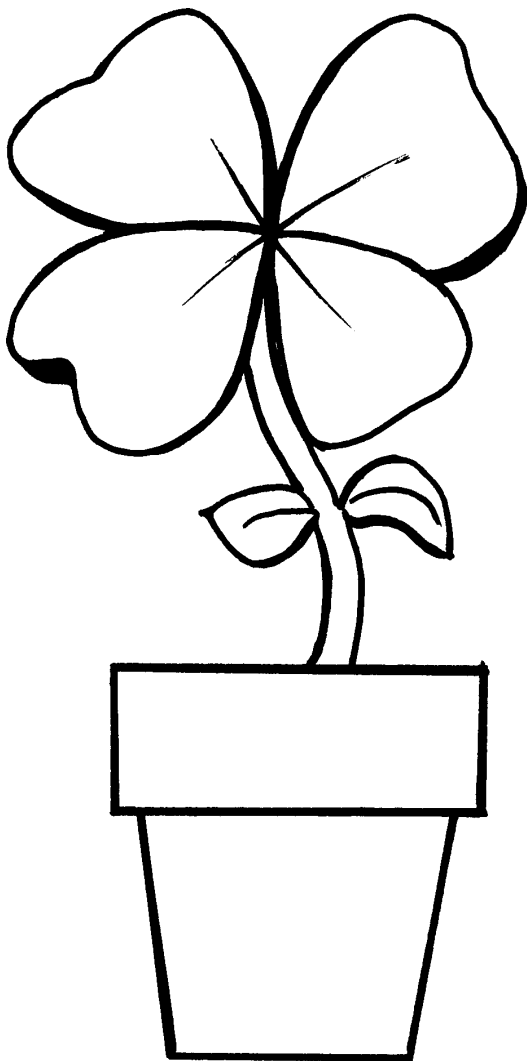




LIT. NO. 301
4-H Member Guide

PLANT SCIENCE



HORTICULTURE

FIELD CROPS

WELCOME TO PLANT SCIENCE UNIT 2

Joe M. Maxson
4-H Specialist-Plant Science

In Unit 1, you learned about different areas of plant science and how plants are important to man.

In this unit, you will learn more about plants and fun things you can do with plants.

WHEN YOU HAVE COMPLETED THIS UNIT YOU SHOULD BE ABLE TO:

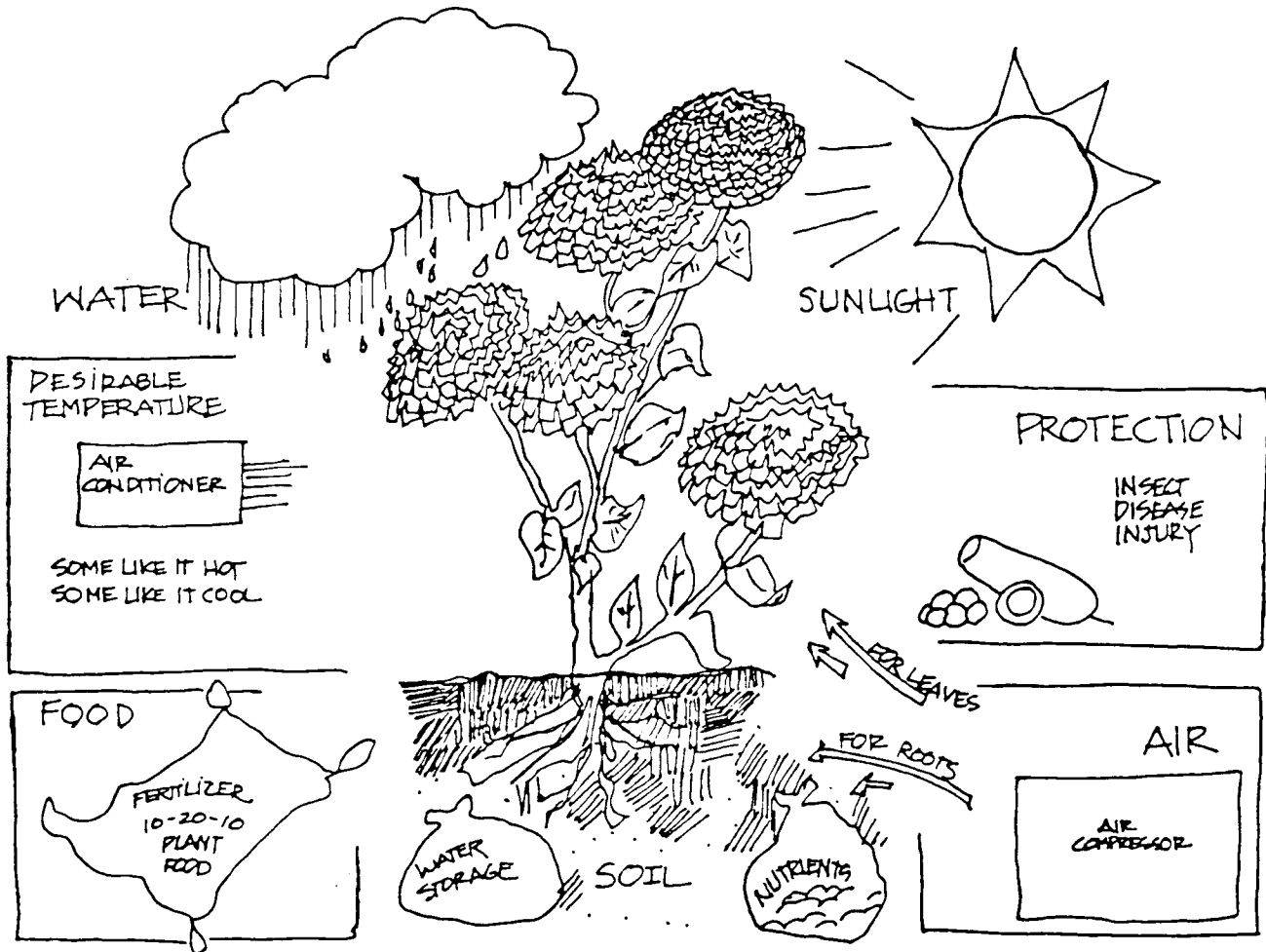
- 1. Name six things important to plant growth.
- 2. Tell how plants make their own food.
- 3. Root cuttings in water or in a propagation chamber.
- 4. Prepare a vegetable or flower garden plot.
- 5. Tell the difference between cool-season and warm-season crops.
- 6. Tell what an annual plant is.
- 7. Germinate ten pecan seeds and plant them outside.
- 8. Collect, press, and mount 15 leaves on a herbarium card.
- 9. Tell what forage plants are and why they are important.
- 10. Tell how to fill out a 4-H judging card.
- 11. Participate in a crop judging contest.
- 12. List symptoms for plant diseases.

NOTE: You may place a check in the box when you have completed each of the above objectives.

Keep a plant science library and let it continue to grow. You will find other plant science things you can do in addition to those listed here.

1. What Plants Need To Grow

Plants need several things to allow them to grow. How many can you name without looking below?



Water -

Dissolves and transports minerals to different plant parts. It is also used in food manufacture and in regulating the temperature of the plant. Water circulates through the plant and evaporates from the leaves. This protects the plant from rapid changes in temperature.

Air -

Air contains oxygen, carbon dioxide, and nitrogen. All are very important to plant growth. Oxygen is important for many things that happen such as helping the plant use nitrogen from the soil. Plant roots cannot grow in a soil without any oxygen. Leaves must also have air in order to manufacture food.

Food -

In order to a grow plants they must have a regular supply of food. Through the process called photosynthesis, the plant manufactures food. In order for it to do this, the plant must have light, water, carbon dioxide, and nutrients. Many of the nutrients needed by plants are supplied by adding fertilizer to the soil.

Light -

Is the energy plants use to make food. The green color in leaves, called chlorophyll, takes up light. With the help of water, nutrients, and carbon dioxide from the air, leaves change light energy to sugars and starches. This is called photosynthesis. You will learn more about it later. These sugars and starches are then changed to fats and proteins.

Sunlight is the best source of this light. However, plants can be grown under electric lights in the home.

In addition to light, most plants need a dark period each day. For example, soybeans will not produce seed without a period of dark each day. There are many flowers that will not bloom until fall when nights get longer and days get shorter.

