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4-H SOIL CONSERVATION CLUB MANUAL

First Year



LAND CAPABILITY CLASSES			
SUITABLE FOR CULTIVATION		NO CULTIVATION-PASTURE, HAY, WOODLAND AND WILDLIFE	
I	REQUIRES GOOD SOIL MANAGEMENT PRACTICES ONLY	V	NO RESTRICTIONS IN USE
II	MODERATE CONSERVATION PRACTICES NECESSARY	VI	MODERATE RESTRICTIONS IN USE
III	INTENSIVE CONSERVATION PRACTICES NECESSARY	VII	SEVERE RESTRICTIONS IN USE
IV	PERENNIAL VEGETATION - INFREQUENT CULTIVATION	VIII	BEST SUITED FOR WILDLIFE AND RECREATION

COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS.
UNIVERSITY OF NEBRASKA COLLEGE OF AGRICULTURE, AND THE UNITED
STATES DEPARTMENT OF AGRICULTURE COOPERATING,

C-1

ACKNOWLEDGEMENT

This circular was prepared under the direction of the Agricultural Extension Service of the University of Nebraska. It is built around an idea conceived by the Lancaster County Soil Conservation District and the Lancaster County Extension Service. All of the problems have been written so that the principles will apply in any section of Nebraska. The Agricultural Extension Service deeply appreciates the assistance given by the U. S. Soil Conservation Service and the Nebraska Game, Forestation and Parks Commission.

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CLUB REQUIREMENTS

1. Study and become familiar with soil and erosion.
2. Grassed Waterway - Assist in preparation and seeding of a natural drainage for a grassed waterway on the farm where you live.
3. Take part in a demonstration at a club meeting or some public gathering.
4. On the farm where you live do at least two of the following:
 - A. Fertilize a grassed waterway with manure or commercial fertilizer.
 - B. Construct a sod dam or spot and strip sod a gully.
 - C. Renovate five acres of pasture by deferred grazing, weed control, pasture furrowing, etc.
 - D. Assist in planting a wildlife area in your community and in making necessary preparations to exclude livestock.
 - E. Seed at least five acres for permanent pasture.
5. Go on a tour to observe complete soil and water conservation and water utilization programs.
6. Take part in the club achievement day. Problem VII suggests a type of 4-H Conservation Club achievement day which has been very successful in other clubs. Your club should plan its own program for the achievement day.
7. Seed and planting instructions are available from your county extension agent for planting an observation grass nursery. This is an excellent optional conservation club activity.

SOIL AND EROSION

Soils

The three things we must have in order to live are SOIL, WATER, and AIR.

Soil is our most important natural resource.

Soil is the upper few feet of the earth's crust, which has been weathered, has accumulated organic matter, and will grow plants. Organic matter is decayed and decaying animal and vegetable matter.

It takes nature a long time to make topsoil. Soil is formed from the breaking down of rocks and the decay of animal and vegetable matter.

Some soil is sticky and clay-like. Other soil is lighter and more sandy.

The color and texture of the soil depend upon the kind of rocks from which it is made, and upon the amount of vegetable and animal matter in it. Texture of the soil means the amount of fineness and coarseness in the soil.

Decayed organic matter is called humus. You should remember this term since it is used often when talking about soil.

The Soil Profile

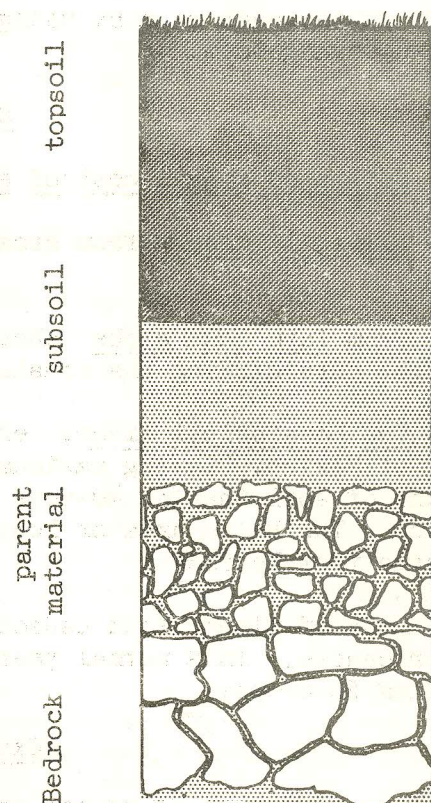
TOPSOIL - The topsoil is the surface layer and is usually 6 to 15 inches deep. It contains the most of the organic matter or humus. It is dark in color. Most of the available food for plants is found here.

Much of the topsoil has been lost by wind and water erosion. Originally the topsoil of this country averaged about 9 inches deep. Today the topsoil averages only about 6 inches deep. This means about one-third of the topsoil has been lost by man-made erosion.

SUBSOIL - The subsoil lies just beneath the topsoil. It is light in color and contains practically no humus. The subsoil is harder to work than the topsoil.

PARENT MATERIAL - The parent material lies between the subsoil and the bed rock beneath. It is the material from which the soil is formed. Sometimes soil is made from parent material that is just below it. Other times soil is made from parent material that has been blown or washed for a long distance.

BEDROCK - Bedrock is the part of the earth that has not been changed from its original form.



Soil Erosion

The word erosion means eating or wearing away.

Sheet erosion - Occurs when flowing rainwater spreads out over an unprotected slope and removes soil more or less evenly from the land surface.

Gully erosion - Results when the downhill flow of water becomes concentrated in a certain course and digs out a channel or ditch.

Wind erosion - This means soil blowing which often causes dust storms. It takes place on level or sloping land. Soil will blow very easily when the ground is dry and there is little or no cover on top. By cover is meant crop residues such as straw or cornstalks.

High yields are obtained from the abundant plant food in the dark topsoil. When the plant food is gone, crop yields drop and farming becomes more difficult and less profitable.

The gullies on your farm show definitely that erosion is taking place. The little rills (ditches), which are filled in during cultivation, mean that large amounts of fertile topsoil are being lost each year. These losses mean lower crop yields. Gullies also cause greater difficulty in tilling the subsoil which has become exposed.

Organic matter is used up each year to give plants food. Therefore it must be replaced. This can be done by adding barnyard manure, preserving crop residues, and by plowing under grass and legumes. Alfalfa and clover are some very common legumes.

Don't allow erosion to waste the organic matter in the soil. Build up the organic matter each year by using grassed waterways, terraces, crop rotations, and crop residue management.

Some Interesting Figures

Estimated annual cost of erosion: \$3,844,000,000.

All soil losses from erosion in the U. S. are about 5,400,000,000 tons annually.

From farm land alone about 3 billion tons of soil (enough to fill a train of freight cars girding the equator 18 times) are washed or blown away every year.

The Mississippi River, each year, pours some 730 million tons of soil into the Gulf of Mexico. During maximum high flood stages at Vicksburg, Mississippi, the same amount of soil that a 40-acre farm contains goes by every minute toward the Gulf of Mexico. The Delta area of Louisiana has been built up from midwestern soil. Some of it came from Nebraska.

Loss of plant food caused by erosion is greater than that resulting from all other causes. In a normal year, erosion removes from the land 21 times as much plant food as do crops.

