trap enough sunlight and also prevent the shorter plants below from getting the light. The lower plants

eventually die off and overcrowding is avoided.

### **6. PRODUCTION OF CHEMICALS**

Roots of some plants produce chemicals which prevent the growth of other plants close to them. Therefore, overcrowding is avoided.

## **FOOD SHORTAGE**

In a well established habitat, population sizes of various species are adjusted to the quantity of food that is available in the habitat. Factors that can decrease the food supply to the habitat thereby causing food shortage are as follows;

- Natural disaster like flood, drought
- Diseases of plants and animals
- Pests such as locust, grasshoppers, weevils
- Lack of or inadequate storage facilities
- Bush burning which destroys soil organisms reduces soil fertility and exposed the soil to erosion.

All these result in poor yield and eventual food shortage

### **EFFECT OF FOOD SHORTAGE ON POPULATION SIZE**

1. Competition: - Scarcity of food leads to struggling among organisms for any available food. This results in the survival of the fittest. This can result in fighting and cannibalism (animals feeding on themselves e.g. man)
2. Emigration: - Animals also move from an area of food shortage to where sufficient food is available.
3. Decrease in the rate of reproduction: - Many human beings and marriage due to lack of or inadequate food supply may engage in family planning to reduce the number of children to be catered for.

### **GENERAL EVALUATION**

1. What is food shortage?
2. Outline four factors that cause food shortage.
3. State three causes of food shortage.
4. State two outcomes of succession.
5. Discuss five adaptive features of organisms used to survive overcrowding.

### **READING ASSIGNMENT**

College Biology, chapter 23, pages 541-544

### **WEEKEND ASSIGNMENT**

### **SECTION A**

1. The following except one results from food shortage A. Competition B. Reduced mortality rate C. Emigration D. Increased mortality rate.
2. Food shortage makes the population size A. increase B. decrease C. stabilize D. fluctuate
3. Food storage results in A. stability of price B. Natural disaster C. high natality rate D. overpopulation
4. These are methods of storing and preserving food except A. Silos B. barns C. refrigeration D. Marketing.
5. These are forms of adaptation to avoid overcrowding except A. Pairing B. Territoriality C. Swarming D. Canopy

### **SECTION B**

1. (a) What is overcrowding?
- (b) State five effects of overcrowding.
2. State five ways of improving crop yield.

**WEEK:** 10      **DAY:**      **SUBJECT:**  
**DATE:**      **TOPIC:**  
**SUBTOPIC:**      **PERIODS:**      **DURATIONS:**

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**LEARNING OBJECTIVES:** At the end of the lesson, students should be able to

1. Meaning of Food shortage
2. Causes
3. Effects

**KEY VOCABULARY WORDS:**

**INSTRUCTIONAL MATERIALS:** Wall charts, Pictures, Related Online Video, Flash Cards

**CONTENT: FOOD SHORTAGE**

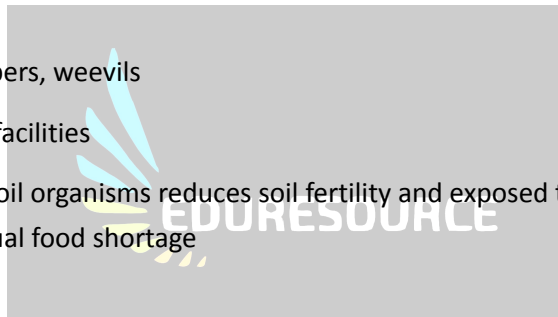
### **FOOD SHORTAGE**

In a well established habitat, population sizes of various species are adjusted to the quantity of food that is available in the habitat. Factors that can decrease the food supply to the habitat thereby causing food shortage are as follows;

#### **CAUSES OF FOOD SHORTAGE**

- Natural disaster like flood, drought
- Diseases of plants and animals
- Pests such as locust, grasshoppers, weevils
- Lack of or inadequate storage facilities
- Bush burning which destroys soil organisms reduces soil fertility and exposed the soil to erosion.

All these result in poor yield and eventual food shortage



#### **EFFECT OF FOOD SHORTAGE ON POPULATION SIZE**

4. Competition: - Scarcity of food leads to struggling among organisms for any available food. This results in the survival of the fittest. This can result in fighting and cannibalism (animals feeding on themselves e.g. man)
5. Emigration: - Animals also move from an area of food shortage to where sufficient food is available.
6. Decrease in the rate of reproduction: - Many human beings and marriage due to lack of or inadequate food supply may engage in family planning to reduce the number of children to be catered for.

#### **GENERAL EVALUATION**

6. What is food shortage?
7. Outline four factors that cause food shortage.
8. State three causes of food shortage.
9. State two outcomes of succession.
10. Discuss five adaptive features of organisms used to survive overcrowding.

**WEEK: 11**

**REVISIONS**

**WEEK: 12 EXAMINATIONS**

**WEEK: 13 EXAMINATIONS**