Temperature - Some plants like cool temperatures to grow while others like warm temperatures. Some plants will not live in areas where winter temperatures get below freezing while others must have a cool weather to grow well. At cooler temperatures, chemical reactions in the soil become slower and the plant may go through a rest period until temperatures get warmer. Some plants require this rest period in order to grow the next year.

Protection - In order to grow well, plants must be protected from insects, disease, and injury from man. They must also be protected from weeds that use their water and fertilizers intended for the crop. Many plants must also be protected from bad weather. This is the reason many crops are not planted until warm weather in the spring. It is also why greenhouses are used to grow plants.

Soil - Is not necessary for all plants to grow. Mistletoe is a plant that lives on other plants. It grows in trees and takes its nutrients from them. Another example is water plants that live without soil.

However, we normally consider soil as a requirement for plant growth.

Why Is Soil Important?

Because:

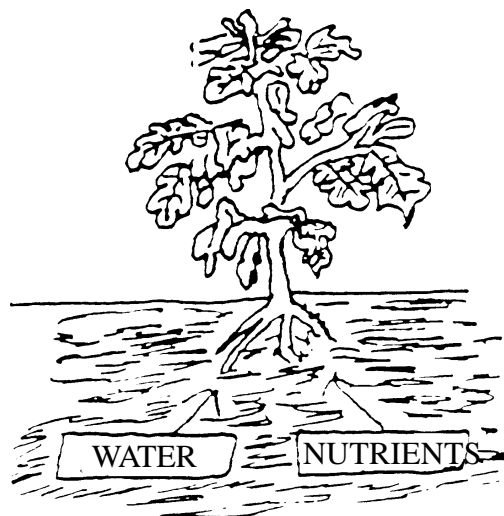
1. It contains the minerals which food plants need to grow.
2. It is a storage place for much of the water plants use.
3. Soil provides support for plants; it holds them in place.

Not only is soil important, but the kind of soil you have helps determine the kind of crops you can grow.

Some plants will not grow well if the soil contains too much clay while others do not grow well in very sandy soils.

Soil Texture

When we talk about sandy soils or clay soils, we are talking about soil texture. Soil texture refers to the amounts of different-sized particles. Sand is large soil particles and clay is small soil particles. Silt is made up of those particles between sand and clay. -

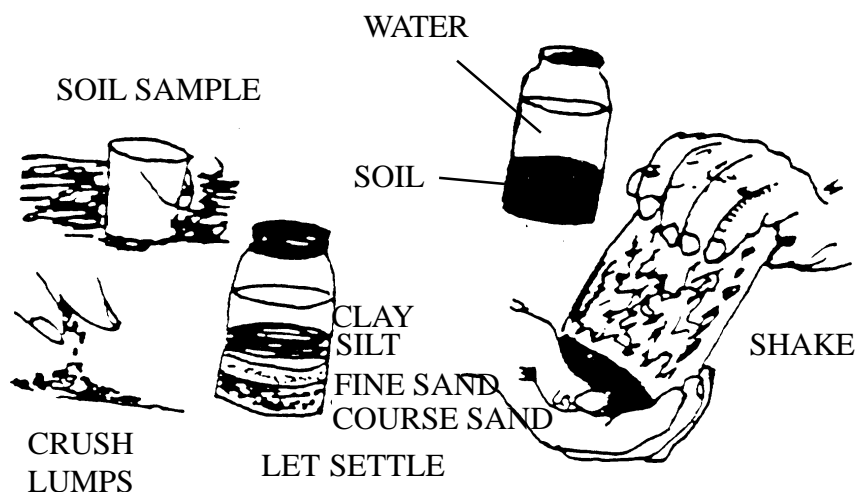


More About Sand, Silt & Clay

- Sand** Is the largest particle of soil. When rubbed between the thumb and finger, it feels rough and gritty. This is because the large particles have sharp edges on them. Soils with a large amount of sand in them are called “light-textured” soils.
- Silt** Is soil with particle sizes between those of sand and clay. These particles feel smooth and powdery. When wet, it still feels smooth but not slick or sticky. If silt is rolled between the fingers, it will break up before a long ribbon can be formed.
- Clay** The smallest soil particles are called clay. When dry, clay feels smooth, but when wet it becomes sticky. When wet clay is rubbed between the thumb and finger, a long ribbon can be formed before it breaks apart. Soils high in clay are called “heavy textured” soils.

AN ACTIVITY

SEPARATE SAND, SILT, AND CLAY OF SOILS



1. Get a quart of soil from the garden, flower bed, or field.
2. Let the soil dry. Crush lumps between your thumb and finger as the soil dries.
3. Remove trash, rocks, and roots.
4. Fill a quart jar 1/4 full
5. Add water until the jar is 3/4 full.
6. Add a tablespoon of nonfoamy detergent.
7. Close the lid and shake hard for about three minutes. Keep shaking until particles are separated from each other.
8. Set the jar on the table and watch very closely for a few minutes. Write down what you see happening.
9. Do not disturb the jar for two days.
10. Place a card alongside the jar. Mark off the depth of the clay, silt, fine sand and coarse sand. Label your card for each layer.
11. Fasten the card to the jar with tape as shown in the illustration.

TRY TO ANSWER THESE QUESTIONS

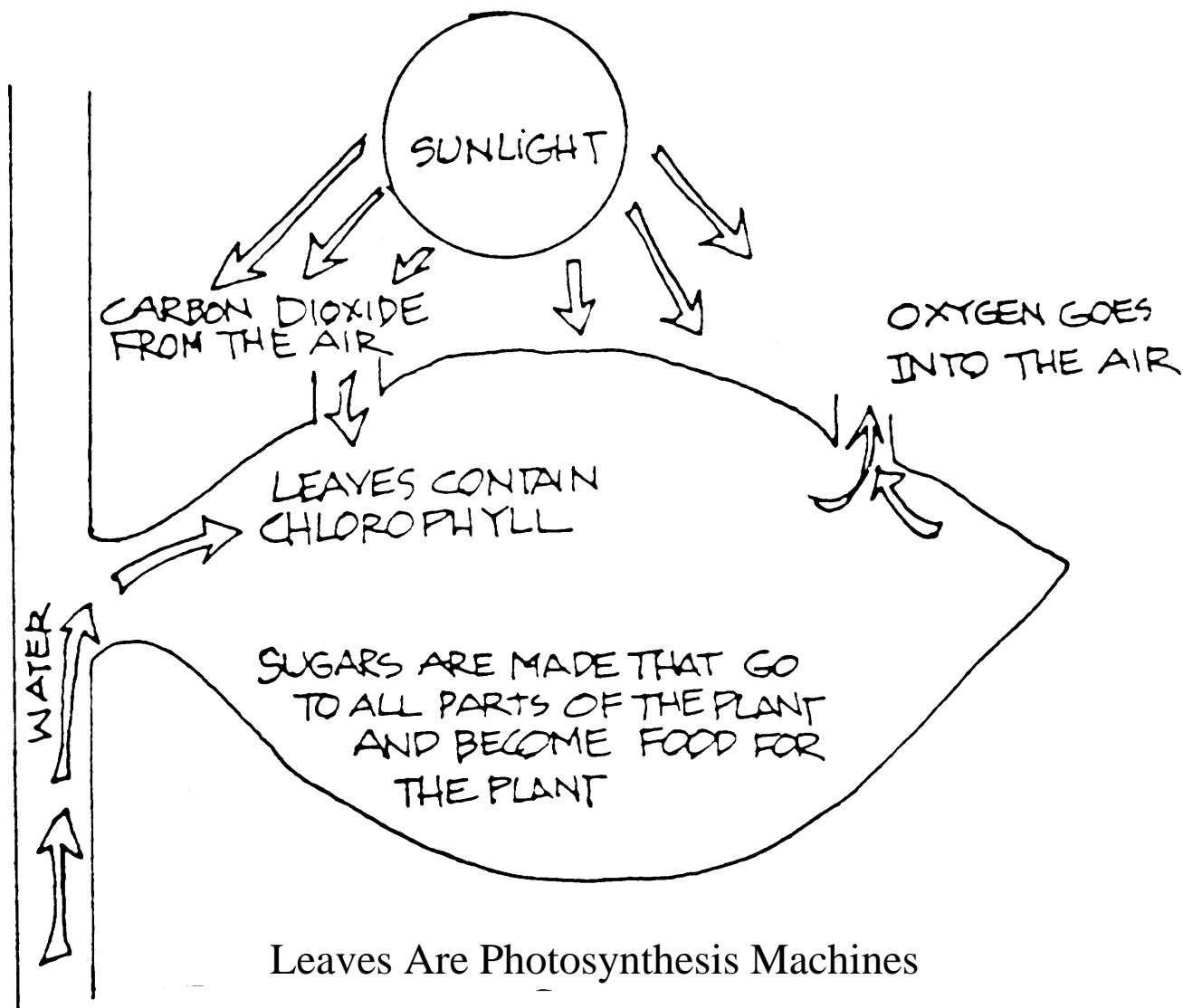
How long did it take for each fraction to settle to the bottom?