Extent of Erosion in the U. S.

50,000,000 acres	- Ruined
50,000,000 acres	- Near ruin
100,000,000 acres	- Impoverished
100,000,000 acres	- Showing signs of erosion
98,000,000 acres	- Fertile and Productive

Problem I

HOW GRASSES CONSERVE SOIL AND MOISTURE

Perennial grasses are those that live for several years. They are one of the most effective crops in controlling soil and moisture. Moisture is lost from our soil in four ways: transpiration, percolation, evaporation, and runoff. Transpiration is water given off by plants. Percolation loss is that water which goes down into the soil beyond the reach of the plant roots. Evaporation is water which evaporates from the surface of the soil into the air. Runoff is that water which runs off the soil. Grasses do a good job of stopping runoff and evaporation of water.

The top growth of a good grass cover shades the ground and keeps it cooler. This helps to stop evaporation. Runoff losses are checked because grasses put the soil in condition to take water more readily. Grass does this because it prevents what we call "puddling". Bare soil will puddle because there are no grass roots or top growth to hold the soil particles apart. They all run together very much like cement. Water then will not soak into the soil.

Grasses conserve the soil and prevent erosion in two ways. First, the blades of grass act as barriers or small dams which check the flow of water and at the same time filter out soil particles carried by water. Secondly, grasses have a shallow and very thick root system. These roots tend to bind and hold the soil together. In addition to this, they improve the soil structure by adding organic matter. Some of these points can be brought out by the following demonstration.

Show the Others How

One of the things that is the most fun in 4-H club work is showing the other club members how to do some job. The way grass helps to conserve moisture makes a very interesting demonstration for your club meeting.

Here's how you do it-----

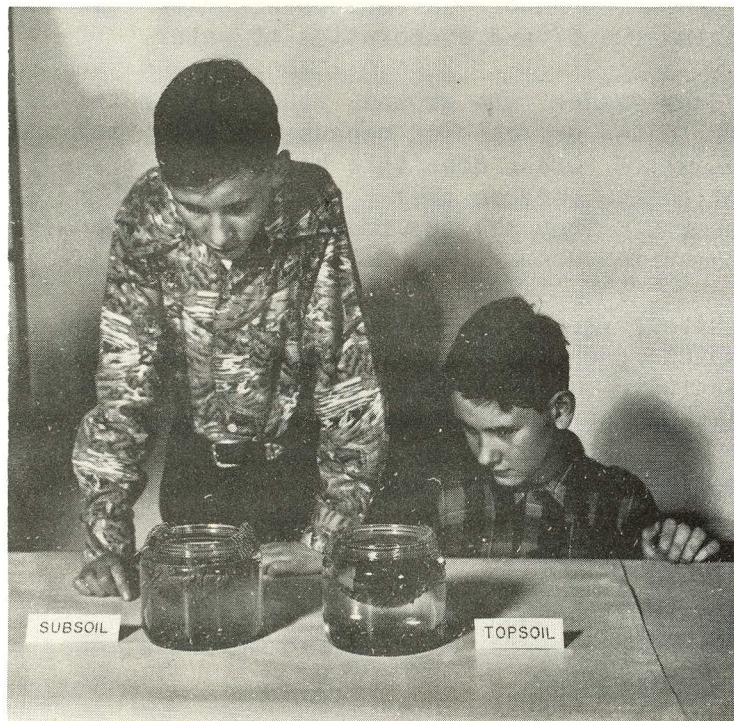
OBJECTIVE: To show value of organic matter in reducing soil erosion.

MATERIALS NEEDED: (1) Two 1-pound tobacco jars or fish bowls or other wide mouthed containers. (2) Two pieces $\frac{1}{4}$ " mesh hardware screen 3 x 10 inches. (3) One piece of topsoil from native prairie or grassland about the size of a goose egg. (4) One piece of subsoil taken at a depth of at least 4-5 feet. Get this from a road bank. Use a piece about the size of a goose egg. (5) Water enough to fill both jars within one inch of top.



STATEMENT: Organic matter is the remains of plant and animal life present in the surface layer or topsoil. This is the material that gives the topsoil its dark color. This organic matter helps to hold the soil particles together so that they will not be readily carried away by water.

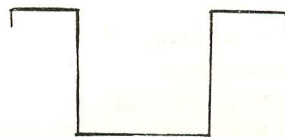
In this demonstration you will see how a soil low in organic matter is easily eroded and carried away by water and in comparison how one high in organic matter is stable and reduces erosion by water.



STEPS: (1) Obtain all of the above materials and have them readily available in front of audience.

(2) Fill both jars with water to one inch from top.

(3) Bend hardware screen to form a cradle so that it will hold the soil suspended below the surface of the water in the jars.



(4) Place the piece of topsoil (containing organic matter) on hardware screen and lower carefully into place in the water in one of the jars. (note the rate at which the soil falls apart in the water.)

(5) Place the piece of subsoil (containing no organic matter) on the other hardware screen and lower carefully into place in the water in the

other jar. (Note the rate at which the soil falls apart in the water.)

(6) Let stand for 3 to 5 minutes and tap each jar with a pencil and notice the results.

DISCUSSION: This demonstration clearly shows what happens to soils containing organic matter and what happens to soils containing no organic matter when they are exposed to water. This same thing takes place in the fields when heavy rains fall. Soils that are high in organic matter are more easily tilled than those which are low in organic matter because organic matter keeps the soil mellow, open and loose. These soils also furnish a better seedbed because of their high moisture holding capacity. They remain mellow and do not cake or crust when dry.

Bacteria which are necessary to plant growth feed on organic matter. For this reason soils high in organic matter grow better crops than soils that have lost their organic matter through erosion and continuous cropping. Fields that have lost their topsoil erode much faster, as has been proven by this demonstration.

We can get more organic matter back into the soil by:

1. Using conservation practices to keep what we have left.
2. Using crop rotations including grasses and legumes. Lime and phosphate are frequently needed in the eastern part of Nebraska to get a good crop of legumes.
3. Conserving all crop residues -- do not burn stubble or corn stalks.
4. Returning all barnyard manure to the fields.

Here's another demonstration you might try to show how grass conserves soil and moisture-----

Materials needed: (1) Three large bread pans of similar containers of nearly equal size and shape, (2) three pie pans, (3) three small wooden blocks about one inch thick for raising one end of the pans, (4) two pieces of dense grass sod cut to fit the bread pans, and sufficient soil to fill the third pan when well packed, (5) a bunch of native grass with roots, (6) small water sprinkler, (7) water supply can, (8) blackboard or substitute, and (9) watch with second hand.

Preparation for demonstration: Cut the sod pieces to exactly fit into the pans. If the grass is very tall, clip it down to approximately 3 or 4 inches in one pan and clip off close to the ground in the second pan. Have the soil in the third pan firmly packed. Place the three pans side by side on a table raising one end with the wooden blocks. Place the pie pans or similar containers at the lower end so as to catch any runoff water or soil. A round tin can may be used for a sprinkler. Punch very small holes in the bottom of the can. These holes should be very small, otherwise the water will run out too fast and the demonstration will not be as effective.

