Grade 6 Agriculture and Nutrition

Terms 1, 2 and 3 - notes for 10 topics

IN EVERY TOPIC

- What you will learn and the key words.
- Short, clear notes with worked examples.
- Questions to try and a topic test, with the answers at the back.

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A TASTE OF THE FIRST TOPIC

Soil erosion and its agents

Soil erosion is the removal of the top fertile soil from one place to another by running water, wind, people or animals.

The top soil is the most fertile layer: it holds the humus and plant food. When it is carried away, crops grow poorly and the land can become bare.

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Strand 1.0 Conservation of Resources | Term 1

1.1 Controlling Soil Erosion

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- describe types of soil erosion in the environment
- control soil erosion in the environment

KEY WORDS

soil erosion, splash erosion, sheet erosion, rill erosion, gully erosion, mulching, cover crop, grass strip, terrace, check dam, cut-off drain.

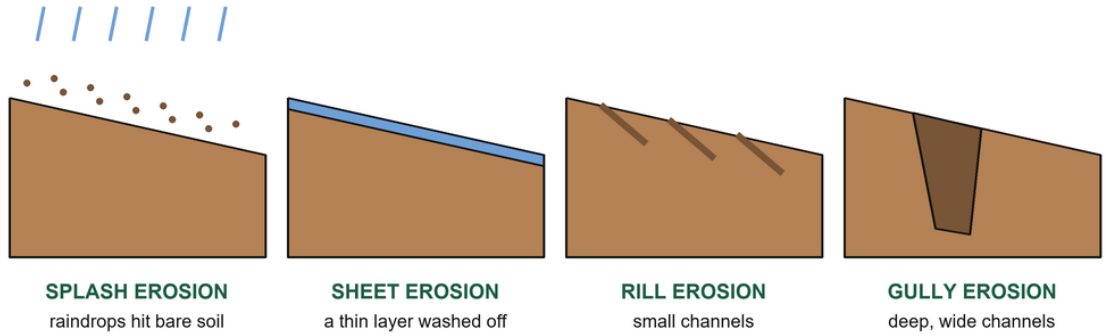
1. What soil erosion is

Soil erosion and its agents

Soil erosion is the removal of the top fertile soil from one place to another by running water, wind, people or animals.

The top soil is the most fertile layer: it holds the humus and plant food. When it is carried away, crops grow poorly and the land can become bare.

Agents of erosion: running water (the main agent in Kenya), wind (in dry, bare areas), and people and animals (overgrazing, paths, cultivating steep slopes, cutting trees).



Four kinds of erosion by water

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2. Splash erosion

Practical: showing splash erosion

Materials: two trays of soil (one bare, one covered with dry grass), watering can, white paper; group work.

Splash erosion happens when raindrops hit bare soil and break it into small particles that are thrown (splashed) into the air and land elsewhere. It is the first stage of water erosion.

Stand white paper upright beside each tray and sprinkle water from a height. The paper beside the bare tray is splashed with mud; the paper beside the covered tray stays almost clean.

3. Sheet erosion

Sheet erosion

Sheet erosion is the removal of a thin, even layer of top soil over a wide area by water flowing as a sheet over gently sloping land. Because it is even, farmers often do not notice it.

Signs: exposed plant roots, small stones and pebbles left on the surface, pale soil, soil piled against fences and grass at the bottom of a slope, and falling crop yields.

4. Rill erosion

Rill erosion

When running water collects into small streams, it cuts small, shallow channels called rills into the soil. Rill erosion follows sheet erosion.

Rills are shallow enough to be removed by ordinary digging, but if nothing is done they get deeper and wider and can join up to form gullies.

5. Gully erosion

Gully erosion

Gully erosion is the most serious stage of water erosion. Rills grow into deep, wide channels called gullies that cannot be filled by ordinary digging.

Gullies divide farms, destroy roads, paths and houses, carry away huge amounts of soil, and are dangerous to people and animals who may fall in.

6. Observing soil erosion around the school

Field walk: observing erosion

Materials: notebooks, pencils; group work with the teacher.

Walk around the compound in groups with the teacher. Look for splash marks on walls, exposed roots, stones left on the surface, small rills on paths and slopes, and any gullies near the fence or road.

For each place, record: where it is, the type of erosion, what caused it (bare soil, path, slope, roof water) and one way to control it. Stay with the group and keep away from deep gullies and roads.

7. Controlling erosion with mulching and cover crops

Practical: mulching

Materials: gloves, dry grass or maize stalks; group work.

Mulching is covering the soil with dry plant materials such as grass, maize stalks or leaves. It breaks the force of raindrops (stopping splash erosion), slows running water (reducing sheet erosion), keeps the soil moist and adds humus as it rots.

Cover crops are low, spreading crops such as sweet potatoes, pumpkins or beans that cover the soil. Spread a layer of mulch about a hand-width thick on a bare patch, leaving a small gap around any plant stem.