Clay _____,
 silt _____,
 fine sand _____,
 coarse sand _____.

2. How Plants Make Food (Photosynthesis)

We have mentioned that plants make their own food earlier in this unit. The leaf uses water that comes through the roots and carbon dioxide it takes from the air. With the help of chlorophyll (the green color in leaves) and sunlight, the leaf makes sugar and oxygen. The sugars move to all parts of the plant and become food for the plant.

The diagram below will help show how it works.



Some plants store sugars and starches which are used for human food. A good example of this is potatoes.



3. A New Way To Start Plants!

In Unit 1 you learned to start plants from seed. Another way to start plants is by stem cuttings. The reasons we start new plants by cutting are (1) some plants seldom or never produce seed; (2) some seeds do not produce plants exactly like their parents, and; (3) cuttings often produce large plants quicker than seeds.

Try These Plants

Geranium

English Ivy (Needle Point)

Chrysanthemums

Begonia

Coleus

Peperomia

Swedish Ivy

Artillery Plant

Wandering Jew

Here's How

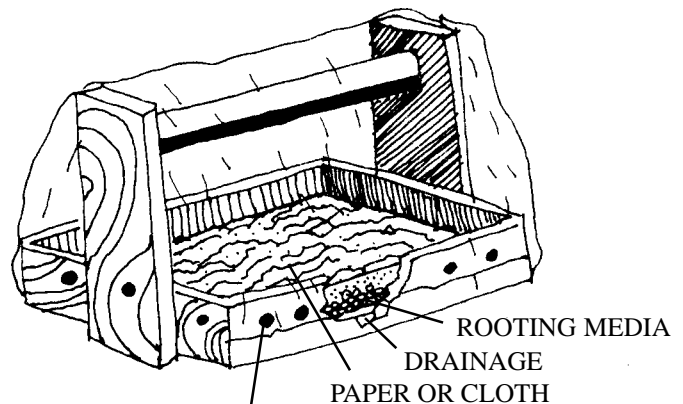
Select or build a propagation chamber.

This is a container with a clear cover that will help keep the air damp around the cuttings. It must also have holes in the bottom so excess water can drain out. The container is then filled with a rooting mixture that the cuttings can be stuck into. Washed sand, peat moss, and vermiculite can be used, but perhaps the best mixture is one-half peat moss and one-half perlite. These materials are available at garden centers and variety stores.

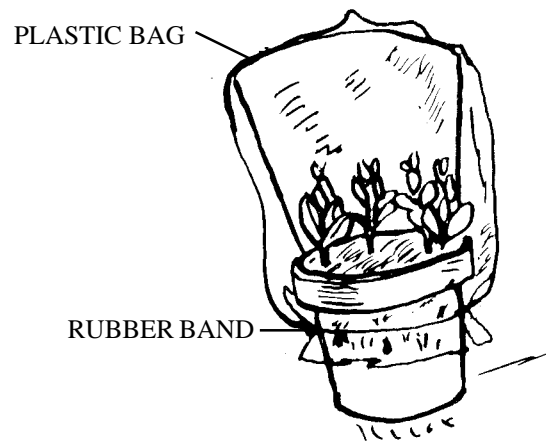
Wet the mixture well and let it drain before sticking the cuttings. This will help firm the mixture and remove excess air. Be sure there are drainage holes in the container so excess water can escape. If the holes are large enough for the rooting mix to wash out, they can be covered with paper or cloth. Set the container in a tray or pan to catch the water. If a terrarium container is used as a propagation chamber, gravel can be placed in the bottom to help drainage. Be careful not to overwater any container without drainage holes.

Taking The Cuttings

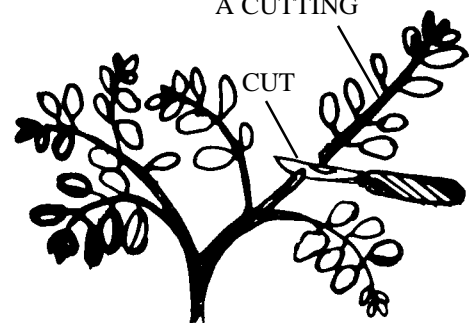
Use a knife, garden clippers, or scissors to take the cuttings. Cuttings of house plants should be two to three inches long.

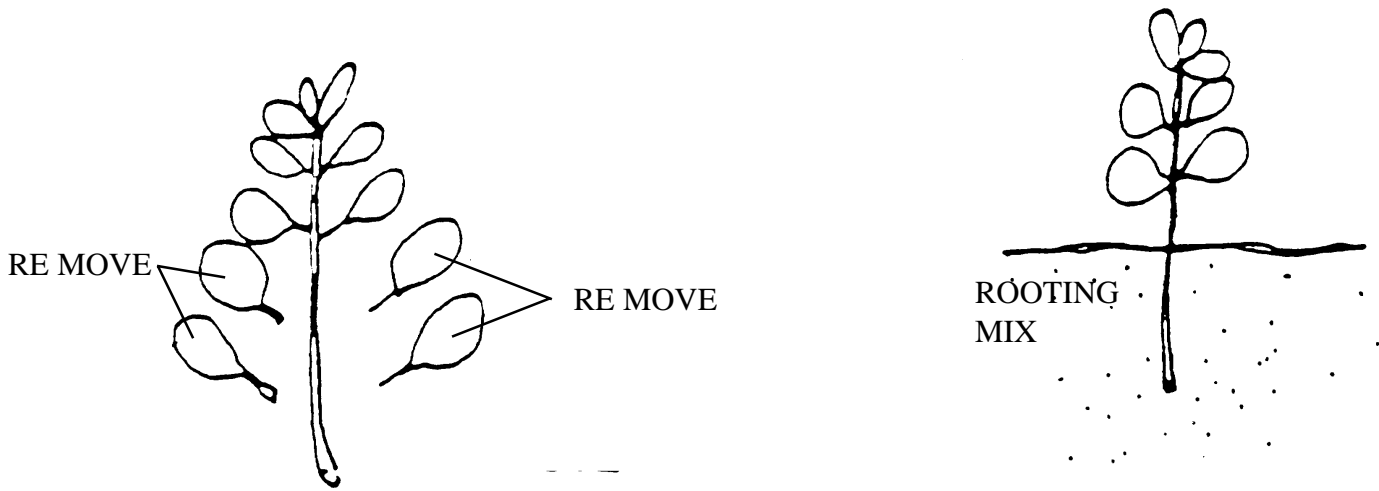


TACK TO HOLD PLASTIC



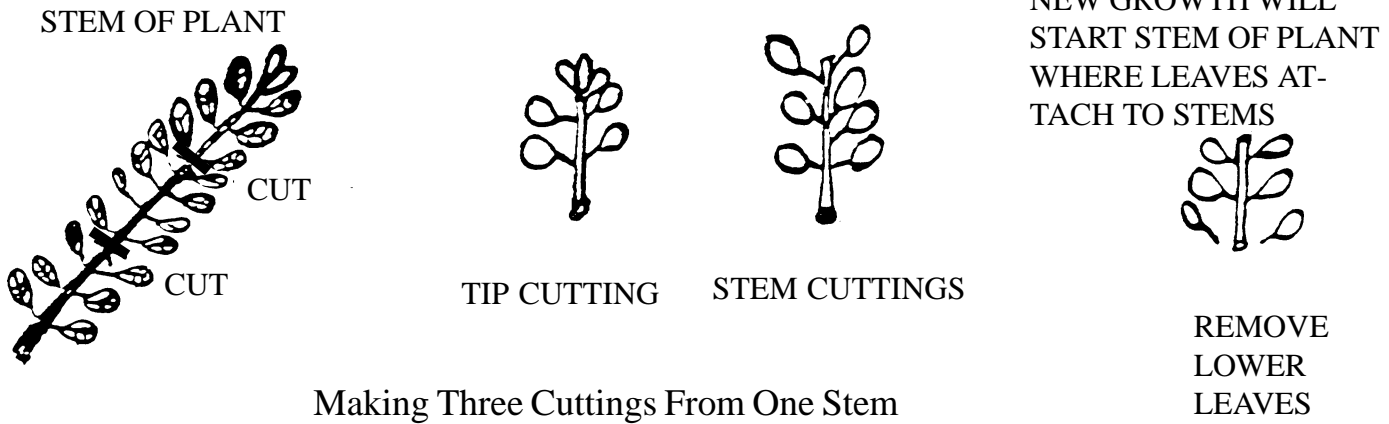
A CUTTING





Remove the lower leaves from the cutting and stick into the rooting material about one inch.