Sprinkle the water slowly and evenly over the entire area of one pan. Check the time of starting and the time when there is any appreciable amount of runoff. Also keep track of the amount of water sprinkled on each pan. Using the same amount in each case. Using the amount of water applied to the grassed plot as a key, sprinkle the same amount on each of the other two, catching and measuring the amount of runoff.

Summary of Demonstration

You will notice that the pan with a good grass cover absorbs a comparatively large amount of water before run-off occurs. The pan with the grass clipped close to the ground does not absorb near as much because a certain degree of puddling has taken place due to the fact that the soil was not fully protected from the impact, of the drops of water. Puddling and run-off has taken place almost immediately on the bare soil. This is exactly what takes place on your fields when it rains.

Another point to observe is the amount of silt in the run-off water. Run-off water from the good grass cover shows a small amount of silt in it. Run-off water from the closely clipped grass shows a higher degree of silt because the grass has not retarded the rate of flow of water sufficiently to keep it from picking up soil particles. Run-off from the bare soil shows that a considerable amount of soil has been lost. A good field example can be seen by observing run-off water after a heavy rain. Water draining off a good grassed area will be comparatively clear, while water draining off of a cultivated field will be muddy.

Problem II

ESTABLISHMENT OF A GRASSED WATERWAY

A grassed waterway is a strip of grassed land used to lead runoff water from the fields.

Location

Waterways are usually located in depressions where runoff water runs naturally, and gullies eventually form. Under special conditions waterways may be located along boundaries or at other places in the field that are not natural drainageways.

Purpose

Waterways, if constructed properly, will (1) provide a means for carrying runoff water from a field or farm without gullies being formed, and (2) provide outlets for terraces.

The basis of the farm conservation plan is dependent upon establishing grassed waterways. The waterways must be made before terraces are constructed.



A bad gully needing repair

Construction and Seeding of a Grassed Waterway

Step I. Leveling and Shaping the Waterway

Level the depression or gully with a plow, disc, or other suitable implement until a flat bottom of at least 12 feet in width is obtained and the sides are smooth and not too steep. The properly shaped waterway should be flat and not less than two rods in total width. The sides of the waterway should be shaped to permit farm equipment to cross easily. Where a large area drains into the waterway, the width of the bottom and total width should be increased.

Caution: Great care should be taken in working near a deep gully with farm equipment. When the gully is wide and deep, it may be more economical to have the sides broken in with heavy equipment, such as a bull dozer or motor patrol.



Plowing in gully with ordinary 2 bottom plow

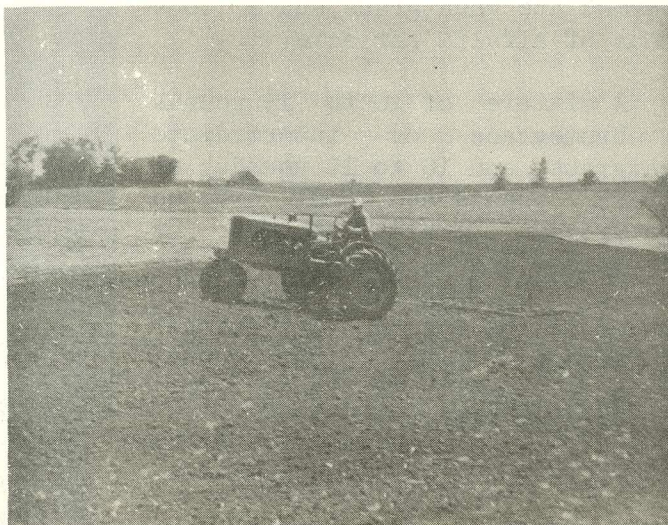
After the gully is leveled, it should be shaped and packed by discing. The discing will tend to level the bottom and sides by filling low places and cutting off the higher places. Much of the success of the grassed waterway will depend on obtaining the proper shape.

In many cases it will be desirable to construct a dike on the outside of the waterway by plowing a furrow around the outside. See Figure 18. The dike should be constructed by throwing the dirt toward the waterway. This dike will protect the waterway until the grass becomes established. As soon as the grass becomes established, the dike must be leveled to prevent gullies from forming along the sides.

Move dirt into ditch from one to two rods from each side to make waterway broad and flat.

Shaping waterway using plow and disc.

Shaping waterway by going diagonally with a spike toothed harrow.



Step II. Manure the Waterway

The area around a gully is usually very badly eroded. Therefore to have a good growth of grass, it is necessary to add fertility. The best fertilizer for this purpose is manure as it not only adds fertility, but also increases the humus in the soil and prevents cracking and drying out of the soil.

Apply a generous amount of manure and pack it into the waterway before seeding as is shown at the left.

Step III. Seeding the Waterway

Seeding a waterway is not expensive, but unless a good stand of

grass and legume is obtained, the waterway may be a failure.

Time of seeding. Waterways should be seeded in the early spring or early fall. Spring seeding may be made from the time the ground is first workable until April 15th. Fall seedings are best between August 15th and September 15th.

Rate of seeding. In eastern Nebraska, drill or broadcast 25 to 30 pounds of brome grass; or brome grass and western wheatgrass, or brome grass and intermediate wheatgrass, and 4 to 6 pounds of alfalfa or red clover per acre. Small amounts of Reed's canarygrass, and switchgrass may be used in the mixture to good advantage. The switchgrass should be seeded in the spring. In the fall a nurse crop of oats or barley should be used at the rate of approximately $3/4$ bu. per acre.

In western Nebraska, drill or broadcast 25 to 30 pounds of a mixture of brome grass, crested wheatgrass, western wheatgrass and intermediate wheatgrass and 2 to 4 pounds of alfalfa per acre.

A mixture of 10 to 15 pounds of brome grass or intermediate wheatgrass and 10 to 15 pounds of western wheatgrass and crested wheatgrass. Small amounts of switchgrass may be included in the mixture. Switchgrass should be planted in the spring. For further information consult your county extension agent or local Soil Conservation District.



Broadcasting the grass mixture by hand.
Waterways should be seeded heavily.

After seed is broadcast it is covered and packed with a treader or roller.

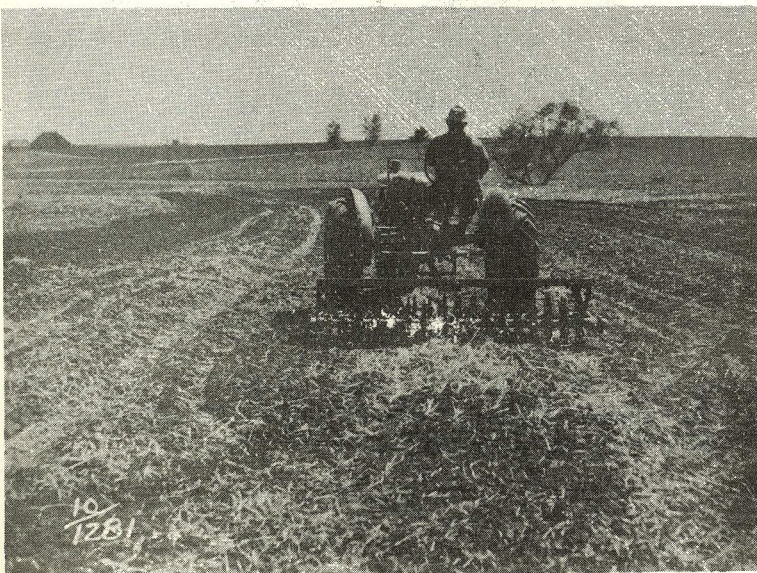


Step IV. Packing and Mulching

Mulch the waterway with manure, straw (old stack bottoms), or corncobs to protect the surface of the ground. This prevents the drying of the soil, and protects the young seedling grasses.



