4-H CLUB

SOIL and WATER

Conservation

Circular 518
Extension Division
Shawnee Brown, Director
Oklahoma A. & M. College
Stillwater, Oklahoma

SOIL AND WATER CONSERVATION

By Edd Roberts

Extension Soil Conservationist

PURPOSE OF THE 4-H SOIL AND WATER CONSERVATION PROJECT

Everyone living in Oklahoma has an important job to do in conserving soil and water. The job is that of keeping their soils producing food and material for clothing, which are two of our basic needs. Boys and girls can help by studying land conditions and helping prevent the soil from blowing and washing away, in order to keep the soils productive. Conservation farming produces larger crops, which bring in more money to buy things that we want.

Boys and girls can help their parents because they have learned more about soil and water conservation.

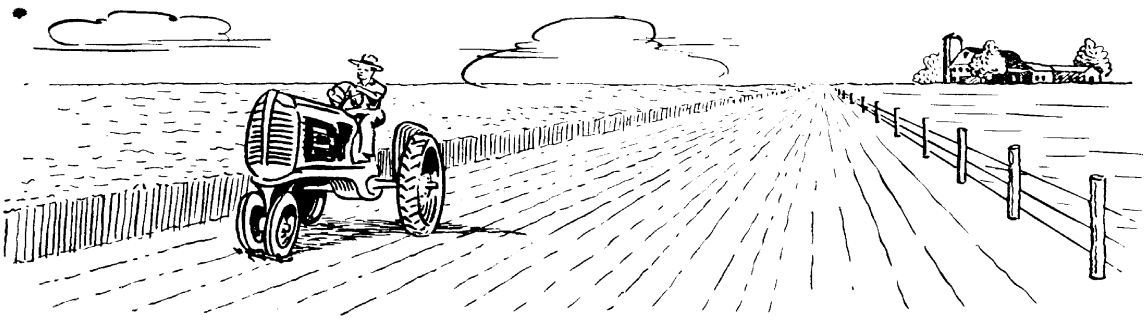
ENROLLMENT IN THE 4-H SOIL AND WATER CONSERVATION PROJECT

This circular outlines appropriate activities in a soil and water conservation project. Boys and girls who live in town will find 4-H activities in this project which they can carry out like those who live on farms. Each boy and girl taking part in 4-H Club work is eligible to enroll in the 4-H Club Soil and Water Conservation project.

It is recommended that each club member enroll in at least one of the following projects, field crops, horticulture, garden, dairy, livestock or poultry, in order to actively apply the soil and water conservation work.

THE NATIONAL 4-H CLUB SOIL AND WATER CONSERVATION AWARD PROGRAM

Those boys and girls who take part in this Soil and Water Conservation Project will have an opportunity to compete in the National Awards Program. County, state and national awards are made. There are two divisions in this program for the age groups 10 to 14 and 15 to 21 years. Ask your county agents about this program.



Part I. Food Comes from the Soil

Food is one of the necessities of life. Soil produces plants which are made into food. We should be interested in the conservation and wise use of our soil and water, in order to continue producing food. Four things are needed in order to produce plants: **sunshine, air, water** and **soil.** The soil also furnishes a support for plants and a place for roots to feed.

If soil is lost, it is like destroying a part of our food factory. Thus, the entire nation is concerned about the conservation of soil and moisture. Each of us in the United States has about three cultivated acres from which our food is produced. We may not know where our three acres are located, but we should be concerned about the care of this land. Our natural resources contribute to making the United States a strong nation.

Man has invented many great machines, but he has never been able to produce food in any way other than by growing plants in the soil and water. The loss of this soil by erosion is serious, because it destroys our power to produce food. We must save our soil and water.

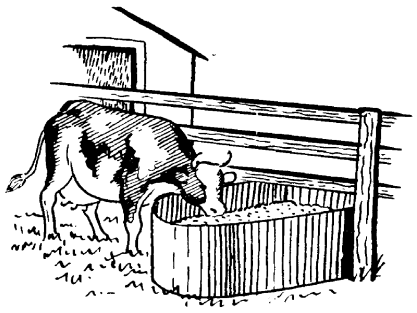


Figure 2. Soil produces feed for the cow that gives us milk.

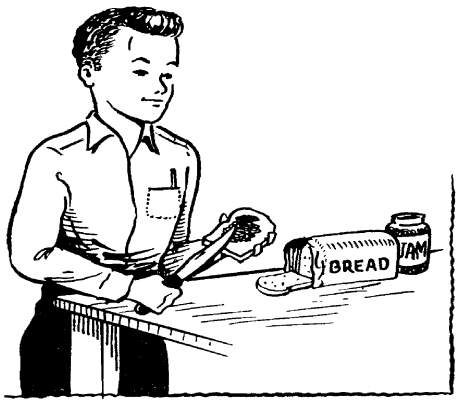


Figure 3. Soil produces wheat that makes bread. Soil grows vines and trees that make fruit for jams.

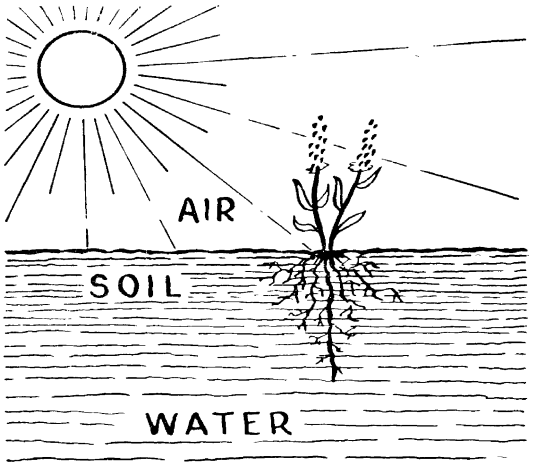


Figure 4. Our food is produced by air, water, soil and the action of the sun on the leaf of a plant.

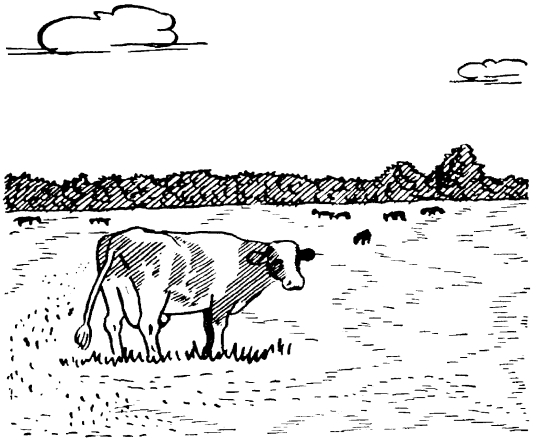
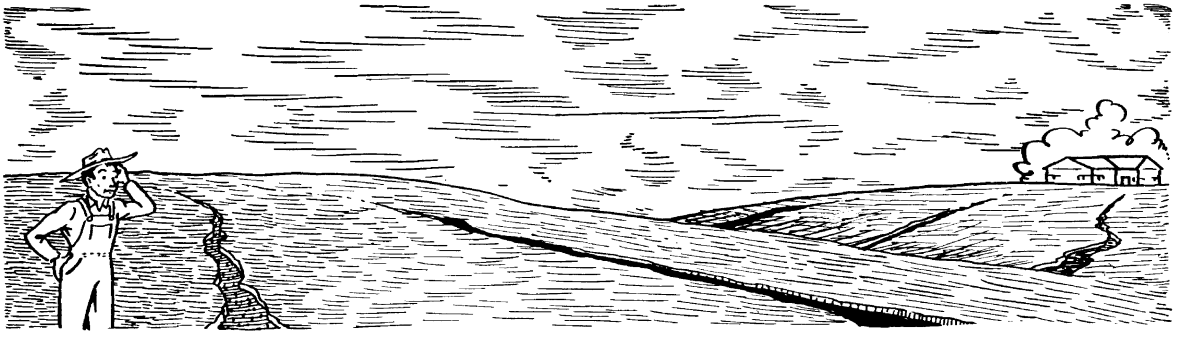


Figure 5. Soil provides food for animals that give us food and warm clothes.