Practice tells you what type cuttings work best from different plants. On many plants a cutting from the middle of the stem will work quite well. They sometimes take a little longer to start growing. Making cuttings from the entire stem will allow you to make many cuttings from a single plant.

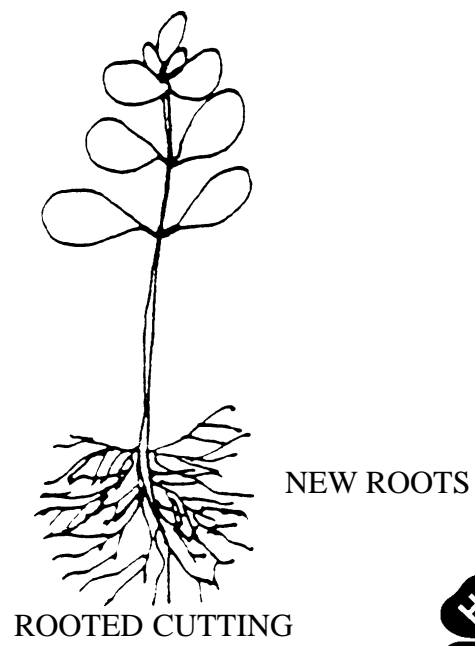


Making Three Cuttings From One Stem

After the cuttings are placed in the container, water again and cover the container with plastic. Place the container near a window in light but not in direct sunlight. In summer, larger propagation chambers can be placed outside in shady areas. Check the chamber every day or two and water again when the rooting mix becomes dry.

Check the cuttings after one week and see if they are beginning to root. Some cuttings will root in one to two weeks and others will take longer.

When the cuttings are rooted, you should transplant them into pots as you did the seedlings in Unit I. You can also plant them into hanging baskets or other containers.

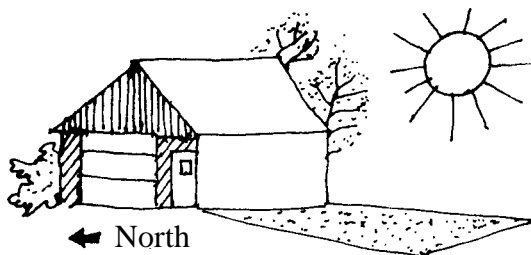


4. Prepare A Vegetable Or Flower Garden Plot

Plant A Plot!!

In Unit 1 you learned to grow vegetables in containers. Now let's prepare a flower or vegetable plot outside.

Location - The first step in beginning a garden is to choose a location. Perhaps your family already has a garden for vegetables or flowers. Ask permission to use a part of it. If you must find a new location, choose a sunny, well-drained location with a good, sandy loam soil if possible. This could be a bed near the house or in the corner of the yard. Try to have at least 100 square feet total space.

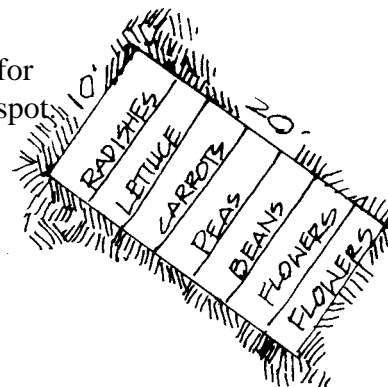


A good location is on the south side of buildings.

What Will You Grow? Vegetables? Flowers? Both?

Draw a plan of your plot and mark where you plan to plant different crops. Discuss your plan with your parents or 4-H leader and see what plants they suggest. Look over some of the references listed at the end of this section and find the height planting distances, etc. for different flowers and vegetables

Draw a plan for your garden spot.



Preparing the Soil

Flowers and vegetables grow best if you work the soil about 8 inches deep before planting. This can be done with a shovel and smoothed with a garden rake. Break up the clods and rake off the sticks, stones, and other trash.

Spread about two pounds of 10-20-10 for each 100 square feet and work it into the soil before planting.



Planting - Your parents or leader can help you locate a store that sells seed and plants for your garden. Perhaps you can start some plants in your home that you can transplant into the garden. (Unit I tells you how.) With some plants, seed must be planted in the garden while others do best if young plants are used.



Vegetables That Are Seeded

Beans
Beets

Carrots
Corn

Radishes
Pumpkins

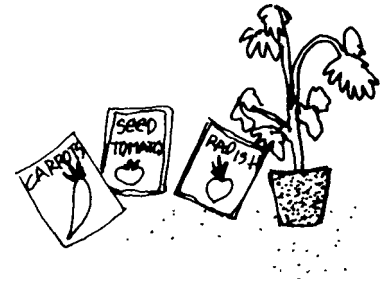
Vegetables Started With Plants

Broccoli
Cabbage
Cauliflower

Eggplant
Onion

Pepper
Tomato

Several vegetables and flowers can be started in the garden by seed or transplants. Examples are zinnias, marigolds, cucumbers, and melons. Petunias should be started with plants since seed usually does not do well when planted outside.



Something Different

Try to grow as many different kinds of plants as possible in your plot. Grow only a few plants of each kind. In addition to flowers and vegetables, you could grow ornamental gourds, cotton field corn, peanuts, castor beans, wheat, barley, oats, soybeans, and other crops. You will not harvest as much as when growing only a few crops, but you will learn about more different crops.

Invite other 4-H members and friends to see your different crops. Take pictures and make a report to your science class at school about your different crops.

Make a report of the crops you grow, where they came from, and their uses.

Crop	Where It Came From	Uses

Another Activity

Many postage stamps from the United States and other countries feature plants. Make a collection of stamps that feature plants and learn about the plants that are pictured on the stamps. You could even specialize and collect stamps that picture plants used to make medicine.

More Information

The county extension office has the information listed below. Your parents can also help you find more information on planting a garden.

Fact Sheet No. 6004, Oklahoma Garden Planning Guide

Fact Sheet No. 6011, Vegetable Varieties for Oklahoma

Fact Sheet No. 6012, Growing Tomatoes in the Home Garden

Fact Sheet No. 6013, Summer Care of the Home Garden

USDA Bulletin No. 19, Growing Flowering Annuals

USDA Home and Garden Bulletin No. 202, Growing Vegetables in the Home Garden

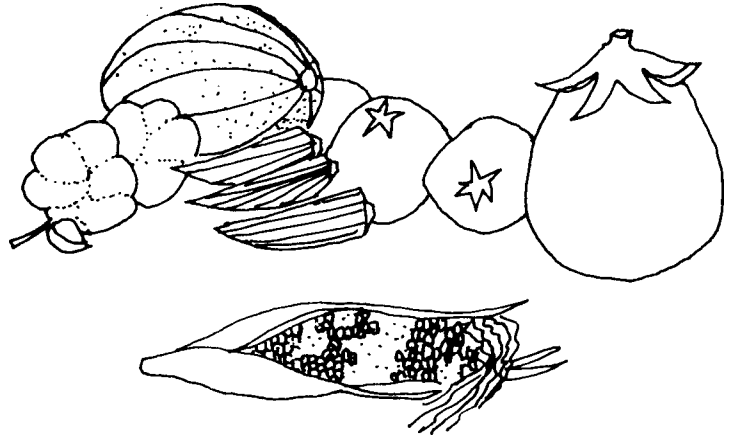


5. COOL-SEASON AND WARM-SEASON CROPS:

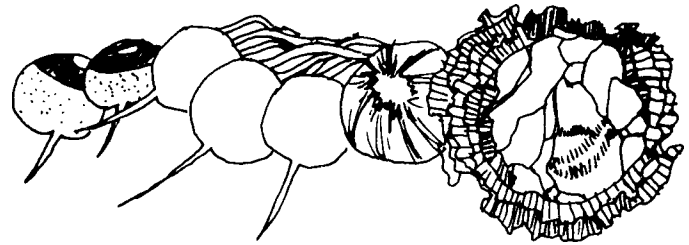
WHAT'S THE DIFFERENCE?

