

Secondary Engagement Programme

Christmas Term

Grade 10

Activity Sheets

Agricultural Science



MINISTRY OF EDUCATION



**MINISTRY OF EDUCATION
SECONDARY ENGAGEMENT PROGRAMME
OCTOBER 2020
WEEK 7**

LESSON # 1

GRADE :10

**SUBJECT : AGRICULTURAL SCIENCE
TOPIC : SOIL AND SOIL FERTILITY
SUB TOPIC : SOIL FORMATION**

Objective

To describe the process of soil formation.

Soils

Soil is the upper most layer of the earth's crust.

It is a mixture of weathered rocks and organic matter.

Soil is a major component of the earth's ecosystem.

Soil acts as:

- an engineering medium
- a habitat for soil organisms
- a recycling system for nutrients and organic wastes
- a regulator of water quality
- a modifier of atmospheric composition
- a medium for plant growth
- a critically important provider of ecosystems services.

Soils can effectively remove impurities, kill disease agents, and degrade contaminants.

Soils provide readily available nutrients to plants and animals by converting dead organic matter into various nutrient forms

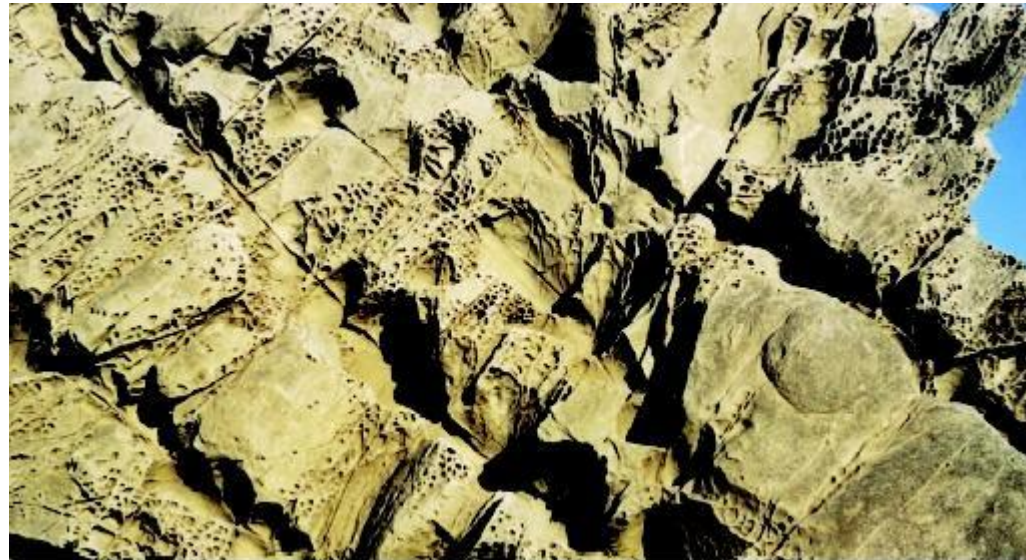
Weathering

Weathering is the breakdown of rocks at the Earth's surface, by the action of rainwater, extremes of temperature, and biological activity.

It does not involve the removal of rock material.

There are three types of weathering, physical, chemical and biological.

Weathering breaks down and loosens the surface minerals of rocks so they can be transported away by agents of erosion such as water, wind and ice.



Physical Weathering (Mechanical)

Physical weathering is caused by the effects of changing temperature on rocks, causing the rock to break apart. The process is sometimes assisted by water.

There are two main types of physical weathering:

Freeze-thaw occurs when water continually seeps into cracks, freezes and expands, eventually breaking the rock apart.

Exfoliation occurs as cracks develop parallel to the land surface, a consequence of the reduction in pressure during uplift and erosion.



Freeze-thaw



Exfoliation

Where does it occur

Physical weathering happens especially in places where there is little soil and few plants grow, such as in mountainous regions and hot deserts.

How does it occur?

Either through repeated melting and freezing of water (mountains and tundra) or through expansion and contraction of the surface layer of rocks that are baked by the sun (hot deserts).

Chemical Weathering

Chemical weathering is caused by rain water reacting with the mineral grains in rocks to form new minerals (clays) and soluble salts. These reactions occur particularly when the water is slightly acidic.

Where does it occur?

These chemical processes need water, and occur more rapidly at higher temperature, so warm, damp climates are best. Chemical weathering (especially hydrolysis and oxidation) is the first stage in the production of soils.



How does it occur?

Solution

There are different types of chemical weathering, the most important are:

Solution - removal of rock in solution by acidic rainwater. In particular, limestone is weathered by rainwater containing dissolved CO₂, (this process is sometimes called carbonation).

Hydrolysis - the breakdown of rock by acidic water to produce clay and soluble salts.

Oxidation - the breakdown of rock by oxygen and water, often giving iron-rich rocks a rusty-coloured weathered surface

Hydrolysis

Biological Weathering

Disintegration of rocks and the formation of soils through the activities of living organisms.

Trees put down roots through joints or cracks in the rock in order to find moisture. As the tree grows, the roots gradually prize the rock apart.

Many animals, such as these Piddock shells, bore into rocks for protection either by scraping away the grains or secreting acid to dissolve the rock.

Even the tiniest bacteria, algae and lichens produce chemicals that help break down the rock on which they live, so they can get the nutrients they need.

Trees roots in rock



Piddock shells



Bacteria, Algae and Lichens



Review Questions

1. Write a definition for the term “weathering of rocks”.
2. List the different types of weathering.
3. What are the effects of rain water on carbonate rocks.
4. Describe how physical weathering occurs.
5. How do plant roots contribute to weathering.

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