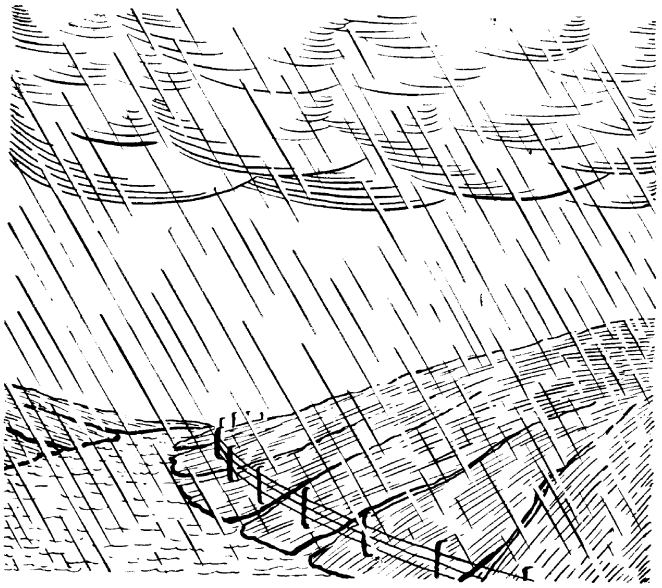
Due to our natural resources, we have the highest standard of living in the world. Only seven percent of the people in the world live in the United States, but we own nearly all the bathtubs, most of the automobiles, and about one-half of all the telephones and radios in the world. If we are going to keep this high standard of living, we must protect our soil.



Part II. How our Soil is Lost

Soil is lost by wind and water erosion (the blowing away and washing away of soil). There are two things that happen when soil particles, (small grains of soil) are eroded. First they are pulled loose from other clumps of soil. Then, either the flow of water or the

Figure 7. One heavy rainstorm can destroy as much soil as Mother Nature has processed in a long time.



force of wind moves these soil particles. This is often caused by the beating of raindrops on bare land. If it keeps on raining, the flow of the water moves the soil to lower ground. For instance, water washes the soil from the hillside to the creek bottom. If it rained hard for several days, therefore, there would be a lot of good soil washed down the creek.

Nature protects the bare ground by putting some type of plant life on it. Did you ever notice that when you quit farming a field or stop playing on the school ground, some type of weeds or grass starts to grow? This vegetation (grass, weeds, or trees) works just like an umbrella. It protects the land from the beating rain. In addition, roots of the plants help bind the soil and hold it together.

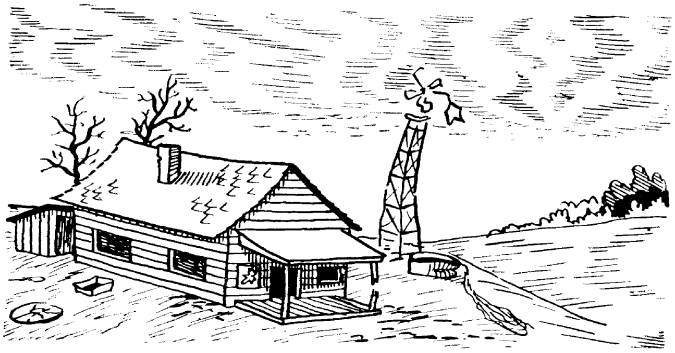


Figure 8. The productivity of this farm has been destroyed by erosion.

Strong winds move soil particles and bring about wind erosion. A heavy covering of vegetation will protect the bare land and prevent this type of erosion.

Decayed leaves, stems and roots help tie soil particles together. This also aids in stopping wind erosion.

Floods damage land by covering up the surface with

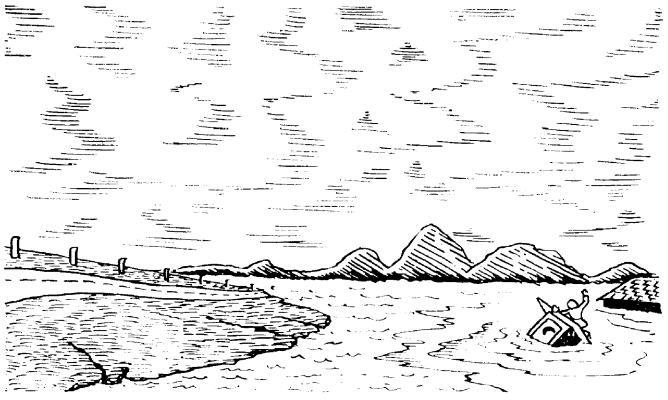
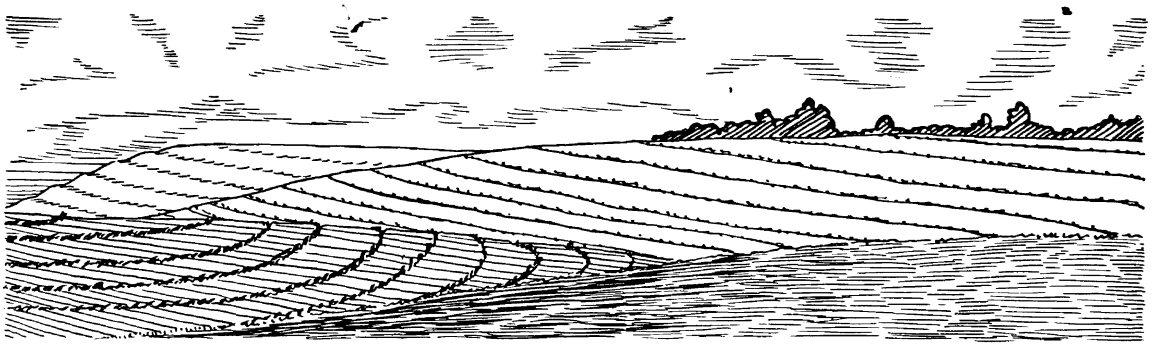


Figure 9. Rampaging floods damage fields, highways, crops and property.

poor soil washed from the hillside. The force of the water loosens the soil and carries it away. In addition, crops, wildlife, buildings, livestock and other property are destroyed by swiftly moving flood waters.

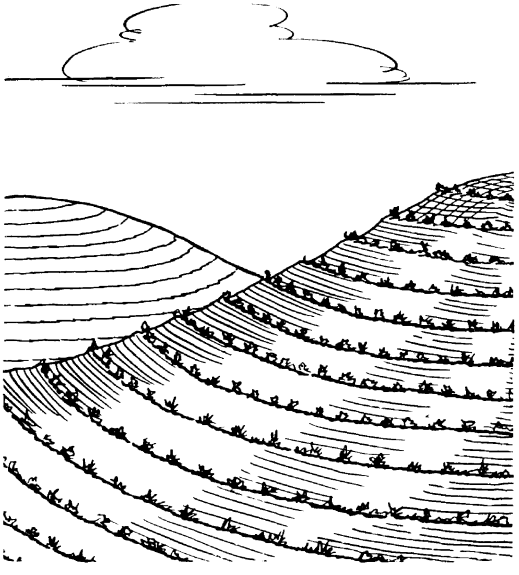


Part III. Ways to Save Our Soil and Water

There are two ways to check wind and water erosion. They are by the use of vegetation and mechanical methods, such as terracing, contour cultivation, earthen dams and tillage methods.

Steep eroded fields, which have been cultivated for many years, are often returned to grass and clover to check erosion.

Legume crops add organic matter and other plant food to the land, which improves the structure of the soil. Legumes also add nitrogen, which is produced through nodules (knot-like growth) on the plant roots. Deep-rooted legumes help pry the soil particles apart so that water can go through easily and let air circulate back and forth in the soil. Legumes also improve the tilth of the soil.



Soil is found in either single grains or in granules. The granules are little clusters of several grains of soil stuck together. This formation looks like moist sugar. Keeping soil in granular form is best so that air and water can go through the soil freely and feed plant roots.

Figure 11. Contour farming prevents soil erosion and traps extra water, which is needed to produce crops.

The killing of weeds is another moisture conservation practice. Tillage soon after the harvest of small grain crops kills weeds and saves moisture, which the weeds would otherwise take from the land. A five bushel increase per acre of wheat has been obtained by this method.

Terraces are the larger type of contour ridges which are constructed across the slope of the land. They usually have a fall which allows the extra water to flow slowly out the ends through sodded outlets, although some terraces are made on the level.