Pack the waterway with a treader, light sheeps foot packer, or land roller until the ground is firm enough so that the tire treads on the tractor do not make a mark. The treader shown at the left works the mulch into the ground. This reduces erosion until the young seedlings get started.



Problem III

MAINTENANCE OF GRASSED WATERWAYS

A grassed waterway like the barn or fence occasionally will need some repair. When repair is needed it should be done immediately. This makes the job easier and will keep the grassed waterway working the way it should.

Reseeding

Occasionally before the grass sod becomes established, the waterway may be damaged. A heavy rain may wash the seed away or cause a deep rill. Sometimes insects may kill the grasses and legumes. If this should happen the waterway should be leveled and reseeded as shown in Problem II.

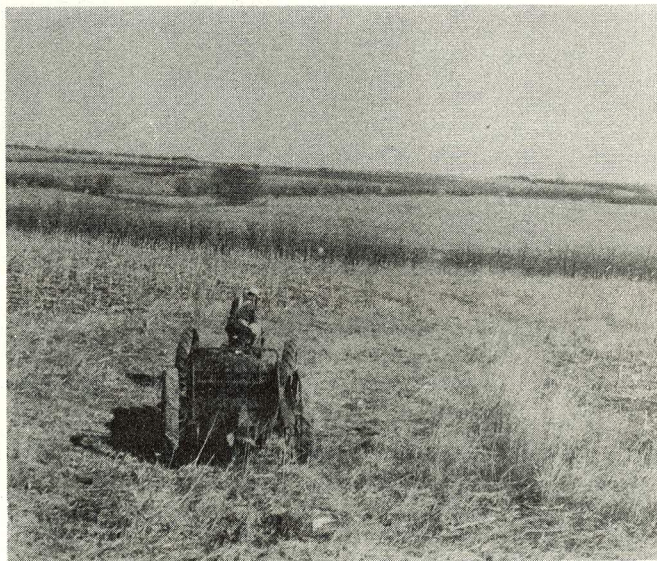
Weeds

The first year or two after the waterway is seeded, weeds may become quite a problem. Sometimes the weed competition may kill the grass. Mow the weeds 4 to 6 inches above the ground. If done often enough, this will prevent them from killing the grass. The time of mowing will depend upon the amount of moisture in the soil and the frequency of the rains. Usually the first mowing will be required in early June when the weeds reach a height of one foot. One or more additional mowings will be required later in the season whenever the weeds reach a height of one foot.

Fertility

A heavy, healthy growth of grass must be maintained if the waterway is to function as it should. Usually the soil on the waterway is badly eroded and low in fertility. It will not support a good growth of grass. Therefore, to provide fertility, the waterway will need to be manured or commercial fertilizer applied. Many waterways will need manure or commercial fertilizer each year.

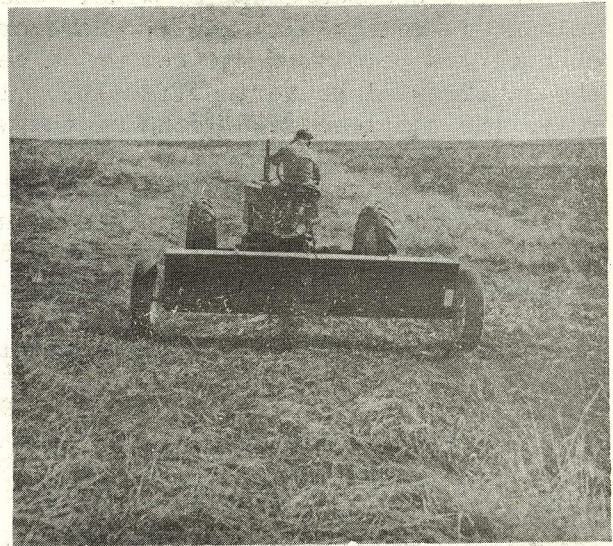
The fertilizer (manure or ammonium nitrate) is best applied in the fall or early spring. Manure should be applied at the rate of 5 to 8 tons per acre. The commercial fertilizer can be spread by hand if care is taken to spread it thinly and evenly; otherwise, a fertilizer spreader or old drill can be used.



Manuring a waterway

Care must be taken to thoroughly clean the drill or spreader. Rinse out several times with water and then with kerosene. An application of crank case oil after the machine has been thoroughly cleaned will help prevent corrosion.

The commercial fertilizer spreader is used to spread ammonium nitrate on a grassed waterway. A grain drill may be used, or the fertilizer may be spread by hand. Apply 60 to 80 pounds of nitrogen fertilizer or 200 to 250 pounds of ammonium nitrate per acre.



Building a Sod Dam

Level the ground where the dam is to be located. The ground is leveled to a height so that when the sod is put in place it will be even with the natural level of the waterway.

Cut into the grassy side of the rill to make a notch in which to lay the sod.

Cut sod 3 to 4 inches thick. Cut with spade, plow or hydroscoop.

Place sod in leveled area making certain the sod fits into the notches.

Pack sod by hand tamping or roll with the wheel of a tractor.



Sod dam shown in the foreground. This will prevent this gully from getting larger.

Repair Small Gullies in Waterway with Sod

A trickle channel or rill will some times form in the waterway while the grass sod is becoming established. If this rill is repaired before it becomes deep or wide, the work involved is relatively small. However, if the channel is permitted to become a deep gully, the repair will be very difficult. It may involve the complete rebuilding of the waterway.

The best and cheapest way to control small rills in the waterway is to place chunks of sod in the rill or construct small sod dams. If sloughgrass and Reed's canarygrass are available, they are preferable. Otherwise, use good brome grass, western wheatgrass or native grass sod.

Set the sod pieces well, so that the grass roots can grow and tie the sod down. The sod pieces or sod dams should be placed every 10 feet apart in the rill. The sod should be set into the sides of the rill so they will stay in place during rains.

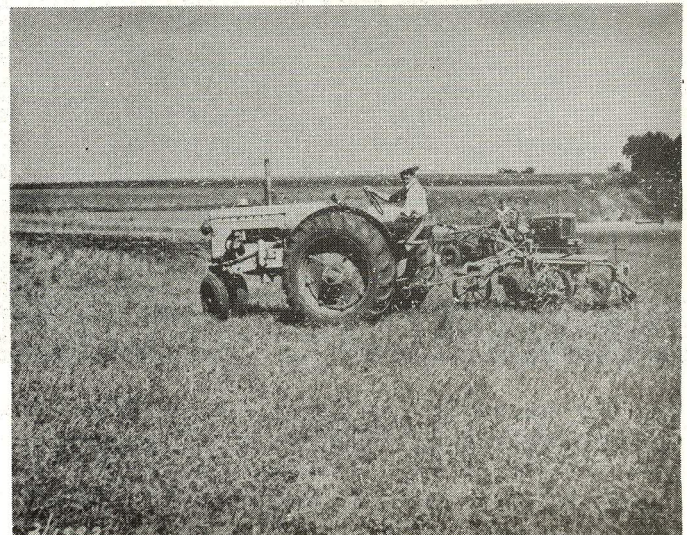


Repairing a small rill with sod pieces.