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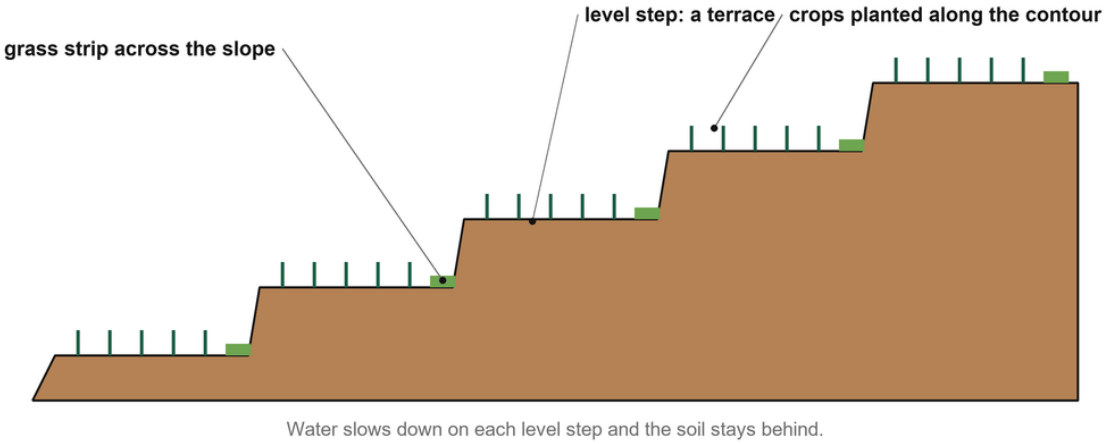
8. Grass strips, contour farming and terraces

Practical: planting a grass strip

Materials: jembes, grass splits, gloves; group work; one learner digs at a time.

Grass strips are lines of grass planted across a slope. They slow running water and trap soil. Contour farming is ploughing and planting across the slope (along the contour), not up and down it. Terraces are step-like level strips cut into a slope; over time soil trapped behind grass strips also forms terraces (bench terraces and fanya juu).

Mark a line across the school slope with sticks. Dig a shallow furrow and plant grass splits about a hand-span apart, then firm the soil and water them.



Terraces and grass strips on a slope

9. Controlling gullies with check dams

Practical: building a small check dam

Materials: stones, sticks, jembe, gloves; group work.

Ways of controlling gullies: check dams (small walls of stones, sticks or sandbags built across the channel to slow water and trap soil), gabions (wire baskets filled with stones), filling small gullies with brushwood and soil, planting trees, grass and bamboo along and inside the gully, and diverting water away from it.

Across a rill on the school compound, push a row of sticks into the ground and pile stones behind them to form a low wall slightly lower in the middle, so that water flows over the centre and not round the sides.

10. Cut-off drains, tree planting and controlling wind erosion

More control measures

Cut-off drains (diversion ditches) are channels dug above a farm or across a slope to collect running water and lead it safely away. Roof water can be collected in tanks so it does not wash the soil.

Tree planting (afforestation): roots hold the soil and leaves break the force of rain. Controlled grazing stops animals from leaving the land bare.

Wind erosion in dry areas is controlled by windbreaks (rows of trees or shrubs that slow the wind), keeping the soil covered and not leaving land bare after harvest.

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11. Importance of conserving soil

Why we conserve soil

Soil grows the food we eat and the grass animals feed on. Conserving it keeps land fertile, gives higher yields, keeps rivers and dams clean (eroded soil fills them with silt), protects roads, paths and buildings, and saves money on fertilisers.

Class presentation: each group presents its erosion record from the field walk and the control measures it has put in place (mulch, grass strip, check dam), and says how it will look after them.

TRY THESE

1. What is soil erosion?
2. Why is losing top soil a problem?
3. What causes splash erosion?
4. Which tray had more mud splashed on the paper?
5. What is sheet erosion?
6. Why is sheet erosion hard to notice?
7. What are rills?

8. Which type of erosion comes before rill erosion?
9. What is a gully?
10. From what do gullies develop?
11. Name one place in the compound where you saw erosion.
12. What type of erosion was it?
13. What is mulching?
14. Give two ways mulch helps the soil.
15. What is a grass strip?
16. What is contour farming?
17. What is a check dam?
18. What is a gabion?
19. What is a cut-off drain?
20. How do trees control erosion?
21. Give two reasons for conserving soil.
22. How does soil erosion affect rivers and dams?

TOPIC TEST

T1. Why is erosion worse on bare land than on land covered with grass?
T2. Suggest one way of reducing splash erosion in a vegetable garden.
T3. Explain how sheet erosion lowers crop yields.
T4. Why do rills often form along cattle paths?
T5. Why is it cheaper to control erosion at the rill stage than at the gully stage?
T6. Draw a simple sketch map of the compound showing where erosion happens.
T7. Why should mulch be dry and not fresh green grass?
T8. Name one grass suitable for grass strips and give one more use of it.
T9. After the next rain, check the dam. What do you expect to find behind it?
T10. Which erosion control measure would you recommend for a dry, windy area in Turkana? Why?
T11. Write a short message to farmers in your area on why they should control soil erosion.