Contour cultivation is applied by constructing all furrows on the level or nearly on the level and across the slope.

Earthen dams are built in draws, creeks, and low spots to trap runoff water and form a pond. This is a means of saving extra water for livestock and irrigation. It is best to have a grass or timber cover above the farm pond in order to keep the water clear and to stop soil from washing into the body of water. Ponds have spillways to take care of extra water. Sometimes if they are not built right, they wash away.

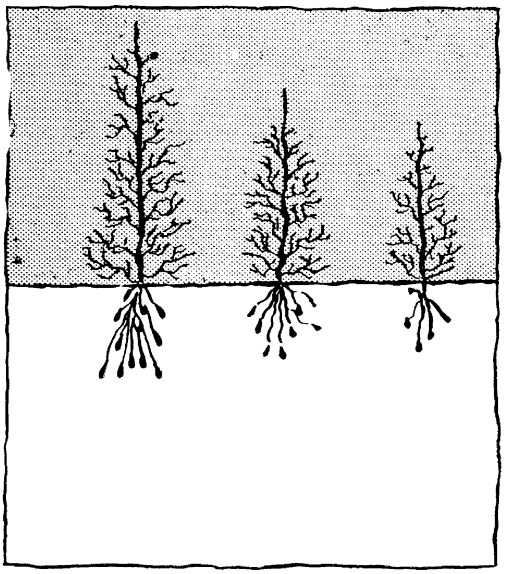


Figure 14. Deep-rooted legumes pry the soil open, thus making it easier for water and air to penetrate and circulate through the soil, and they add nitrogen and organic matter.

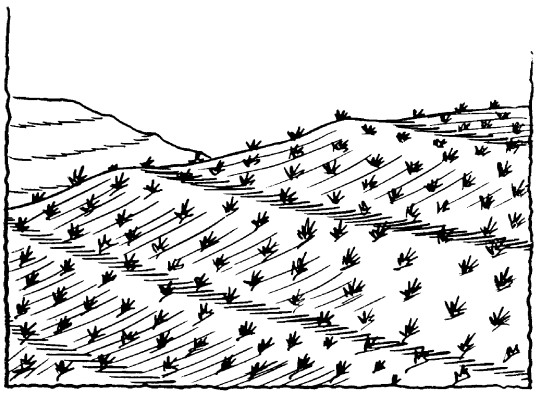


Figure 12. Terraces retard water runoff, reduce sheet erosion, and stop gully formation. They also trap extra water for crop production.

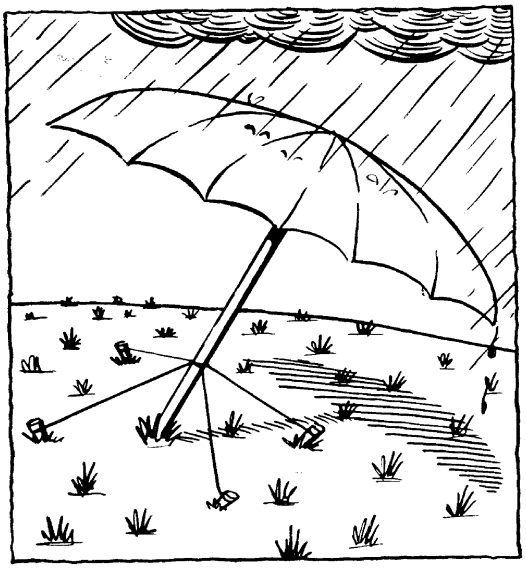
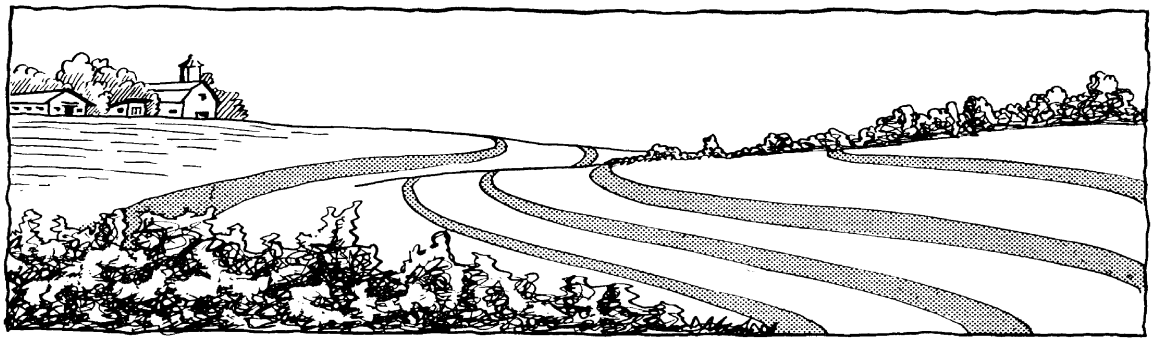


Figure 13. Cover crops spread like an umbrella over the land and protect it. Thus the force of beating raindrops is reduced by the vegetative cover, and splash erosion is checked.



Part IV. What You Are To Do

Girl's Work:

1. Collect samples of soil from the vegetable or flower garden and have a soil test made.

2. Find out the minerals and fertilizers needed for the vegetable or flower garden or lawn and apply when needed.

3. Conduct a demonstration garden plot—for example, one with good soil and fertilizer versus one with poor soil and no fertilizer.

4. Apply one or more soil and water conservation or improvement practices on your garden, horticulture or field crop project.

5. Learn to determine the texture of the topsoil, permeability of subsoil and depth of soil in fields or gardens. In studying these factors, learn the value of each with reference to cultivation and production.

6. Learn to identify and determine the value of native range plants, pasture crops, clovers and weeds.

7. Prepare a scrapbook as related in Part VI.

8. Give a team demonstration on some phase of soil and water conservation.

9. Give a timely topic on some phase of soil and water conservation.

10. Make posters on soil and water conservation to be displayed at appropriate times.

Girls enrolled in the soil and water conservation project may select a minimum of four of the above activities in carrying out this project. In addition write a narrative of 300 words or less on your soil and water conservation activities and work.

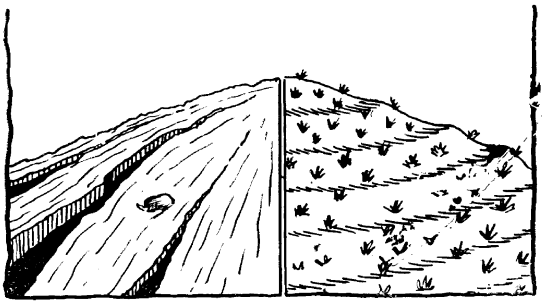


Figure 16. Observations on field trips make it possible to compare conservation farming methods with soil depleting methods.

Boys' Work:

1. Collect samples of soil from the crop, garden or horticulture project and have a test made.

2. Prepare a soil and water conservation scrapbook as related in Part VI.

3. Apply one or more soil and water conservation or improvement practices on your garden, horticulture or field crop project.

4. Apply soil and water conservation or improvement practices on a field and leave a part of it untreated as a check plot for comparison.

5. Learn to determine the texture of the topsoil, permeability of subsoil and depth of soil in fields or gardens. In studying these factors, learn the value of each with reference to cultivation and production.

6. Learn to identify and determine the value of native range plants, pasture crops, clovers and weeds.

7. Take part in at least one timely topic and team demonstration in regard to soil, soil and water conservation or related subjects.

8. Make posters on soil and water conservation to be displayed during special occasions or events.

4-H boys enrolled in the soil and water conservation project may select a minimum of four of the above activities in carrying out a project. In addition, write a narrative of 300 words or less on your soil and water conservation activities and work.