Farming across Grass Waterways

When crossing grass waterways, raise implements to prevent damage to the sod as shown at the right.

Note the dense growth of brome grass and alfalfa in the picture to the right. In the background may be seen a farm pond and the trees and shrubs which make an excellent wildlife area.



Harvest Grass or Seed

The waterway may be profitable as well as soil conserving. This picture taken 3 miles west of Seward, Nebraska shows some nice bales of brome and alfalfa hay that were produced on this waterway. Crops of grass seeds are usually quite valuable.

Waterways may also be grazed when crops in adjoining fields have been removed.



A Few Pointers about Waterways

1. Protect the waterway from overgrazing and from trampling in wet weather.
2. Keep all machinery and stock travel along the edge of the outlet on the grassed turnrow and never in the channel.
3. Consult your local Soil Conservation Service personnel when maintenance measures have been applied and erosion still continues.
4. Water cut-outs similar to the temporary diversions shown below will protect newly seeded waterways until the grass gets a good start. After the waterway becomes well established, the ditches should be leveled and grassed, and terraces constructed.



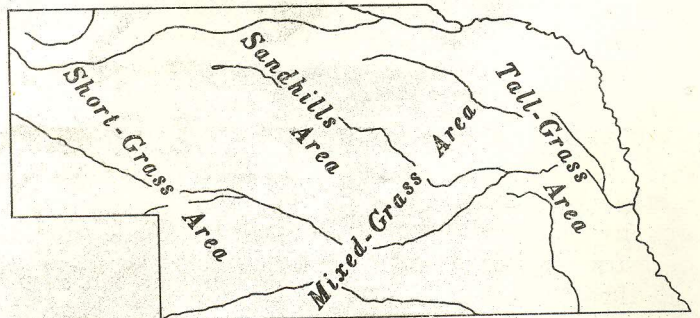
Problem IV

PASTURE RESEEDING AND RENOVATION

Reseeding

Selection of Desirable Grasses

Nebraska may be divided into four large grazing areas grouped with respect to the dominant species of grass. These four major areas are: (1) Tall grass area of eastern Nebraska, (2) mixed grass area of central Nebraska, (3) short grass area of western Nebraska, (4) the sandhills area in north central Nebraska. These grassed areas are not as well divided as they might seem since droughts, improper management, and weeds have changed the grass composition within the areas as well as the boundaries. Some grasses are more or less common to all four areas. Some species of grass may be of minor importance in as many as three of the areas. Select a grass that is suitable to the area where desired. Blue grama and buffalograss are more common in the hard land areas of western Nebraska. The bluestems and switchgrass are more common in eastern Nebraska where rainfall is more plentiful. The most common in the Sandhills are similar to those considered for eastern Nebraska. The sandy texture of the soil allows the rainfall to percolate deep, where it is stored and used by deep rooted grasses. The mixed grass areas of central Nebraska can be considered to be a transition zone or in between the short-grass areas and the tall-grass areas.



THE FOUR LARGE GRAZING AREAS OF NEBRASKA

Grasses may be divided into two distinct groups. These groups are cool-season grasses and warm-season grasses. Cool-season grasses such as brome grass, bluegrass, and wheatgrasses are common to Nebraska. Warm-season grasses such as grama, buffalograss, bluestems, switchgrass, and indiagrass are native grasses which were here at the time the settlers came into Nebraska. Cool-season grasses grow mainly during the cool part of the year. They begin growing early in the spring and set seed by July and are dominant for the remainder of the summer. They put on new growth as cooler weather approaches in the fall. Warm-season grasses put on 90% of their growth during June, July, and August or during the hot part of the summer. It is easy to understand how cool-season and warm-season grasses can be effectively worked into a satisfactory pasture management program.

Method of Seeding

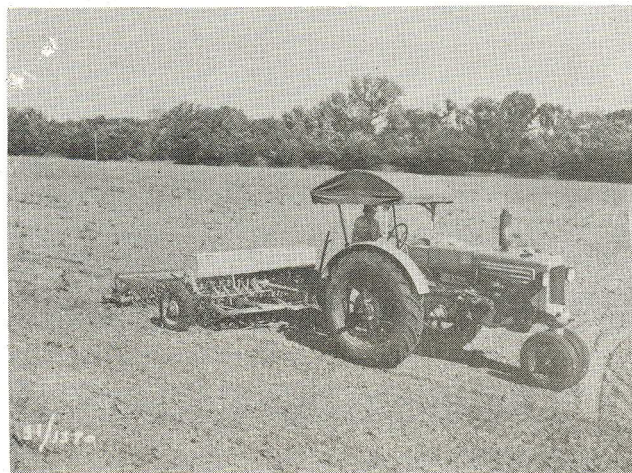
The cheapest and one of the most effective methods of reseeding is natural reseeding from the previous grass plants already there. If grasses are to reseed and propagate themselves, good management of the pasture is necessary.

Artificial reseeding may be necessary where we want to improve the pastures as fast as possible and where the present grasses are so few that natural reseeding would be almost impossible. The method used in reseeding will depend on these factors: (1) present ground cover, (2) topography, (3) texture of the soil, (4) equipment available, and (5) the amount of rainfall. If the present stand of grass

is poor and the pasture is weedy, it is best to till the soil and prepare a weed-free seedbed for establishing grasses. As far as possible weeds should be eradicated before reseeding is attempted. In eastern Nebraska this can best be done by cropping the land for a year or two. Drilling the grass seed or broadcasting into the present pasture land is another method which may be considered and is similar to natural re-seeding. Regardless of method used the desired end result is the reestablishment of the pasture or range.

Time of Seeding

Seeding the grasses is generally broken down into two seasons. Cool-season grasses put on a better growth and are generally more hardy when they are planted in the fall (August 15 to September 30). It isn't, however, absolutely necessary that cool-season grasses be planted at that time of year. Satisfactory stands may be obtained when they are planted as early as the soil may be worked in the spring. Warm-season grasses with exception of sand lovegrass should be planted after the soil warms up--during late spring or summer depending upon moisture conditions. Sand lovegrass should be planted as early as possible in the spring. A chilling or cold period seems to increase germination of sand lovegrass seed. The date of planting is easy to remember when associated with crops. Cool-season grasses should be planted during the time when we normally plant small grains. Warm-season grasses should be planted at the time we normally plant corn or sorghums.



Drilling grass seed in a well prepared firm seedbed. A treader is being pulled behind the drill to pack the soil after seeding.

Care of Seedling Grasses

The greatest problem involved is the control of weeds. Weeds naturally compete for moisture and sun light. Weed control by mechanical or chemical means has proved satisfactory. A mower adjusted to clip the weeds as high as possible is the best implement for controlling weeds in Nebraska's grass seedings. The use of 2,4-D is considered to be the cheapest and fastest means of controlling the majority of common weeds found in pastures. Normally spraying with 2,4-D should be done in the spring. At this time the amount of 2,4-D required to control weeds is not injurious to the grasses. Weedy grasses such as downy brome, hairy chess, little wild barley, and squirrel tail cannot be controlled by 2,4-D.

