Level: Forms 4 & 5
CSEC Agricultural Science Syllabus
SECTION B: CROP PRODUCTION

2. Environmental factors affecting crop growth

Specific objective(s):

2.7 explain the causes and effects of soil erosion (Definition of soil erosion. Agents (water, wind and man). Causes (e.g., deforestation, burning and poor land and crop management). Effects (for example, loss of fertility and devaluation of land).

2.10 Explain how soil fertility can be maintained e.g. **measures to prevent erosion**

WHAT IS SOIL EROSION

Soil erosion is the process by which soil particles are transported from one area, by either wind or water and deposited in another area. In agriculture, soil erosion mainly refers to the removal of topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage.

CAUSES OF SOIL EROSION

Soil erosion can be due to either natural forces or can result from the activities of man.

Natural Soil Erosion

Occurs in a natural environment undisturbed by man. This type of soil erosion is usually a result of:

1. Running water on sloping areas with loose soil
2. Running water on steep slopes
3. Landslides
4. Sea waves
5. Strong winds

Accelerated Soil Erosion

Occurs in a natural environment that was impacted by human activities. This type of soil erosion is usually a result of:

1. Slash and burn agriculture, especially on hillsides
2. Deforestation
3. Overgrazing of livestock
4. Quarrying and mining

5. Leaving land exposed to the elements after harvesting

EFFECTS OF SOIL EROSION

1. Loss of topsoil
2. Decrease in soil fertility
3. Silting of water courses
4. Eutrophication in water courses

TYPES OF SOIL EROSION

The following table illustrates the major types of soil erosion

Type of Soil Erosion	**Description**	**Cause**	**Measures to Prevent Soil Erosion**
Splash erosion	Remove of soil particles due to rain drops	Heavy rainfall	Cover cropping, Crop rotation
Sheet erosion	Sheet erosion means removes a thin uniform covering of top productive/surface soil from large areas, often from field, more or less, during every rain which produces a run-off.	Rainfall	Cover cropping, Crop rotation
Rill erosion	When runoff starts, channelization begins and erosion is no longer uniform. Raindrop impact does not directly detach any particles below flow line in rills but increases the detachment and transportation capacity of the flow. Rills are small channels, which can be removed by timely normal tillage operations.	Rainfall	Cover cropping, Crop rotation, Terracing
Gully erosion	A more prominent type of erosion in which heavy rainfall, rapidly running water and transporting water may result in deeper cavities or grooves called gullies. Gullies may be either ‘U’ shaped or ‘V’ shaped.	Heavy rainfall	Strip cropping Terracing, Gabion baskets

Landslides or slip erosion	This type of soil erosion is caused by heavy rainfall and it occurs in sloppy lands, such as mountains and hilly areas with slope is >20%. In this type of erosion when the running water percolates through the crevices of rocks great masses of soils and loose rocks lying on the steep slopes slip downward.	Rainfall and in some instances earthquakes	Contour ploughing, Terracing, Gabion basket walls
Stream bank erosion	On the banks of swollen rivers it is most active. During the rainy season when fast running water streams take turn in some other directions, they cut the soil and make caves in the banks. As a result of this, quite often large masses of soils become detached and washed away from the banks and are deposited at places in course of streams.	Swollen water courses	Construction of levees
Wind erosion	Wind erosion takes place normally in arid and semi-arid areas devoid of vegetation, where the wind velocity is high. The soil particles on the land surface are lifted and blown off as dust storms.	Wind	Cover cropping, Crop rotation

Glossary of Terms

TERM	DEFINITION
Eutrophication	The process by which a body of water becomes overly enriched with minerals and nutrients which induce excessive growth of algae. This process may result in oxygen depletion of the water body. A major cause of eutrophication is run off from agricultural areas.
Cover cropping	A cover crop is a crop of a specific plant that is grown primarily for the benefit of the soil rather than the crop yield. Cover crops are commonly used to suppress weeds, manage soil erosion, help build and improve soil fertility and quality, control diseases and pests, and promote biodiversity.
Crop rotation	Crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. It is done so that the soil of farms is not used for only one set of nutrients. It helps in reducing soil erosion and increases soil fertility and crop yield.
Terracing	Terracing is a soil conservation practice applied to prevent rainfall runoff on sloping land from accumulating and causing serious erosion. Terraces consist of ridges and channels constructed across-the-slope in a step-like design.
Contour Ploughing	A farming practice of ploughing and/or planting across a slope following its elevation contour lines.
Gabion basket walls	A gabion wall is a retaining wall made of stacked stone-filled gabions tied together with wire.
Levee	An embankment along a watercourse that is artificially constructed to regulate water levels, especially in times of increased water flow. It is usually earthen and often parallel to the course of a river in its floodplain or along low-lying coastlines.

STUDENT SELF ASSESSMENT

Answer the following questions:

1. What is soil erosion?

_____
_____

2. Identify four (4) effects of soil erosion
    a. _____
    b. _____
    c. _____
    d. _____

3. What is the difference between **natural** and **accelerated** soil erosion?

_____
_____

4. Identify three (3) causes of **natural** soil erosion

    a. _____
    b. _____
    c. _____

5. Identify three (3) causes of **accelerated** soil erosion

    a. _____
    b. _____
    c. _____

6. Explain the difference between **Sheet erosion** and **Gully Erosion**

_____
_____
_____
_____

STUDENT SELF ASSESSMENT

ANSWER SHEET

Answer the following questions:

1. What is soil erosion?

   Soil erosion is the process by which soil particles are transported from one area, by either wind or water and deposited in another area. In agriculture, soil erosion mainly refers to the removal of topsoil by the natural physical forces of water and wind or through forces associated with farming activities such as tillage.\

2. Identify four (4) effects of soil erosion

   a. Loss of topsoil

   b. Decrease in soil fertility

   c. Silting of water courses

   d. Eutrophication in water courses

3. What is the difference between **natural** and **accelerated** soil erosion?

Natural soil erosion occurs in a natural environment undisturbed by man while accelerated soil erosion occurs in a natural environment that was impacted by human activities.

4. Identify three (3) causes of **natural** soil erosion

ANY OF THE FOLLOWING ANSWERS

1. Running water on sloping areas with loose soil
2. Running water on steep slopes
3. Landslides
4. Sea waves
5. Strong winds

5. Identify three (3) causes of **accelerated** soil erosion

ANY OF THE FOLLOWING ANSWERS

1. Slash and burn agriculture, especially on hillsides
2. Deforestation
3. Overgrazing of livestock
4. Quarrying and mining
5. Leaving land exposed to the elements after harvesting

6. Explain the difference between **Sheet erosion** and **Gully Erosion**

SHEET EROSION

Sheet erosion means removes a thin uniform covering of top productive/surface soil from large areas, often from field, more or less, during every rain which produces a run-off.

GULLY EROSION

A more prominent type of erosion in which heavy rainfall, rapidly running water and transporting water may result in deeper cavities or grooves called gullies. Gullies may be either 'U' shaped or 'V' shaped.

References: https://www.researchgate.net/publication/325300770_Soil_Erosion_Types_and_Their_Mechanism, https://www.wikipedia.org/

End of Lesson