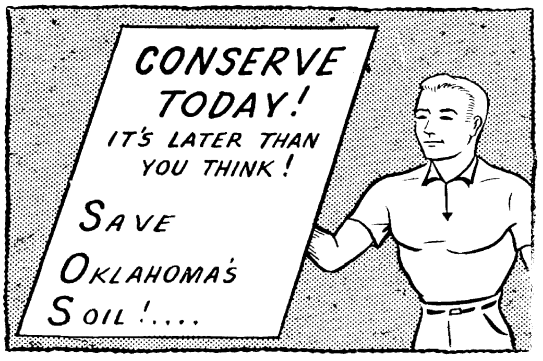
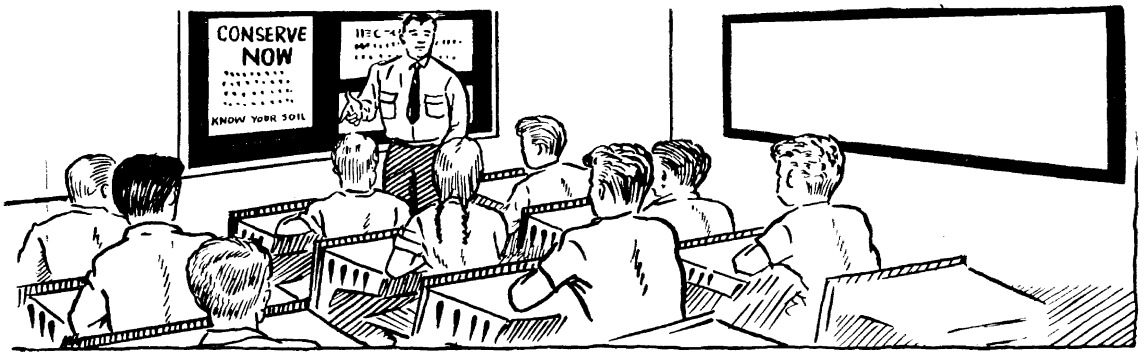


Figure 17. Posters regarding soil and water conservation may be exhibited at appropriate events to make the public conscious of this important work.

Part V. Activities for Studying Soil and Water Conservation



The conservation of soil and water can be studied by making field trips and by having exercises in the 4-H club room, at school or at home. It is suggested that you use Circular No. 509. "Know Your Soil," as a reference. Visit your local soil conservation district and ask the people of the Soil Conservation Service to help you.

The following things may be studied by the 4-H club members:

1. **How Soil is Formed.** Soil is ground-up rock, shale, sandstone and like materials. It takes several hundred years for the elements of nature, such as freezing, thawing, air and sunshine to weather rock and turn it into soil. Take two rocks and rub them together and let the particles fall on a piece of paper. You will notice that you have turned the rocks into very small particles of soil.

2. **Parent Material of Soil.** Take a shovel and dig down into a field or pasture, and you will find the material from which soil is made.

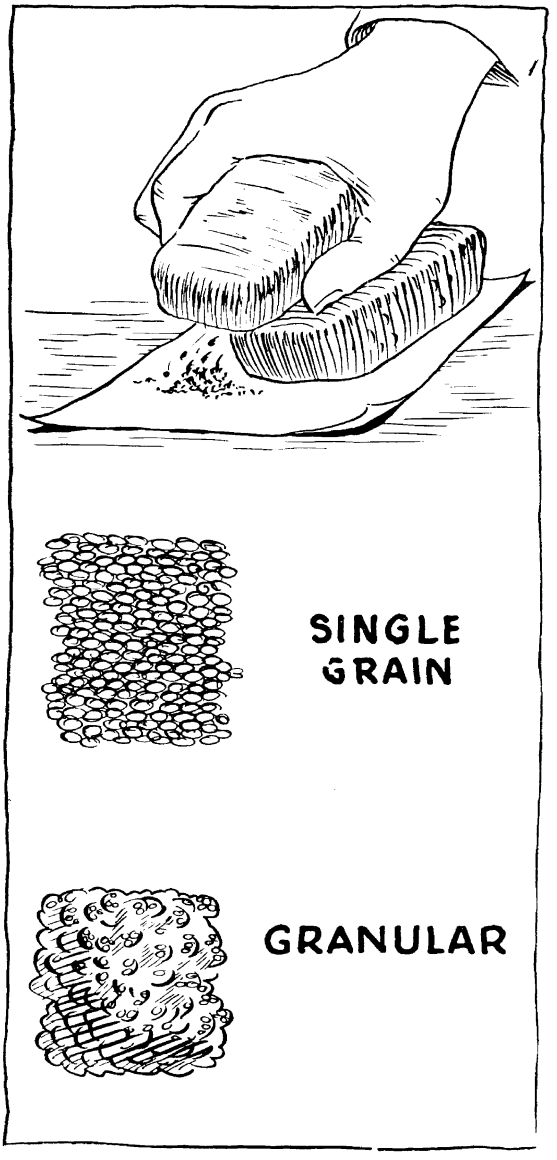


Figure 19. Where sandstones are rubbed together, they form single grains of soil. If organic matter is added to the single grain, soil clusters or granules are formed.

It may be rock, shale or sandstone, and it is called parent material. Notice the color of this material. Usually the color of soil is determined by the color of parent material. For example, red land may come from red shale or red sandstone. Sandy land is developed from sandstone. This will not always hold true in a valley and bottom lands where the materials have washed in from a distance.

3. **Topsoil and Subsoil.** There is a difference in topsoil and subsoil. The topsoil on the surface area of land has a richer color because it contains more organic matter. It is easy to study profiles (side views) along road banks or gullies. The subsoil is underneath the topsoil, and the next layer is parent material. Notice the thickness of the topsoil and subsoil.

Collect samples of subsoil and topsoil, and put them in separate tin cans or flower pots. Plant seeds in each of these and compare the growth of the plants.

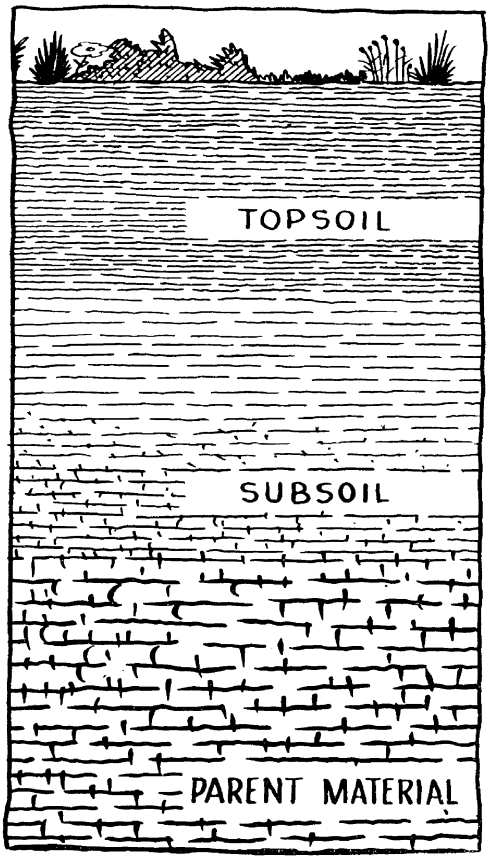


Figure 20. This is a profile of soil In this case, the first layer is topsoil, the next subsoil, and below is parent material.

4. **Virgin Topsoil.** Collect soil from an uncultivated meadow, pasture, grassland, or woodland. This is virgin soil. Notice the thousands of roots that bind it together, if taken from grassland. It has a high content of organic matter. It will hold more water and will not bake or crust as much as cultivated land or an old field. Collect some samples of topsoil from a nearby cultivated field and compare them. Cultivated land often lacks organic matter.

5. **Collect Samples of Different Kinds of Soil.** Collect as many different kinds of topsoil as you can and place the samples in fruit jars, coffee cans, or similar containers. Collect sandy land, clay, loam and even some gravel. Wet the soil and feel it. Rub it between your fingers and thumb. There is a difference. Clay is sticky when wet, but it cracks when dry. Sand is coarse and grainy. Silt is like flour in soil. Loam is a combination of clay, sand and silt. The relative per-

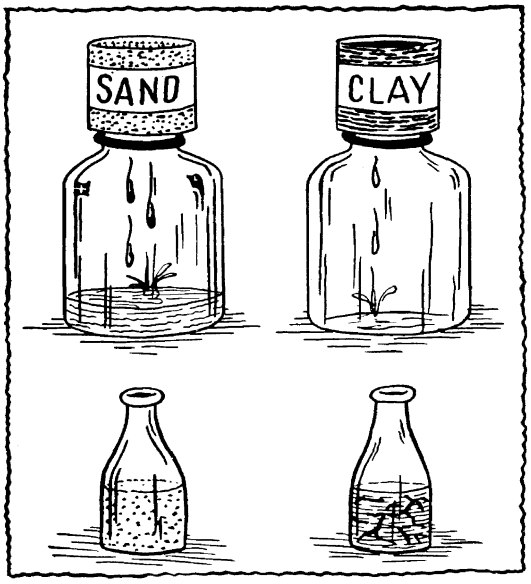


Figure 21. Water penetrates sand quickly. See left above. Goes through clay slowly, see right above. Clay holds nearly twice as much water as sand. The milk bottle on the left contains a sand sample. On the right is a sample of dry clay. Notice how the dried clay has cracked.

centages of sand, silt, and clay in soil determine the texture of topsoil, which are classified as fine, medium and coarse.