The second problem in the care of seedling grasses is that of grazing too early during the growth period. Normally a certain amount of grazing can be expected the summer following planting in the fall. It may be necessary to eliminate grazing on warm-season grasses for two or three years in order for them to become completely established.

Renovation

There are several successful ways by which a poor, thin stand of grass may be improved and brought back into production. Some of the more important methods are discussed in the following paragraphs.

Retirement or Limited Grazing

One of the most feasible ways of improving thin, unproductive pastures is by removing part or all of the stock for one or more seasons. Many farmers have restored their pastures to a high state of productivity through this practice. Native grass pastures respond particularly well to this treatment.



This pasture is badly in need of renovation.

Pasture improvement through reduced grazing is especially valuable in central and western Nebraska where seeding is not as practical as it is farther east. In these drier areas of the state one is seldom justified in plowing a pasture because it has become unproductive. Such a pasture should be rested until a good grass cover is restored.

In eastern Nebraska, very thin pastures may warrant reseeding. But even in this area a good grass cover can be restored on thin pastures by taking the stock off entirely and following a good mowing program to control weeds.

Fertilizing

Soil fertility has become a limiting factor in the productivity of some pastures. Deficiency, if present, is usually limited to available nitrogen. The so-called "sod-bound" condition commonly found in older bluegrass and brome grass pastures is associated with a lack of available nitrogen. Nitrates can be applied most economically in the form of manure. Well-rotted manure is preferable because the nutrients become available more readily and there is less danger of introducing weed seeds. It can best be applied to pasture as a light top dressing during the winter or early spring months.

Weed Control

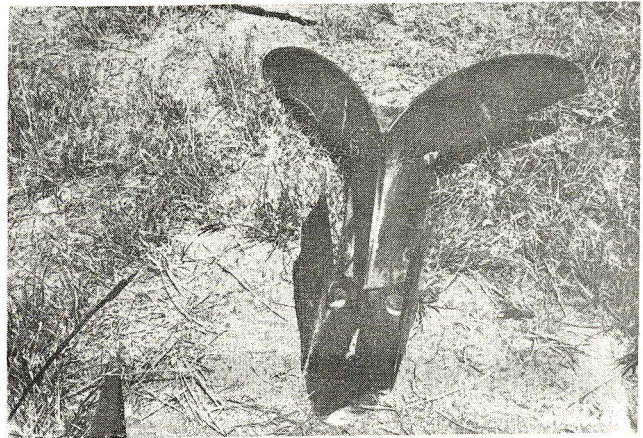
Weeds do not ordinarily offer a serious problem in pastures that are properly grazed. Grass in a thriving condition grows vigorously and covers the ground so completely that weeds cannot become well established. A pasture may become very weedy as a result of overgrazing or repeatedly grazing too early in the spring. Effective weed control methods vary with growth habits of different weeds. Some characteristics, such as the length of life of a weed, influence materially the type of control practices that are most effective.

Annual weeds or those growing from seed produced the previous year are controlled most effectively by mowing when the plants are beginning to blossom. This keeps them from producing seed. Perennial weeds are those weeds that come up from the roots of old plants and also from seed produced the previous year. Perennial weeds grow from old roots. Their food comes from these roots when they start growing in the spring. Mowing of these weeds is most effective when the food reserves are the lowest. The exact time of year when this condition prevails varies but in general, food reserves are the lowest sometime between the middle of May and the early

part of July. It is usually necessary to mow perennial weeds for two successive years or more to eradicate them.

Pasture Furrows

The value of pasture furrows has not been fully determined experimentally. At best these structures offer only secondary methods of pasture improvement or maintenance. Their chief function - to retain water on rolling pasture land - can most advantageously be accomplished by keeping ample vegetative cover on the land through practicing proper grazing. However, on rolling hard-land pastures which have been closely grazed, pasture furrows catch and hold much water which would otherwise be lost through runoff. Ultimately this additional stored moisture results in a heavier growth of grass in and next to the furrows.



A modified lister moldboard which may be used to make pasture furrows. For further details see your local Soil Conservation Service office.

Problem V

WILDLIFE MANAGEMENT

Wildlife has a place in the conservation program. Wildlife on a farm is a product of the soil much the same as are field crops or domestic livestock. Wild animals are dependent on plants or other animals for food. These animals depend on plants for their food; the plants grow in the soil. Wild animals also use vegetation as shelter.

Wildlife management is really good land management. Good wildlife management includes providing food and cover. It also includes balancing the numbers of wild animals with the food and cover that nature provides. We call this "maintaining the population at a desirable level".

Good land management also means good soil management. Good soil management always includes keeping a nice growth of vegetation on the land. Farm crops, hay, pasture, trees, and shrubs encourage wildlife. They provide food and shelter, and reduce erosion.

On many farms there are heavily wooded areas or badly eroded areas where the production of crops is not advisable. These places make good wildlife areas.

Often a wildlife area is developed near a farm pond. These areas should be not further than $\frac{1}{4}$ mile from crops and should be at least $\frac{1}{4}$ mile away from farmsteads and roads. A wildlife area should be next to cropland or should be connected to it by a hedgerow. This gives the wildlife a covered "run" to feed.

Make a definite plan for the plantings that will go in a wildlife area. Here are some points to follow. Make a boundary planting. Multi-flora rose is a very good boundary planting because in time it will make a livestock-tight fence. A wildlife area should offer protection from snow and wind. Evergreens such as cedar or pine planted on the north and west are very effective for this purpose. There should be at least two rows. Besides boundary and protection plantings something should be planted to provide food. Trees or shrubs such as nanking cherry, wild raspberry, buffalo berry, honeysuckle, wild grape, choke cherry, cedar and wild plum will supply food during the summer and fall season. Some of these will supply food for people as well.

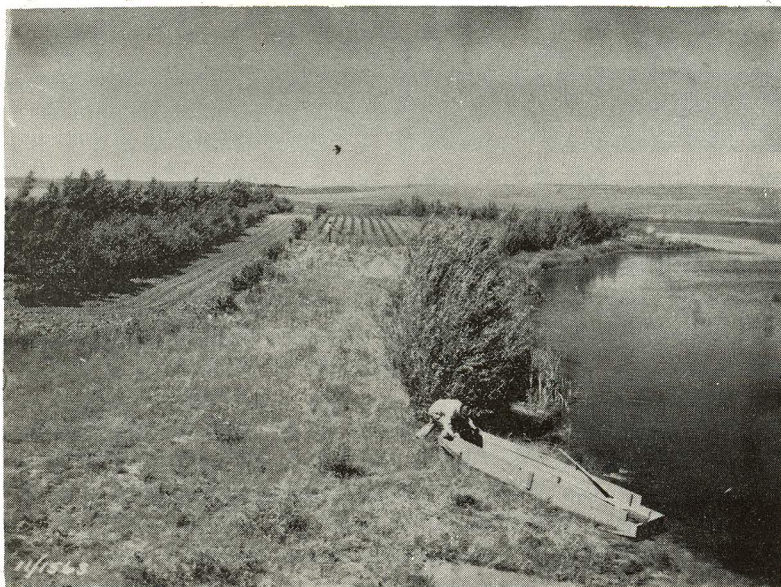
A wildlife area requires some cultivation to get it started. Later it is wise to get grass started. This will provide cover for wildlife and will help to control erosion.