Many plants, especially vegetables, are classed as cool-season or warm-season plants.

Warm-season plants are those that grow well during the summer weather. They also will not do well during cool weather of the early spring and fall. Examples of warm-season plants are corn, cotton, soybeans, tomatoes, eggplant, okra, melons, and squash. Warm-season plants usually have a longer growing season than cool-season plants.



Cool-season plants are those that are somewhat frost tolerant. This means they can grow in colder weather than warm-season crops. Seeds of cool-season crops will germinate when soil temperature is cooler than seeds of warm-season crops. Examples of cool-season crops are wheat, oats, lettuce, beets, potatoes, onions, and turnips. Cool-season grasses are important to ranchers because it provides winter pastures for livestock grazing.



Cool-season crops are usually planted in early spring or in the fall. Warm-season crops are planted in late spring after the soil temperature warms.

An easy way to distinguish cool-and-warm season vegetables:

Cool Season - The part of the plant eaten is the root, stem, or leaf. The single exception is New Zealand Spinach which is a warm-season vegetable.

Warm Season - The part of the plant eaten is from the flower (a fruit). The single exception is garden peas which are cool-season vegetables.

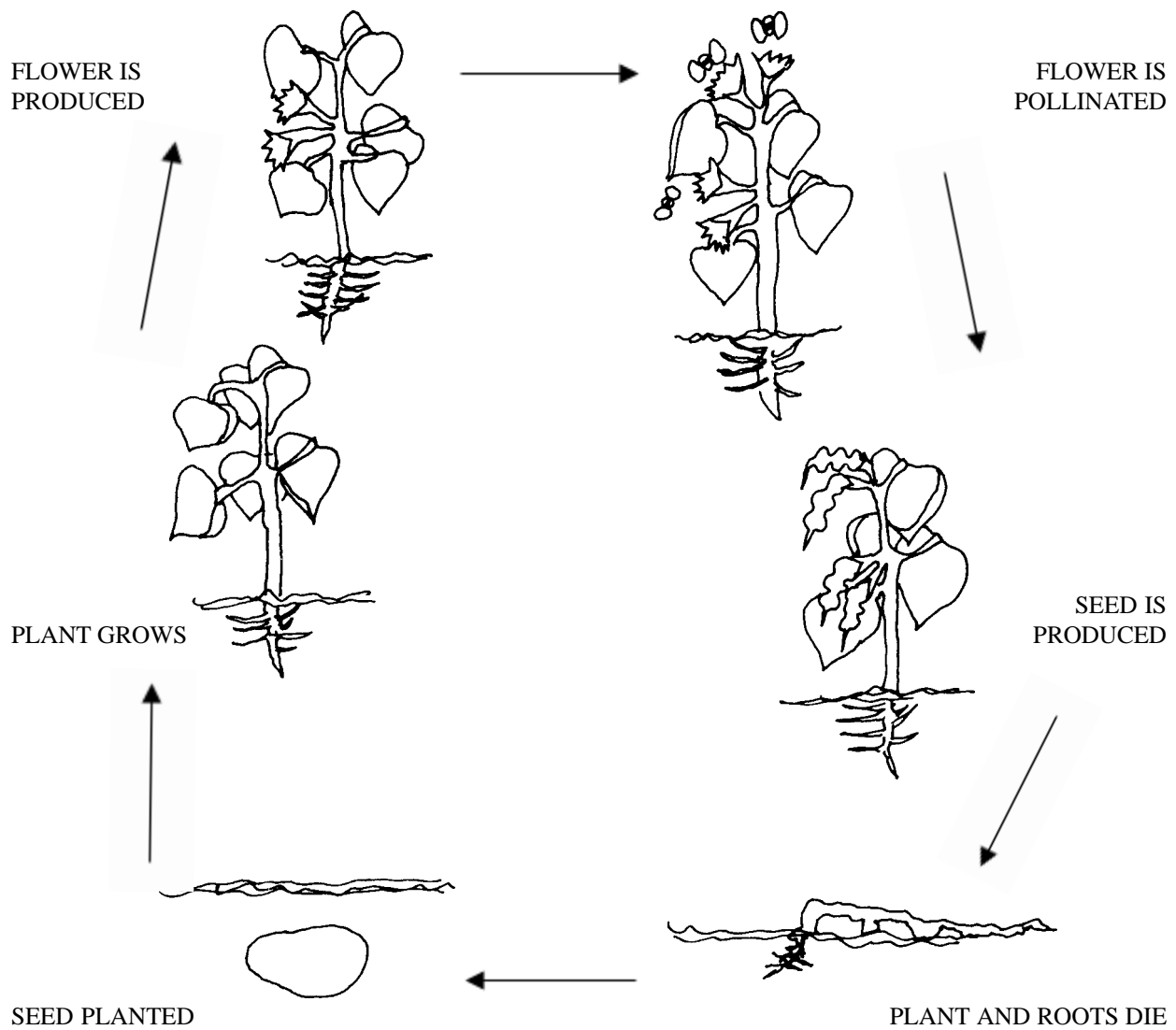
6. What Is An Annual Plant??

Have you heard people talk about planting annuals?? What are they talking about?

An annual is a plant that completes its growth in a single year. It grows from seed, flowers, produces seed, and dies in one year.

Examples of annual plants are cotton, peanuts, corn, marigolds, petunias, zinnias, tomatoes, and egg plant.

Plants that are not annuals may be perennial or biennial. We will study more about them in Unit 3.



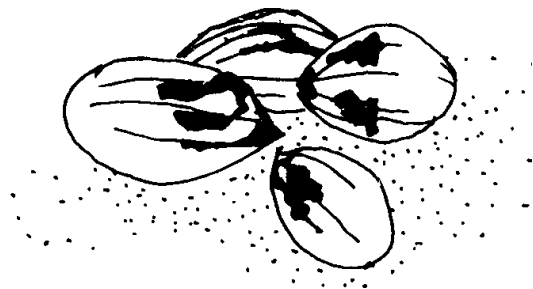
LIFE CYCLE OF AN ANNUAL PLANT (one growing season)

7. Let's Grow Some Pecan Trees

You have learned to germinate seeds of vegetables and flowers. Now try your luck at growing pecan trees from seed.

Selecting Nuts For Planting:

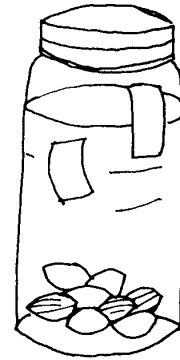
All pecan trees are started from planted nuts. They may be planted in fall, winter, or spring. Select large nuts that are mature and well filled for planting.



Prepare Nuts For Germinating:

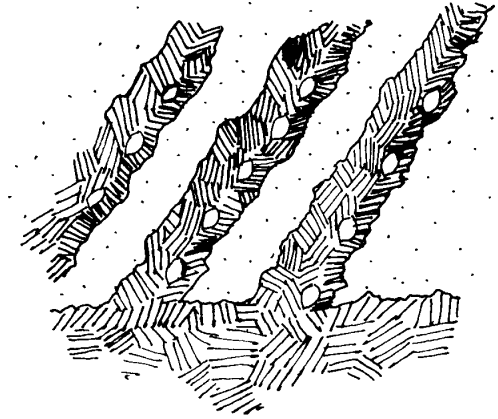
A way to hasten pecan germination is to soak them in water three to four days before planting. This helps soften the shell so the nuts will germinate quicker and more uniformly.

Old nuts that have become stale will not germinate as well as fresh nuts.



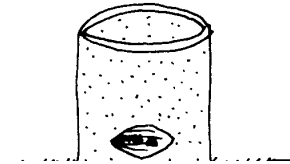
Planting The Seed:

The seed can be planted in the garden in rows if you plan to transplant the trees later. The seeds should be planted ten inches apart and three inches deep. Another way is to plant three to five seeds in each place where you want a tree to grow. When the seeds are up, all but the best tree should be cut out. Be sure to mark the location where you plant trees with a stake.