6. **Water Holding and Penetration Test of Topsoil.** Take two tin cans and punch four nail holes in the bottom of each. Fill one can half full of sand and the other half full of clay. Set them on top of quart fruit jars. Pour one-half cup of water in each tin can. Note the difference in the rate of water penetration. It goes through the clay much slower than through the sand. Notice that the clay will hold about twice as much water as the sand before the water starts dripping out of the bottom of the can. Clay soil is harder to cultivate because it has a sticky effect. Loam soil is the choice kind of soil because it has just the correct amount of sand, silt, and clay which makes it easier to manage.

7. **Plow Sole.** Plow sole is formed in cultivated fields at the depth where the farmer plows every year. The pressure of the plow packs the land and tends to form a hard layer which is usually about 1½ to 2 inches thick. This layer slows water penetration of soil and affects root growth. For example, small grain roots reach the plow sole in the fall of the year, and if they cannot penetrate it, they run along parallel to it. The plow sole can be broken by plowing deeper and below it. This will help for one season. Deep-rooting legumes should be used to keep it broken up for many seasons. You can use a shovel, press down into the topsoil and easily locate the plow sole. Study its effect on root growth and water penetration by comparing them in grassland and cultivated fields. You will not find a plow sole in the grassland. Why?

8. **Subsoil.** There are four classes of subsoil—very slowly permeable (passage of water and air), slowly permeable, moderately permeable, and rapidly permeable. Roots and water have trouble penetrating very slowly permeable subsoil because it is a heavy clay or clay pan. Slowly permeable subsoil will "leaf out" when pressed between

the fingers. It is a crumbly clay subsoil. Moderately permeable subsoil is the best because it has highly granular clay loam content and it feels like cornbread crumbling in the fingers. Roots and water can easily penetrate this subsoil. Rapidly permeable subsoil is sandy and may have some gravel. It has too much open space and allows too much water to go through rapidly. Permeability of subsoil means the ability of soil to take up water and air and to give up water and air to plants. Collect samples of the different types of subsoil and study them.

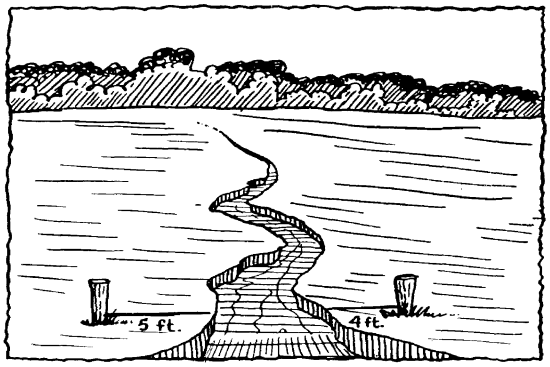


Figure 22. A good place to measure soil loss is along the edge of a gully.

9. **Depth of Soil.** Study the depth of soil along a road cut or gully. The depth of soil is the sum of the depths of top soil and subsoil layers. Deep soil is better because the roots can go deeper into the soil. It will also hold more water and there is more space for plant food. Deep soils are more than 36 inches in depth. Moderately deep soils are 20 to 36 inches deep. Shallow soils are those that have less than 20 inches and more than 10 inches in depth. Very shallow soils are less than 10 inches deep.

10. **Infiltration Rate of Soil.** Soils differ in the amount of time required for water to pass through. It takes water longer to pass through tough layers of soil. Tough layers of soil also make it hard for roots of plants to go through. You can study these conditions by using two tin cans with both the top and bottom cut away. Press one of the cans down into the soil for an inch or more in grassland. Pour in a cup of water and record the time that it takes to penetrate this land which is filled with roots. Do the same on a nearby cultivated field. You will be checking the infiltration rate of soil. You will find that the grassland filled with roots will absorb water much faster. This shows that most good grassland will take up more rain than cultivated land of the same texture.

11. **Leaching of Soils.** The calcium content of soil will leach out due to high amounts of rainfall. The land in the eastern part of Oklahoma is much lower in calcium content than in the western part because of the larger amount of rainfall which has leached out the calcium. Soil tests are made to determine the calcium content of soil. When this content is low, limestone, a form of calcium, is added to the soil at a rate of about one or two tons per acre. This leaching process may be studied by using a tin can with four nail holes in the bottom. Fill the can half full of coffee grounds. Place it on top

of a glass jar. Pour in a half cup of water. Look at the water leach out of the coffee as it drips into the jar. When making a field trip, watch for the white calcium material along deep canyon walls or gullies. You will find this material leached down several feet. We are interested in calcium, because it is a basic element of the bone.

12. **Earthworms Benefit Soil Structure.** The earthworms help land by improving the structure of soil. Castings from earthworms form air and water-penetrating spaces in soil. This air and water space improves land. Usually, there are about 400,000 earthworms to an acre of land where conditions are favorable. Take two samples of poor soil from a cultivated field and place them in separate containers. Put two to four worms in one of the containers. Compare the difference in the structure of the soil samples in about one week. Two plants may be placed in two other flower pots of the same kind of poor soil, one containing earthworms. Watch the difference in plant growth. We can copy the work of earthworms by growing deep-rooted legumes.

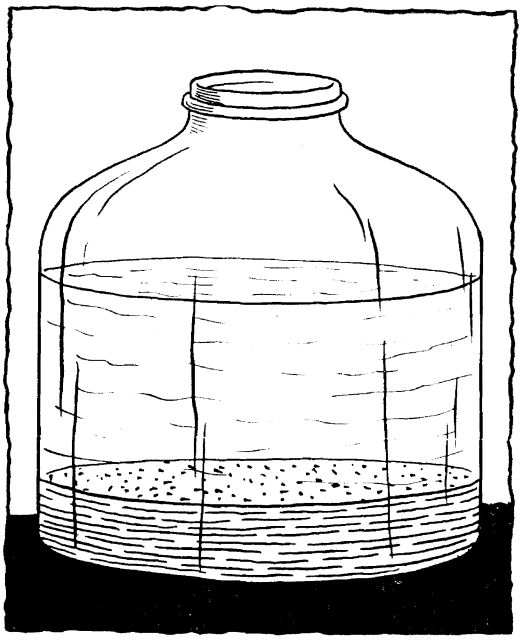


Figure 23. Notice the amount of soil in the bottom of the fruit jar. This soil settled out of muddy water which ran off of a cultivated field. This ilustrates the large amount of soil lost by water erosion.

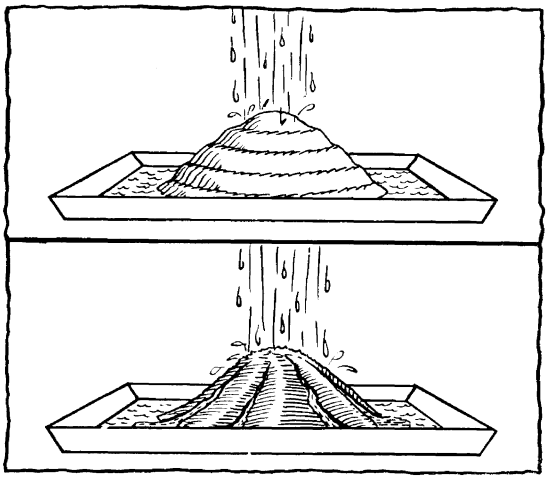


Figure 24. Top. Terracing and contour farming trap extra water and check soil erosion. Bottom. Soil and water is lost by farming with the slope.