A nice wildlife area. The trailing raspberry planted on a steep gully bank below a farm pond has completely taken over this raw gully and furnishes excellent wildlife cover.

When preparing the area for planting it should be plowed if possible and then worked down to establish a good seedbed. Fall plowing when the sod is heavy is recommended. Plantings should be made on the contour. If the ground is too steep to plow, grass may be established by broadcasting the seed. Trees and shrubs may be established by spading an area about 3 feet across for each one.

Early spring is considered the best time to plant trees in Nebraska. Keep the tree roots moist. Dig a hole for each tree, spread the roots in a natural position and cover with moist soil. For further help contact your county extension agent or the Soil Conservation Service.



Wildlife restoration area planted by the Nebraska Game, Forestation and Parks Commission near Red Cloud, Nebraska. Note the crop area nearby in the background.



Lake and wildlife refuge area. This was an old limestone quarry site near Tecumseh, Nebraska.

Developing a wildlife area would make an excellent project for a soil conservation club. It would be necessary to locate a farm where the farmer was interested. Perhaps one of the member's parents would like to cooperate. Your county extension agent, the Soil Conservation Service, and the State Game, Forestation and Parks Commission will be very glad to cooperate in making this project a success.

Problem VI

CONSERVATION TOUR BY THE CLUB



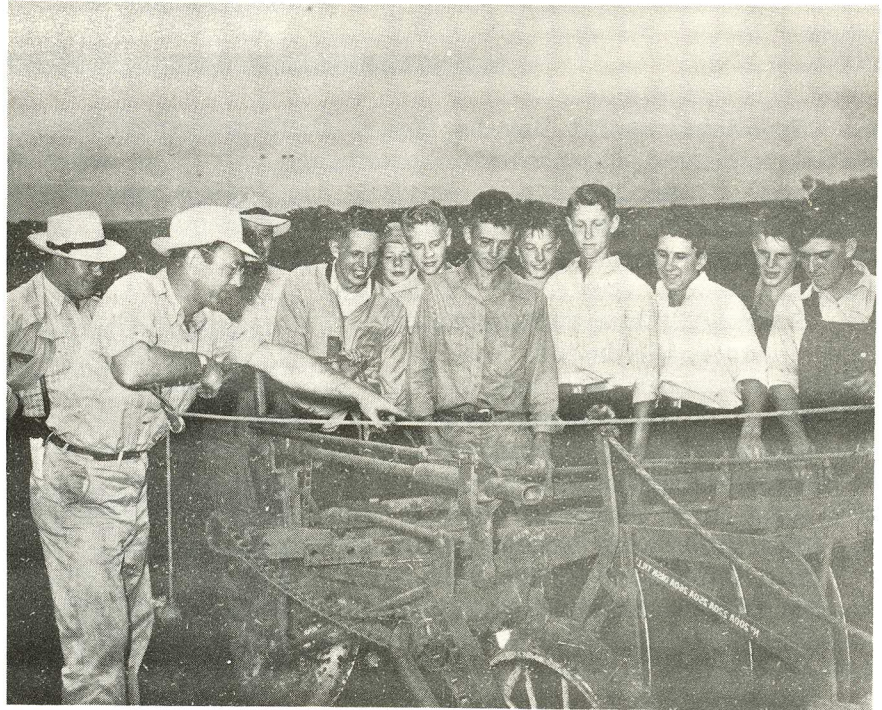
You will enjoy a tour. A properly planned conservation tour is one of the best ways to see conservation in action on the land. When you go on a tour, look for different conservation practices. All of these different practices work together to control soil erosion and to conserve moisture.

Plan to stop at a farm or ranch where complete conservation plan is being used. Someone from the Soil Conservation Service may be asked to explain the conservation plan on the farm. Point out the land use and the way the different practices work together. One stop on a place with a complete conservation plan is worth much more than a visit to a number of farms where you see only one practice at each stop.

Arrange to see some approved practices being put to work. At the right is pictured a group on a soil conservation tour watching the preparation of a grassed waterway.



Equipment is always interesting to 4-H club members on a conservation tour. This disc tiller has caught the eye of this group of Cedar county boys.



Things to Look for on a Conservation Tour

Keep in mind that a good conservation plan includes more than just terracing, building waterways, contouring and other such mechanical practices. A good conservation plan includes planting trees, pasture and range managements, proper land use and the use of grass and legumes in the rotation as well as on the poorer land. It also provides for the use of these grasses and legumes through livestock.

A Few Suggestions to Use in Planning a Tour

1. See your county extension agent about selecting a farm or farms. Ask him for help with the tour.
2. If possible, select a farm in the neighborhood of the club. Some short stops can be made to see the work the club members are doing on their home farms.
3. Hold the tour down to a maximum of three hours.
4. Club members should discuss their activities at their home places when you make stops.
5. It may be possible to have club members lead the discussion at the main stops along the tour.
6. Encourage club members to bring their parents or at least their fathers on the tour.

Problem VII

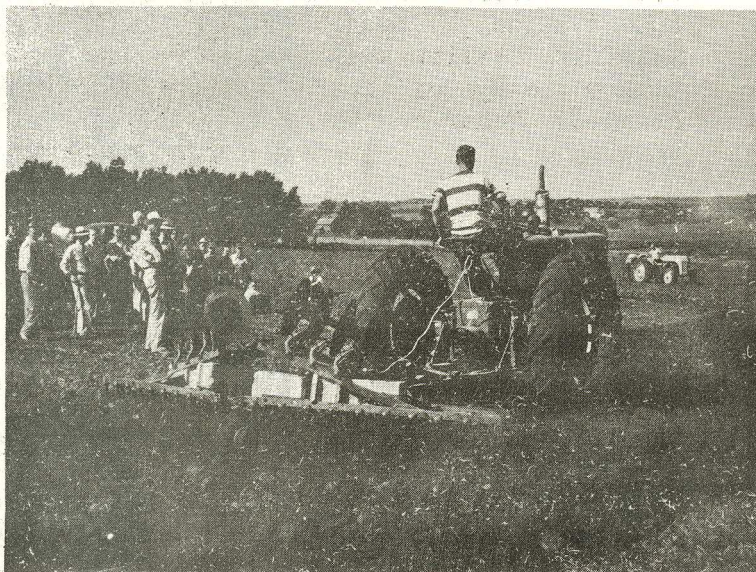
4-H CONSERVATION CLUB ACHIEVEMENT DAY

The Achievement Day is fun. Club members have an opportunity to show every one of the approved conservation practices to other club members and to their parents, neighbors, and friends. Include the Achievement Day as a part of your club program for the year. Sometime in August will usually be best. Plan so that every member will take part and have some job to do.