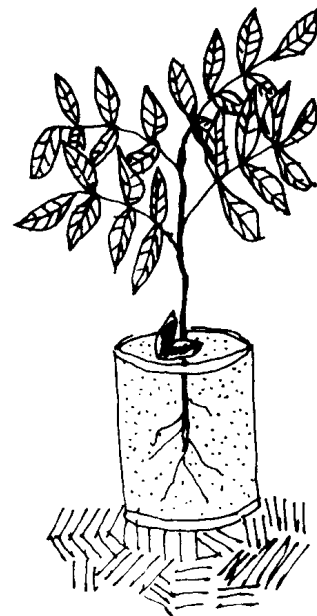


Try A Container:

If you do not have a place outside to plant pecans, you may plant them in a container. Use a tall container such as a juice can so there will be room for roots to grow. Pecans have a long taproot that may be as long as the tree is tall during the first few years of growth. The can with the young tree should be placed outside soon after germination so it can get plenty of light.

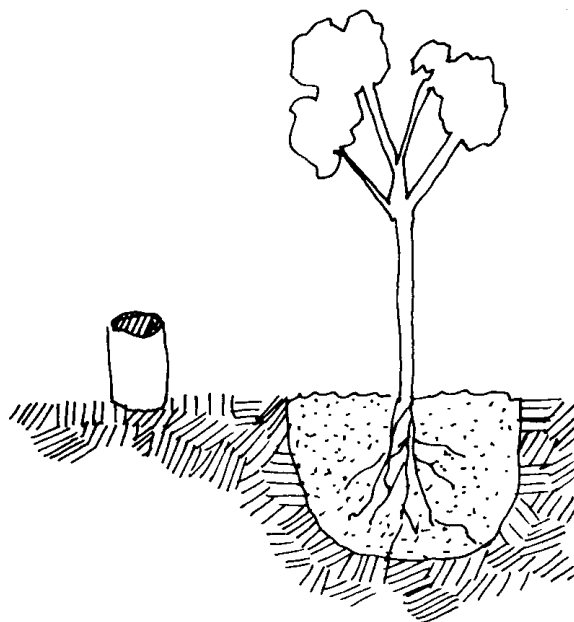


When the young seedling is as tall as the can, you can transplant it. Dig the hole first. Do not leave the roots exposed to the air any longer than necessary. Try to remove it from the can without disturbing the roots. Plant it outside where you would like a tree to grow. Do not plant it too close to the house or other trees and shrubs. Pecan trees get quite large so plant them at least 30 or 40 feet from the house. Be sure to protect it from lawn mowers and other things that could harm it while it is small.



The young pecan trees will need to be watered and fertilized as any other plant,

Two or three years after transplanting, they can be grafted or budded so the trees will produce large, high quality nuts. You will learn to do grafting in a later unit.



FOR MORE INFORMATION ABOUT PECANS

SEE OSU FACT SHEETS

(available at your local OSU extension office)

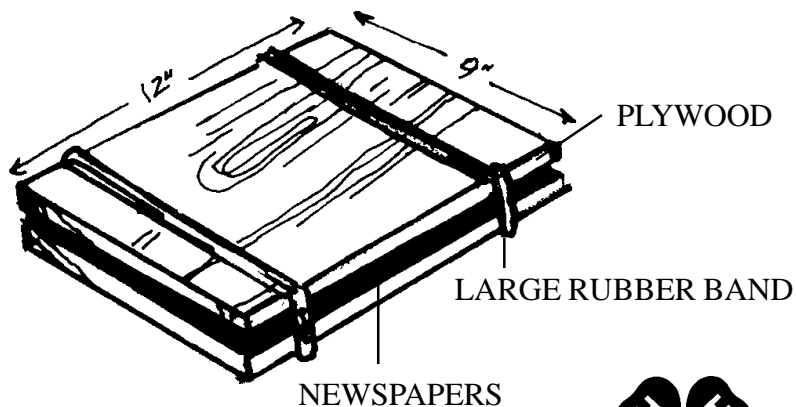
Fact Sheet No.	Title Of Publication
109	“Native Pecan Production Cost and Returns”
6217	“Collecting And Storing Pecan Propagation Wood”
6200	“A Calendar For Pecan Growers”
6201	“Pecan Varieties For Oklahoma”
6202	“Pecan Grafts and Propagation Wood”
6204	“Bark Grafting Pecans”
6205	“Splice and Tongue Grafting Pecans”
6206	“Patch Budding Pecans”
6207	“Starting Pecan Trees”
6208	“Improving Native Pecan Groves”
6209	“Pecan Insect Disease Control”

8. Lets Collect And Press Leaves.

One of the 4-H horticulture exhibits is collecting and pressing leaves of landscape plants. The pressed leaves are mounted on a “herbarium card” for exhibit. These cards include information ab the leaf such as name, growth habit, and how i can be used. In addition to being an exhibit, herbarium cards are also used to identify and le more about plants.

Here’s How:

Secure a leaf press - you can build a leaf press shown in the reference materials listed below. However, if you are unable to do this, you can magazines or newspapers and place heavy obje on them to press the leaves.



Collect leaves Of Landscape Plants -

Begin with plants around your home. Press a few extra so you can use the best for your exhibit. Be sure you get a whole leaf. Remember, compound leaves have several leaflets. Label the leaf as to name when you collect it.

Follow directions for pressing that are given in your herbarium card instructions and other reference materials.

Herbarium cards and instructions are available at the local county extension center.

When you are finished pressing, mount the leaves soon. The more you delay, the more likely they are to become damaged. It is a good idea to answer the questions on the herbarium card before mounting the leaf. If you make a mistake, you can get another card without having to throw away the leaf.

Your exhibit requires only 15 leaves; however, it is a good idea to prepare more so you can select the best.

It is usually a good idea to exhibit leaves of trees, shrubs, vines, evergreens, etc., rather than all from one group.

Your leaf press can be used to press other types of plants - perhaps you can take it to school and demonstrate its use to your science class. Ask your teacher!!!

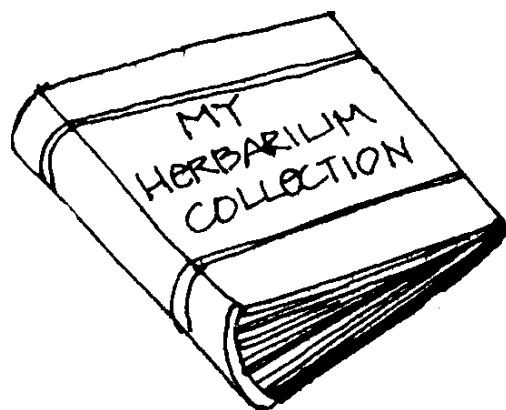
References

1. "Oklahoma 4-H Program Idea No. 1336" Leaf presses and collecting hints.
2. "Oklahoma 4-H Program Idea No. 1332" Learning about tree leaves.
3. 4-H horticulture exhibit information available from the Oklahoma State University county extension centers,
4. Forest Trees of Oklahoma Available from the Oklahoma Division of Forestry, State Department of Agriculture, Room 122, Capitol Building, Oklahoma City, OK 73105
5. Important Trees of Eastern Forest United States Department of Agriculture, Forest Service

LEAFLET

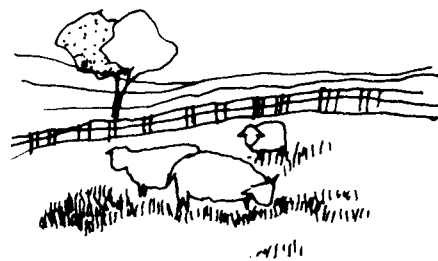
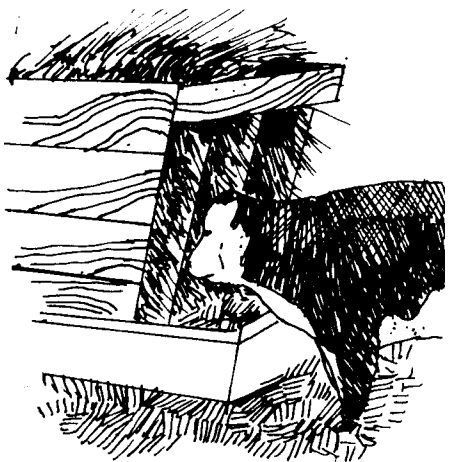


COMPLETE ROSE LEAF



9. Learn About Forage Plants:

Forage plants include those plants that animals graze on. Ranchers provide pastures for livestock so they will have forage to eat.