13. **Loss of Topsoil by Erosion.** Select a place on a road cut along a sloping field and measure the thickness of the topsoil near the fence row. Now compare this with the thickness of the topsoil about

50 feet over in this sloping field. You will need to dig a hole in the field with a shovel or post-auger. Notice that from 1/5 to 1/2 of the topsoil has been lost. Hard rains on a sloping, cultivated field increase soil losses.

14. **Gully Erosion.** Locate a small gully in a cultivated field or some abandoned field. At the head of the gully, set two stakes two feet from the edge of the break on each side of the gully. After a hard rain, check this gully and see how much soil has been lost. Measure the distance now between the stakes and the edge of the gully on both sides. How much soil has been lost? What happened to the soil? Compare with another gully where the headwater has been diverted.

15. **Muddy Water.** Take a fruit jar and collect a sample of muddy water after a rain from a sloping, cultivated field. Let the water in the jar settle for about two days and measure the amount of soil in the bottom of the jar. Notice how much soil is on the bottom of the jar. This shows how much soil we are losing by erosion on bare, cultivated fields. Compare this with water from a pasture.

16. **Study of Terraces and Contours.** Terraces are built to prevent soil and water loss by washing. This can be demonstrated by making two mounds of soil about 18 inches in diameter and about six inches in height. On one of the piles, make furrows up and down the slope with the finger. On the other mound, make contours or terraces around the slope on a level parallel with the ground. Pour water on both mounds with a bucket, spray, or water hose to resemble rain. See how the terraces and contours trap and hold the water. Notice how the water washes down the furrows which were made with the finger on the mound where the terraces and contours were not constructed.

17. **Slope of Land.** After a rain, walk out on a cultivated, sloping field. See how little rills were formed where the soil had washed down the hill. What caused the soil to erode? Notice that the slope of the land makes a difference. Now compare this with another field which is nearly level. Do you find the little rills and washed places? Is there less erosion on the level land?

18. **Raindrop Erosion.** You can study raindrop erosion by filling a tin can with soil, level with the top. Smooth the top with a small board. Place a coin in the center of the can on top of the soil.

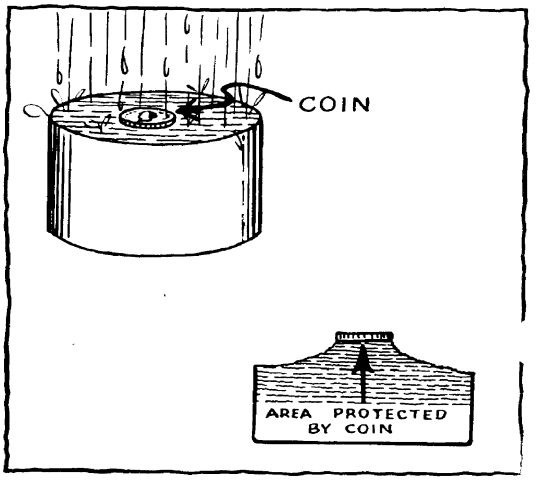


Figure 25. Soil underneath the coin is protected from splash erosion caused by beating raindrops. Likewise, cover crops protect land from splash erosion.

Use a spray can or water hose, and spray the surface in a way that would resemble a hard rain. Notice how the coin remains on a little mound of soil above the other soil. It protects the land. Likewise, grass, legumes, and vegetation protect the soil from the beating raindrops and help to prevent erosion. In addition, notice how pebbles or roots are setting on a small mound of soil after a hard rain. The beating raindrops have splashed the soil particles away from the bare soil.

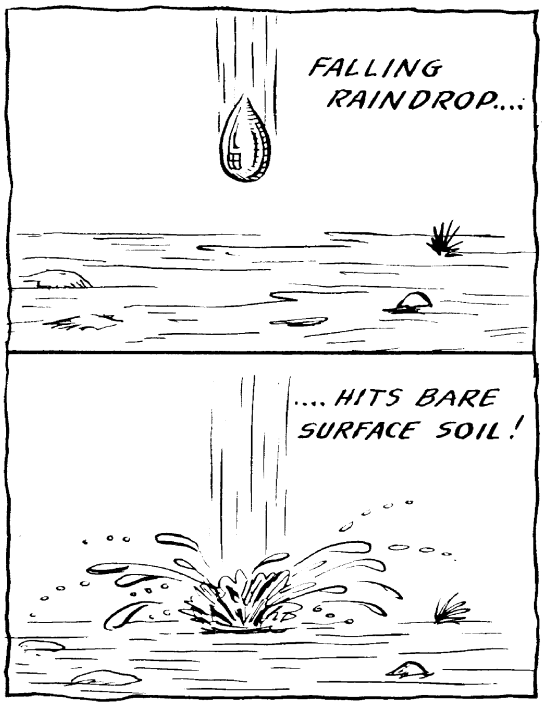


Figure 26. The impact of the falling raindrops on the bare surface soil starts the problem of water erosion.

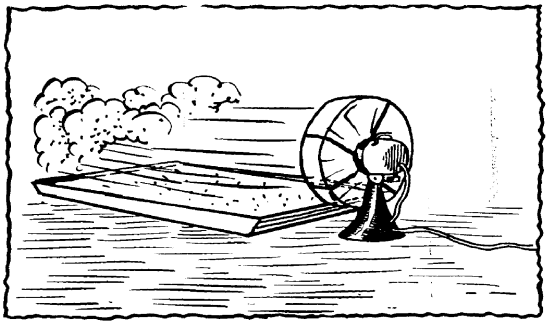


Figure 28. Wind erosion resembles the fan blowing across the box filled with sand. The wind moves the soil unless it is protected.

19. **Cover Crops.** Clovers, grasses, and other cover crops protect bare land and prevent erosion. This can be studied by building two small slopes with boards. Cover the other board with blotter paper. Pour a tablespoon of water on each of the slopes and see the amount of water that runs off. The one covered with blotter pa-

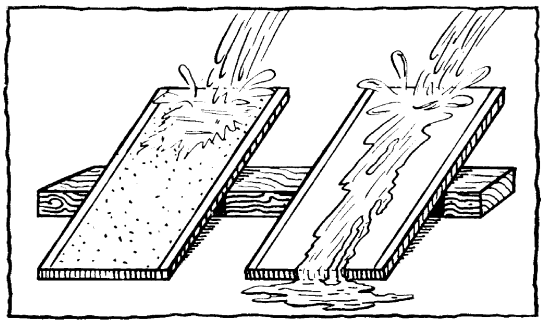


Figure 27. Cover crops, like the blotter paper on the left, help prevent water runoff. Water runs off of bare land like it does on the slick paper on the right.

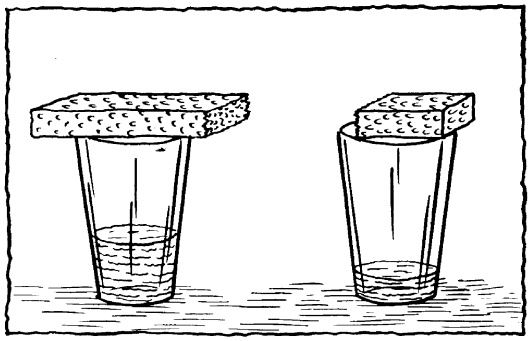


Figure 29. Losing 1/3 of our organic matter in soil is like 1/3 of a sponge. The water holding capacity of the soil is reduced by a deficiency of organic matter.

per will take up large portion of water. Cover crops and vegetation serve to protect the land from splash erosion and drink up more water than the bare surface land.

Wind Erosion. The force of the wind moves bare sandy land. Wind erosion may be checked by the use of vegetation or cultivation crosswise the direction that the wind usually comes. This may be studied by filling a box with sandy soil two feet square and about two inches deep. Set on electric fan at one side of the box of soil and let it blow across. Notice how the loose particles of soil are moved by the wind. If you do not have an electric fan, use a piece of cardboard as a fan for forcing air across the soil. Cut small twigs of vegetation and make little rows crosswise to the wind. Notice how this checks the wind erosion. Try making furrows with the fingers through the soil crosswise to the wind and moisten it. This is like cultivation and furrows which are used as a temporary method of checking wind erosion.