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Strand 1.0 Conservation of Resources | Term 1

1.2 Conserving Water

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- identify types of seedbeds that conserve soil moisture
- prepare different types of seedbeds that conserve soil moisture

KEY WORDS

soil moisture, seedbed, sunken seedbed, shallow pit, zai pit, evaporation, run-off, organic manure, mulch.

1. Why soil moisture must be conserved

Soil moisture

Soil moisture is the water held in the spaces between soil particles. Plant roots take it up; without it, seeds do not germinate and plants wilt and die.

Water is lost from the soil by evaporation (the sun and wind dry the surface), by run-off (water flows away over the surface instead of soaking in), and by weeds that take up water.

In dry areas and dry seasons, farmers prepare special seedbeds that hold water close to the plants.

2. The sunken seedbed

Sunken seedbed

A sunken seedbed is a bed dug so that its surface is lower than the surrounding ground, about 10 to 15 cm below it. The soil removed is piled as a low ridge around the edges.

Water from rain or watering collects in the bed and soaks in instead of running off. The sunken surface is also sheltered from wind, so less water evaporates. Sunken beds are used in dry and semi-arid areas and during dry seasons.

3. The shallow pit

Shallow pits

A shallow pit (also called a zai pit or planting basin) is a small round hole about 30 to 60 cm across and 20 to 30 cm deep, partly filled with a mixture of top soil and manure. One or a few plants are grown in each pit.

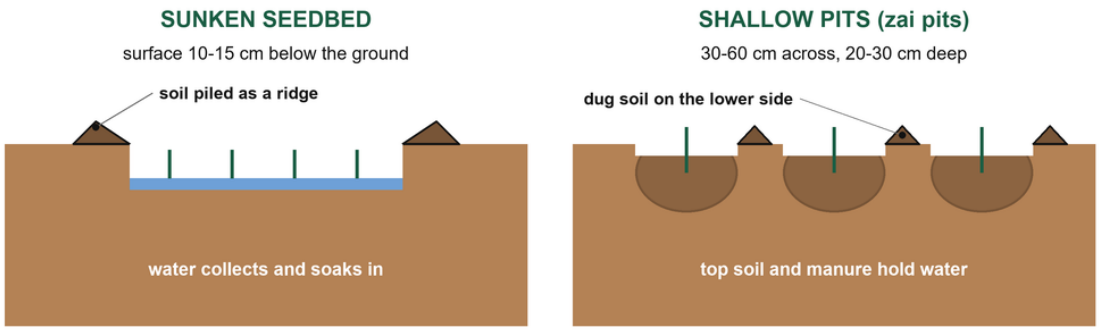
The pit catches rain water and run-off and holds it around the roots, and the manure holds water like a sponge. Pits are dug in rows, and the soil dug out is placed on the lower side to catch more water.

4. Comparing seedbeds

Choosing a seedbed

Raised seedbed: higher than the ground, drains water away; good for wet areas. Flat seedbed: level with the ground; for areas with moderate rainfall. Sunken seedbed and shallow pits: lower than the ground, collect water; good for dry areas.

The choice depends on rainfall, the soil (sandy soil dries fast and gains most from pits and manure), the slope and the crop.



Both catch rain water and keep it near the roots.

A sunken seedbed and shallow pits

5. Choosing and marking out the site

Practical: marking out the site

Materials: pegs, string, tape measure, jembes; group work.

A good site gets plenty of sunlight, is near water, is fairly level (or gently sloping) and is safe from animals. Clear weeds and rubbish, keeping the grass for mulch.

Mark a sunken bed about 1 m wide and 2 to 3 m long with pegs and string, and mark a row of shallow pit positions about 60 cm apart. Share the tasks fairly so that every group member has a turn (social justice).

6. Digging the sunken seedbed

Practical: digging the sunken bed

Materials: jembes, spades, gloves, measuring stick; group work, one learner digs at a time.

Dig out the marked bed to about 15 cm below the ground level and break up the soil at the bottom so roots can grow down.

Put the top soil aside and pile the rest as a low ridge around the edges of the bed. Check the depth with a measuring stick at several points so the bed is level and water spreads evenly.

7. Adding manure and finishing the bed

Practical: adding manure

Materials: well-rotted manure or compost, gloves, rakes; group work.

Spread the kept top soil back into the bed with well-rotted manure or compost (about two buckets for a 1 m by 2 m bed) and mix them together. Rake the surface to a fine, level tilth so small seeds touch the soil.

Wear gloves when handling manure and wash hands with soap afterwards. Fresh manure can burn plant roots and carry germs, so only well-rotted manure is used.

8. Digging shallow pits

Practical: digging shallow pits

Materials: jembes, spades, manure, gloves, measuring stick; group work, one learner digs at a time.

At each marked position, dig a round pit about 60 cm across and 30 cm deep. Put the dug-out soil on the lower side of the pit as a small bank.

Mix the top soil with manure and return it to the pit, leaving the surface about 10 cm below the ground so it can catch water.