Another use of forage plants is to provide hay and silage for livestock feed. Silage is made by chopping forage plants and preserving them in a silo.

Most forage plants used by livestock can be divided into legumes and grasses. Examples of legumes are alfalfa and clovers. Examples of forage plants that are grasses are bermuda and tall fescue.

Forage plants that are grown by farmers and ranchers are fed to livestock which becomes human food in the form of meat.

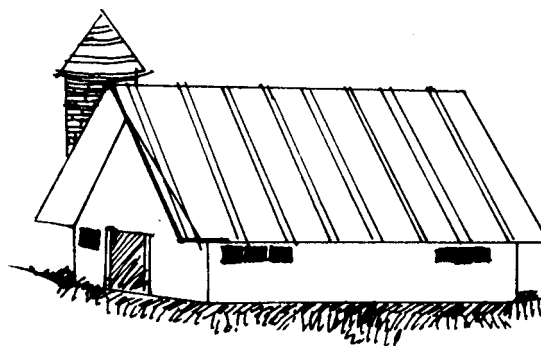
Many plants that we usually call weeds or shrubs serve as forage for wildlife. An example of this is sumac, which is a favorite food for deer.



Preparing Forage For Livestock

When forage is fed as pasture, the livestock does the harvesting. However, if the forage is to be stored and fed during the winter when pasture is not available, it must be prepared so it can be stored and perhaps moved to another location to be fed.

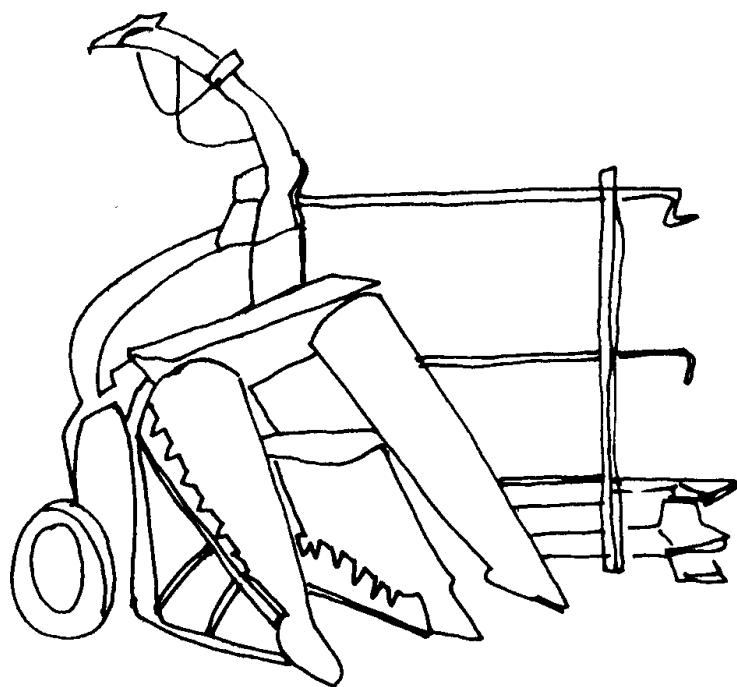
Hay is one of the ways forage is stored for future use. Many farmers produce hay crops such as alfalfa to sell to cattlemen who do not raise enough hay to feed all of their cattle.



Silage is another method of storing **forage for** later use. The forage is chopped and stored in silos. This method is used a great deal by dairy **farmers**.

Other methods of storing and feeding **forages** include grinding, making it into pellets, and making it into meal as is sometimes the case with alfalfa.

In order to produce this forage and prepare it for animal food, the farmer or rancher **must buy tractors** and other equipment. When he sells the forage or the cattle, he must receive enough money to pay for this equipment.



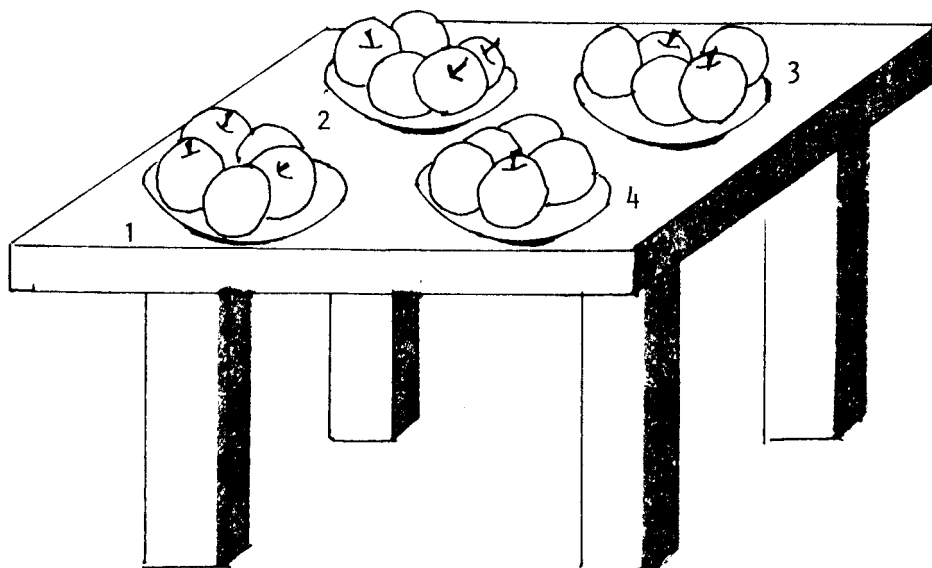
FORAGE HARVESTER

10. Using The 4-H Judging Card

4-H judging is an interesting and educational activity. When judging horticulture crops, you are trying to select the highest quality product.

Here is some information on how to participate in a judging contest:

1. A horticulture judging class consists of four specimens or plates numbered one through four which the member placed in order of quality. The specimens are numbered one through four, from left to right.



2. When learning to judge, you should develop a method to use for selecting your placings. Here is one procedure you might use:

- a. Back away from the table and look at all the specimens at once. Compare their overall appearance.
- b. Look at each specimen individually. Notice for good and bad points about each specimen.
- c. Pick out the one you think is best and write its number on your card. For example, let's say number three looked like the best of the four. Write number three on your card.
- d. Select the specimen you think is poorest of the four and write that number down about one inch from the first number. For example, let's say number one was the poorest specimen.

No. 3 No. 1


e. Next you have to decide which of the remaining specimens are second and third best. For example, let's say number two is better than number four. Write number two next to number three and then write number four next. Your placings would be:

3 2 4 1

f. Look over the specimens closely to make sure you have them placed like you want them.

g. Place a check or X on the judging card next to the 3 2 4 1 placing.

h. Before turning in your card, make sure all information is given that is required on the card.

		1-2-3-4	
Judging Card		1-2-4-3	
_____		1-3-2-4	
Group No. <u>A</u>		1-3-4-2	
_____		1-4-2-3	
Contestant <u>1</u>		1-4-3-2	
_____		2-1-3-4	
Class <u>Apples</u>		2-1-4-3	
_____		2-3-1-4	
3 2 4 1		2-3-4-1	
.....		2-4-1-3	
Placing Grade _____		2-4-3-1	
Reason Grade _____		3-1-2-4	
4H YD 3601		3-1-4-2	
		3-2-1-4	
		3-2-4-1	X
		3-4-1-2	
		3-4-2-1	
		4-1-2-3	
		4-1-3-2	
		4-2-1-3	
		4-2-3-1	
		4-3-1-2	
		4-3-2-1	

11. Let's Judge Field Crops!

Field crops judging is really one of the easier state fair contests after you understand what it includes.

It is actually more of an identification contest than judging.

There are two parts of the contest: (1) identification, and (2) grain grading.

By participating in the identification section, you will learn how to identify many of the important crops that are grown for human food and animal feed. You will also learn the weeds that cause farmers problems when producing these crops.

4-H CROP JUDGING ENROLLMENT CARD

Name _____

Address _____

County _____

Club _____

Contestant's Number



Learning to grade grain will teach you some of the important things farmers have to do when growing, harvesting, and storing grain used for food and animal feed.

Crop Identification

In the crop identification contest, 4-H members are required to identify five weed seeds, five weed plants, ten crop seeds, and ten crop plants. The plants will be directly from the field, not pressed plants.