Some Pointers in Organizing an Achievement Day

1. Select a farm where some soil conservation practices are being established.
2. Give each club member a job to do. Usually 4-H'ers will work in pairs to put on their demonstrations.
3. Plan the program in detail.
4. Arrange for the equipment that will be used.
5. Plan some entertainment.
6. Arrange for food and drinking water. If the event lasts all day, a picnic lunch at noon is fun.
7. Give the event plenty of publicity. Your neighbors and other club members will learn a lot from your demonstrations.
8. Other clubs in the county may be interested in combining for the Achievement Day. Contact their leaders about this.
9. Talk to your county extension agent about planning the event.

The photographs on this and the following pages should give you some ideas about the events you can plan for your Achievement Day.



Several soil conservation clubs may hold the Achievement Day together. Above we see the entire group watching a grassed waterway being shaped with a disc harrow.



A soil conservation club member demonstrates seeding a grassed waterway while the group watches.

Repairing a grassed
waterway by spot
sodding.



Building a terrace
with a whirlwind
terracer. Other
methods that may be
included are the
moldboard plow and
the disc tiller.

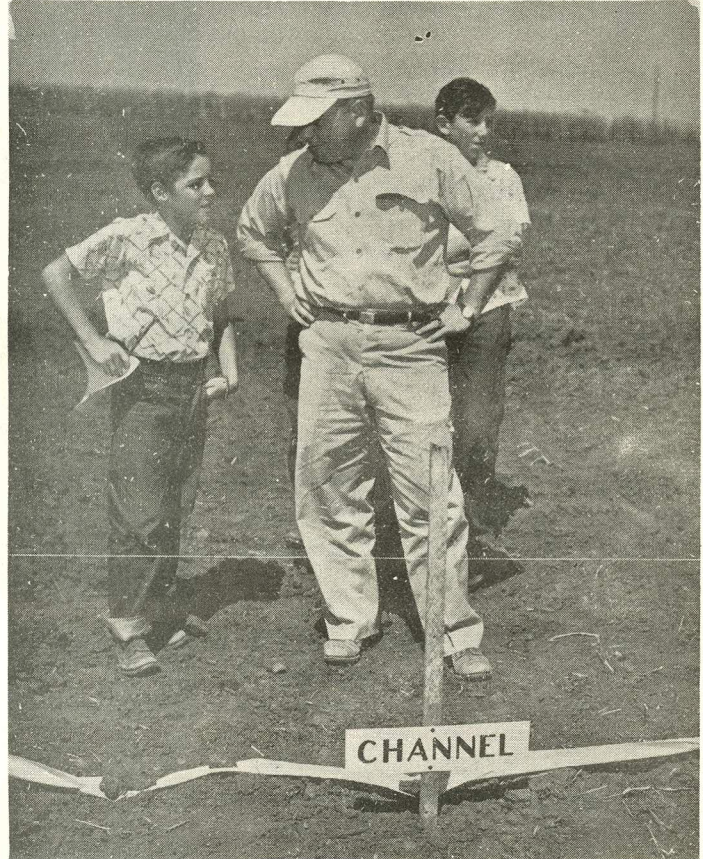


Other demonstrations that should be included in the program are:

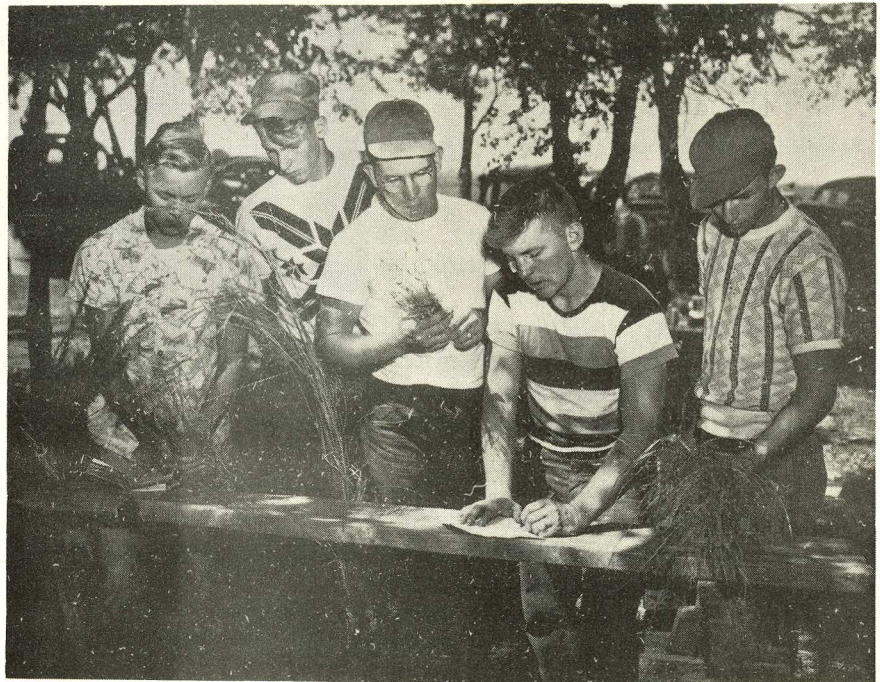
- Fertilizing a grassed waterway
- Tree planting
- Grass seeding
- Terrace maintenance
- How to farm a terraced field
- Stubble mulch farming
- Grass seed harvest

An Achievement Day offers some opportunities for educational contests and games:

This 4-H'er gets some advice about scoring a terrace. All the members tried their hand at terrace scoring.



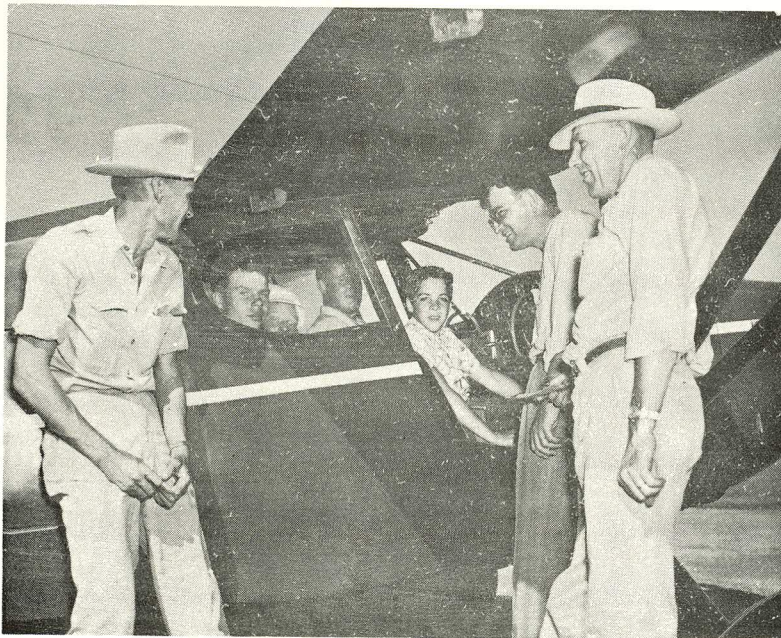
These boys write down their answers in the grass identification contest.



The program may also include a grass seed identification contest. Perhaps the group would also like to join in a softball or baseball game.



A noon day lunch is enjoyed under the trees.



A fitting close for the day's activities is an airplane ride to view the work that was done.