21. **Importance of Water to Plants.** Plants must have water because about 3/4 of the average plant content is water. Subsoils differ in the rate of water penetration, and the rate of water given up to plants. Permeable subsoils take up and give up water more readily than very slowly permeable subsoils. This can be studied by filling two ordinary kersoene lamp chimneys 3/4 full of soil. Put very slowly permeable subsoils in one chimney and permeable subsoils in the other. Be certain the soil is crumbly and dry. Tie a piece of gauze or cloth over the bottom of the lamp chimneys in order to hold the soil. A rubber band may be used to hold the cloth. Put an inch of water in a bake pan. Set the two chimneys in the bake pan and watch the action of the water as it goes up in the soil. In addition, fill two pint containers half-full of soil—clay in one and sand in the other. Pour 1/2 cup of water in each container. Allow the soil to dry. In a few days, notice how the clay soil cracks and bakes, but the sand will not crack open. Crops do not wilt as much in hot, dry weather on sandy soil, because sandy textured soil gives up water more easily to the plant.

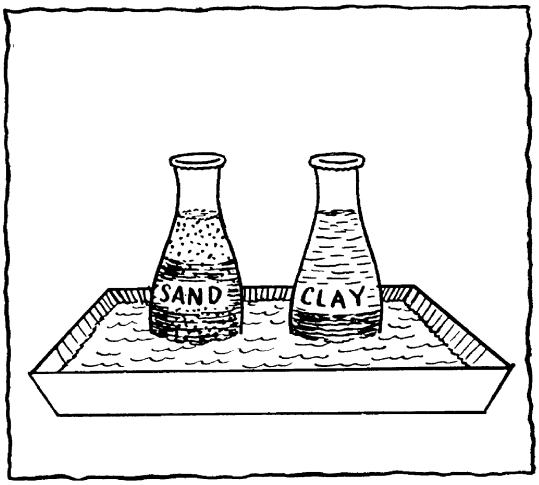


Figure 30. Capillary action caused water to rise from the pan through the lamp chimneys. It will rise through the dry permeable subsoil (left) more quickly than through the very slowly permeable subsoil, (right).

22. **Organic Matter.** Take two samples of soil—one from a meadow, pasture, or woodland. This will have a high organic matter content. Select another soil that is similar in texture from a nearby worn-out, cultivated field. Notice the difference in the color of the soils. Fill two tin cans which

have nail holes in the bottom, half-full of the two different soil samples. Set the two cans on two glass jars. Pour ½ cup of water in each and observe the difference in how the water oozes through the two different soils. The water moves rapidly through the soil which is rich in organic matter. About ⅓ of the organic matter in the cultivated soil has been lost. This decreases the water storage of the land. This can be demonstrated by soaking a sponge with water. Cut off ⅓ of the sponge and squeeze the water out of both pieces of the sponge into two water glasses and see the amount of water that is being lost because of the lack of organic matter.

23. **Plant Food.** Plants need food. The three elements usually needed most are nitrogen, phosphorus and potassium. The nitrogen gives the plants a dark green color and promotes growth. Phosphorus aids in the production of the fruiting, such as the seed, grain and fruits. Potassium aids in the growth of the plant. Make a collection of fertilizer tags. Notice the difference in the fertilizer formulas—for example, in 4-12-4 fertilizer, the proportion of nitrogen is 4 parts in 100, 12 parts of phosphorus in 100, and 4 parts of potassium in 100. Apply fertilizer on soil where plants are growing. either flower pots, gardens or fields and compare this with untreated soils. Try fertilizers of different formulas on plants and compare the results in growth and production. The county agent can test the soil for these plant foods.

24. **Farm Ponds.** Study a farm pond. Is the water muddy, or is it clear? Is the land above it covered with grass or trees, or is it bare land? Notice how clear the water is in ponds where the runoff above is from land heavily covered with vegetation. What kind of plants are growing in the edge of the water? Is the water cloudy because of the development of plant food for fish? Is the pond dam covered with vegetation? Study the spillway. Is it covered with vegetation, or is the water cutting and washing out the soil?

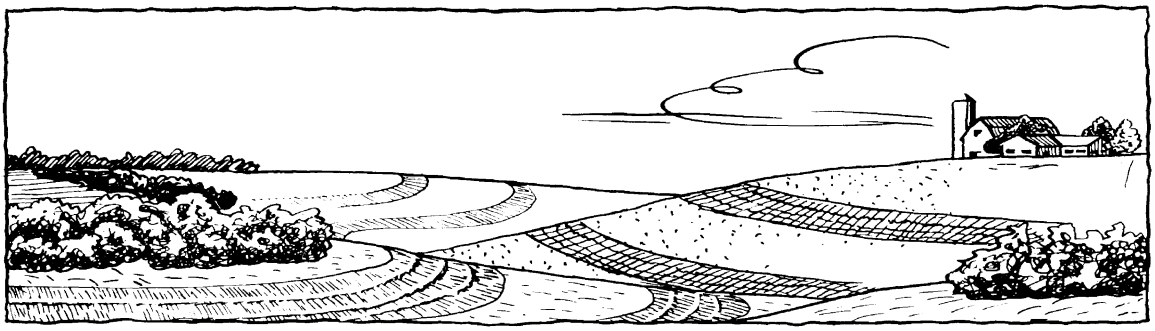
25. **Leaf Mold, Tree Roots and Forest Soils.** Study the soil underneath trees. Notice how the leaves decay. A mulch is formed and you have a litter. Collect a sample of leaf mold from underneath the trees and compare it with soil on cultivated fields. The tree roots bind the soil and help hold it. Notice along a creek bank, where the roots of trees are showing how they bind the soil and hold the creek bank against the flow of water.

26. **Water Evaporation.** Moisten a cloth, preferably a towel or washcloth, and hang it on a clothesline. Does it dry out more quickly when the wind is blowing and the sun is shining or on a still cloudy day? Notice that the wind, sunshine, and temperature speed up evaporation and cause the cloth to dry much more quickly. About six feet of water is lost each year from ponds by evaporation. Moisture also evaporates from fields and soils. Use a stake and mark the waterline of a pond during a dry season. Measure the water level of the pond

and see how much it evaporates. Observe how the surface of bare cultivated fields are dry and how they bake and crust after rains. Land covered with vegetation or litter retards drying out of soil. This can be studied by placing a board on a cultivated plot. Notice how moist it is underneath the board in a few days. Tillage methods and conservation practices can be used to conserve soil moisture.

27. **Visit Your Local Soil Conservation District Office.** Visit your local soil conservation district office. Ask about the organization of the district. It is a sub-division of government similar to other divisions of county government. It has been organized to help farmers conserve soil and water. Plan a trip over some of the farms with a member of the Board of Supervisors of the local soil conservation district or a technician of the Soil Conservation Service, and study soil and water conservation practices.

Part VI. Prepare a Scrapbook



Prepare a scrapbook on soil and water conservation. It should have the following things:

1. Pictures, illustrations, and clippings of soil and water conservation practices. They may be taken from bulletins, magazines and newspapers.

2. Clippings of events in your locality about soil conservation activities.

3. List conservation practices applied on the land that you and your family operate.

4. List conservation practices that your neighbors apply.

5. Where possible, use pictures showing the application of soil and water conservation work you have done, or the studies you have made of this subject.

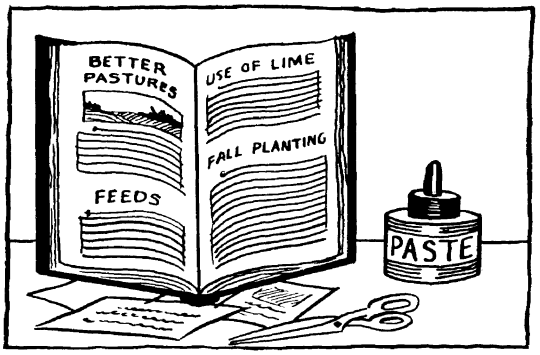
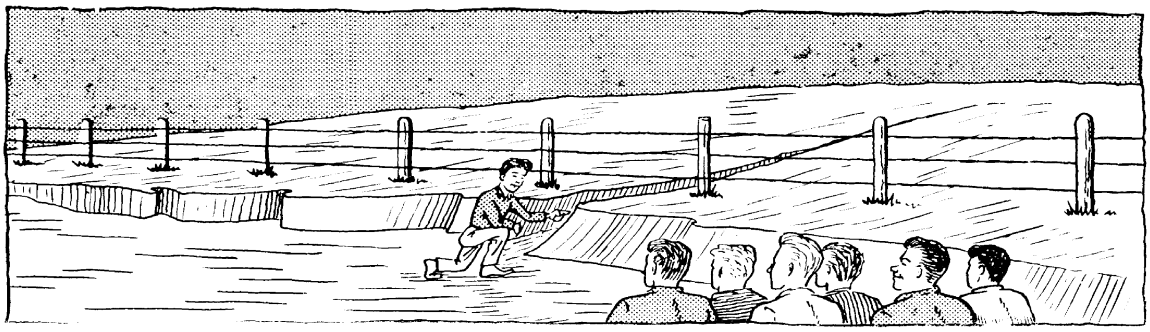


Figure 32. A scrapbook pertaining to soil and water conservation can be prepared by each 4-H club member enrolled in the project.

Part VII. Individual and Team Demonstrations



Prepare individual and team demonstration on subjects relating to soil and water conservation and give them at 4-H club meetings and other meetings. Subject matter for these demonstrations can easily be selected from Part V in this bulletin. In addition, use appropriate references.

Following are examples of an individual demonstration and of a team demonstration:

Example of Individual Demonstration

TESTING SOIL PROFILES FOR COMPACTED (PLOW SOLE) AREAS

(4-H Method Demonstration Outline in Soil and Water Conservation)
PURPOSE: This demonstration has been planned to show how the presence of tight or compacted areas, commonly called plow soles, can be determined by a simple test. This test shows the faster rate in which water containing precipitated chalk in suspension soaks into compact areas where a plow sole has developed.

This demonstration should be given when the soil contains sufficient moisture to permit pushing the soil sampling tube downward into the subsoil.

A. EQUIPMENT NEEDED:

1. One or more soil sampling tubes. (These should preferably be 18 inches or longer in length.)
2. A pocket knife to smooth surface of soil core in sampling tube for testing with the chalk water.

3. A small bottle of water containing precipitated chalk in suspension. This bottle should be fitted with an eye dropper stopper. (Note: only enough chalk should be in suspension to give water a cloudy appearance.)

B. PREVIOUS PREPARATION:

1. Become thoroughly familiar with references which deal with this problem.
2. Practice by taking soil cores in fields where compacted layers are present as well as in fields which are normal so that the compacted condition can be readily recognized when encountered.

C. THE DEMONSTRATION:

1. Introduction
   a. Your name and your club.
   b. State purpose of demonstration.
2. Giving the demonstration
   a. Take soil sampling tube which contains soil profile core which had been taken previously from a field believed to have a compacted layer. Cut exposed surface level with edge of the tube opening. (This should be done by running knife slowly along the edge of tube with a chipping motion, keeping thumb just in front of knife to prevent disturbing soil in tube.)
   b. Note area in the soil profile where soil is tighter and describe condition to audience. Explain what causes this condition to develop.
   c. Beginning at the surface of the soil sample and continuing every inch or so downward, place a drop or two of the precipitated chalk water on the soil and note rate at which water and chalk soak into soil. Call this to the attention of the audience. Where the water movement into the soil is slowed down or the water tends to remain unabsorbed, this indicates presence of a compacted area. Call this to attention of the audience also. Continue this treatment the full length of the profile which will generally show faster absorption both above and below compacted area.
   d. Explain how the tight layer reduces or stops upward or capillary movement of water during dry weather and downward movement or percolation when surface soil is full of water.
   e. Explain measures that can be taken to correct or improve the condition.
   f. If time permits, repeat process with normal soil so that the audience can more clearly understand the problem involved.

D. SUMMARY:

E. QUESTIONS:

EFFECT OF ORGANIC MATTER ON MOVEMENT OF WATER INTO THE SOIL

(4-H Method Demonstration Outline in Soil and Water Conservation)

A. Equipment and Materials Needed:

1. Two samples of soils of the same soil type and texture differing only in their organic matter content. First sample should be taken from a field where the organic matter supply is very low. The second sample should be taken from a field where the organic matter has been built to a high level through the use of good rotations, plowing under cover crops over a period of years, or kept in good pasture sod for several years. **(This demonstration does not show up very well on very sandy soils.)**
2. Two glass cylinders not less than 1 inch in diameter and 8 to 10 inches in height (cylindrical bottles such as olives are packed in will serve very well. Lamp chimneys may be used also).
3. Two small measuring cups or large test tubes to hold water which will be applied to the soil.

B. Previous Preparation:

1. Practice the demonstration so that you can determine the amount of water needed for the type of soil you are working with so as not to have an excessive amount, and also to determine the length of time for the water to complete percolation through the soil. (Soils of different textures vary widely in their percolation rates.)
2. To insure each container of soil having the same degree of compaction practice tapping the bottles or cylinders on a table top say 25 to 30 times or more if needed to get the soil fully firmed in the bottles. Both bottles or cylinders should be tapped at the same time, one held in each hand, and tapped the same number of times.
3. Arrange materials and equipment (including charts or other illustrations) in order to avoid lags or confusion in giving the demonstration.

C. The Demonstration:

1. Introduction
   a. Names of members and club—where located.
   b. Purpose of the demonstration.
   c. Why this demonstration was selected.
   d. Experience members have had or opportunity to observe the effect poor and good soil management has on soil.
2. Steps in actual demonstration
   a. Fill cylinders or bottles with soil and tap as earlier indicated. Call attention of group to the difference between the two soils, what brought differences about and what results can be expected with each.

b. Add equal measured amounts of water to each bottle at the same time and as the water begins to percolate down through the soil call attention to this, explain to the group that the soil low in organic matter from over-cropped field is the kind that erodes easily because the surface tends to seal over and it holds the water at the surface instead of letting it soak in which adds to surface run off and also adds to flood problems.

c. It can be pointed out that the good soil, because of the organic matter in it is more porous or open which allows the water to soak in rapidly and hold more water. That this in turn helps reduce the amount of run off water, holds erosion down, increases yields, especially in dry seasons, helps keep silt out of streams and lessens flood damage.

d. If desired as a further means of pointing out the better structure in the good soil, two larger containers of the same soils could have had water applied say 20 or 30 minutes before the demonstration was started and at this point in the demonstration the soil in each can could be dumped out of the can on a sheet of cardboard or heavy paper. Point out to the group how the soil from the poorly managed field will slide into a water soak or puddled mass that acts like thin mortar and which will form hard clods when dried out, while that from the good soil stands up fairly well. This shows the better structure that goes with adequate organic matter.

e. Give brief illustration of how organic matter can be maintained or built up in the soil through plowing under both winter and summer cover crops, using rotations, and establishing pasture.

D. Summary—Briefly review the main points.

E. Questions.

Part VIII. Timely Topics

Prepare timely topics for short talks on subjects relating to soil and water conservation and give them at 4-H club meetings. Subject matter for timely topics can easily be selected from Part V in this bulletin. Use suitable references.

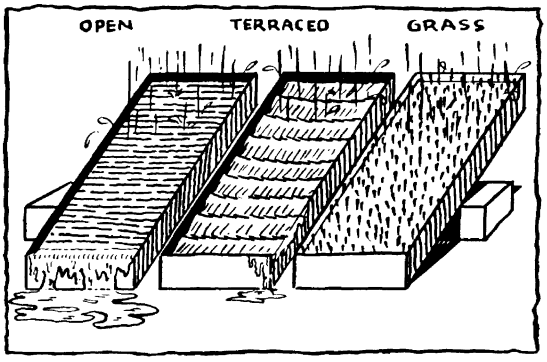


Figure 34. 4-H club members can give team demonstrations and timely topics on subjects relating to soil and water conservation.

ACKNOWLEDGMENT

Some of the ideas and material in this circular have been contributed by various individuals in the Extension Service, the U. S. Soil Conservation Service, staff members of the Oklahoma A. and M. College, the Agricultural Experiment Station, and the Red Plains Conservation Experiment Station of Guthrie, Oklahoma.

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