Plants and seeds will be selected from the list below.

Crops

- Wheat
- Barley
- Oats
- Rye
- Triticale
- Cotton
- Grain Sorghum
- Forage Sorghum
- Broomcorn
- Guar
- Sesame
- Cowpea
- Peanut
- Mungbean
- Alfalfa
- Soybean
- Castorbean
- Sweetclover
- White Clover
- Vetch
- Lespedeza
- Corn

Contestant No. _____	
Identification of <u>Crop Plants</u>	
<u>Sample</u>	<u>Name</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

These are samples of identification cards used for crop plants and seeds in state contests.

Contestant No. _____	
Identification of <u>Crop Seeds</u>	
<u>Sample</u>	<u>Name</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

Weeds

- Field Bindweed
- Bracted Plantain
- Cheat
- Curled Dock
- Dodder
- Horse Nettle
- Johnsongrass
- Cocklebur
- Crabgrass
- Lamb's Quarter
- Rough Pigweed
- Russian Thistle
- Yellow Foxtail
- Puncture Vine
- Common Ragweed
- Sandbur
- Silverleaf Nightshade
- Wild Oats
- Jointed Goatgrass

Contestant No. _____	
Identification of <u>Weed Plants</u>	
<u>Sample</u>	<u>Name</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____

Contestant No. _____	
Identification of <u>Weed Seeds</u>	
<u>Sample</u>	<u>Name</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____

For more information on learning to identify plants, look over the booklet 4-H Horticulture Plant Identification. Although it discusses horticulture plants, crop plants and weeds have the same identification characteristics.

Shape, size, and type of leaf are important in identifying crop and weed plants. Roots, stems, and flowers of plants can also be used to tell the difference between two plants.

Ask your 4-H leader or county extension agent about a set of seed and plant samples that can be ordered from the Oklahoma State University Agronomy Club. These plants and seeds can help you learn identification.

Note: *In 1997, the contest at the State Fair of Oklahoma did not include the following contest of grain grading. Instead, a contest was used (as described on page 16 of this manual) placing 3 classes selected from the following commodities: samples of wheat, barley, rye, oats, alfalfa seed, corn ears, sorghum heads, or cotton bolls .*

Grain Grading

In the grain grading event you will place a grade on grain samples. Grain used will be: wheat, barley, and grain sorghum. You must write the reason for the grade.

4-Hers do not actually see the grain but information about a sample is given by the person conducting the contest. Below is a grain sorghum grading card. Let's go through a practice contest.

- (1) You are at the contest and are ready for the grain grading event.
- (2) You will be given a card that looks like the one pictured here.
- (3) The person conducting the contest will give you information about a sample of grain similar to the following:

Test Weight	52 pounds
Moisture	14 percent
Damaged Kernels	5 percent
Heat Damage	.7 percent
Broken Kernels, Foreign Material	
Other Grains	12 percent

Contestant No. _____					
Grain Sorghum Grading					
		Maximum limits of			
Grade No.	Minimum test weight per bushel	Moisture	Total damaged kernels	Heat damaged	Broken kernels, foreign material, and other grains
	pounds	percent	percent	percent	percent
1	57	13.0	2.0	0.2	4.0
2	55	14.0	5.0	0.5	8.0
3	53	15.0	10.0	1.0	12.0
4	51	18.0	15.0	3.0	15.0

Grade: Grain sorghum which is below above grades, which contains stones, or is musty, or sour, or heating, or which is otherwise of distinctly low quality.

Note: Grain sorghum which is 19 distinctly discolored shall not be graded higher than No. 3.

Sample	Grade	Reason
A.	4	Test weight
B.		
C.		

You can mark this information on your

card as it is given. Notice that the card pictured here has already been marked. Now look at the grade that is possible with each item of test information.

52 pounds -- In order to be grade 3, the test weight must be 53 pounds per test weight bushel. So a test weight of 52 puts the sample in grade 4.

14 percent moisture -- Allows the sample to be in grade 2.



5 percent total damaged kernels -- Also allows the sample to be grade 2.

0.7 percent heat damage -- Is too high for grade 2. So it puts the sample in grade 3.

12 percent broken kernels, foreign matter and other grains -- Places the sample in grade 3.

Now -- Check back and see which item or items caused the sample to be in the lowest grade.

A test weight of 52 pounds per bushel caused the sample to be in grade 4.

So -- At the bottom of the card, across from sample A and under grade mark No. 4. In the space for reason, write "test weight."

See if you can determine the grade for a grain sorghum sample with the following information.

Test Weight 58 pounds
Moisture 15.0 percent
Total Damaged Kernels 2.5 percent
Heat Damage 0.1 percent
Broken Kernels,
foreign material
& other grains 4.0 percent

Answer These Questions - Quiz A

1. What is the grade based on test weight?

2. What is the grade based on moisture?

3. What is the grade based on total damaged kernels?

4. What is the grade based on heat damage?

5. What is the grade based on broken kernels, foreign material and other grains? _____

6. What is the final grade? _____

7. What is the reason? _____

Check for answers to Quiz A at the end of this section.

Contestant No. _____

Grain Sorghum Grading

Grade No.	Minimum test weight per bushel	Maximum limits of			
		Moisture	Total damaged kernels	Heat damaged	Broken kernels, foreign material, and other grains
	pounds	percent	percent	percent	percent
1	57	13.0	2.0	0.2	4.0
2	55	14.0	5.0	0.5	8.0
3	53	15.0	10.0	1.0	12.0
4	51	18.0	15.0	3.0	15.0

Grade: Grain sorghum which is below above grades, which contains stones, or is musty, or sour, or heating, or which is otherwise of distinctly low quality.

Note: Grain sorghum which 19 distinctly discolored shall not be graded higher than No. 3.

Sample	Grade	Reason
A.		
B.		
C.		

Sample Grades

In some cases samples of grain may receive a “sample grade”. These are explained at the bottom of the grade charts on each card. Examples: barley with more than 16 percent moisture, wheat with stones, and grain sorghum that is sour or heating would be given a sample grade.

Barley Grading

The same procedures are used when grading barley. Using the information below, determine the grade for a sample of barley.

Test Weight 45 pounds
 Sound Barley 97.0%
 Total Damaged Kernels 3.5%
 Heat-Damaged Kernels 0.5%
 Foreign Material 3.0%
 Broken Kernels 3.0%
 Thin Barley 12.0%
 Black Barley 0.2%

Answer These Questions - Quiz B

1. What is the grade based on test weight?

2. What is the grade based on sound barley?

3. What is the grade based on total damaged kernels?

4. What is the grade based on heat-damaged kernels?

5. What is the grade based on foreign material?

6. What is the grade based on broken kernels?

7. What is the grade based on thin barley?

8. What is the grade based on black barley?

9. What is the grade?

10. Reasons:

Contestant No. _____								
Barley Grading								
Grade	Minimum limits of		Maximum limits of					
	Test weight	Sound Barley	Total damaged kernels	Heat damaged kernels	Foreign material	Broken kernels	Thin Barley	Black Barley
1	47	97	2.0	0.2	1.0	5.0	10.0	0.5
2	45	94	4.0	0.3	2.0	10.0	15.0	1.0
3	43	90	6.0	0.5	3.0	15.0	25.0	2.0
4	40	80	8.0	1.0	4.0	20.0	35.0	5.0
5	36	70	10.0	3.0	6.0	30.0	75.0	10.0
Sample grade	36	< 70	> 10	>3.0	>6.0	>30.0	>75.0	>10.0
or Barley that contains more than 16% of moisture, or contains stones, or is musty or sour, of heating.								
Sample	Grade	Reason						
A.								
B.								
C.								

Check for answers to Quiz B at the end of this section.



Wheat Grading

If you have mastered the last two examples, wheat grading will be easy. Determine the grade for a sample of wheat from the information below. Mark your grade and reason on the card printed below.

Test Weight 59 lbs.
 Heat-Damaged Kernels 0.1%
 Damaged Kernels 1.5%
 Foreign Material 0.3%
 Shrunken or Broken Kernels 0.4%
 Defects 3.0
 Contrasting Classes 0.5%
 Wheat of Other Classes 2.5%

Answer These Questions - Quiz C

1. What is the grade based on weight?

2. What is the grade based on heat-damaged kernels?

3. What is the grade based on damaged kernels?

4. What is the grade based on foreign material?

5. What is the grade based on shrunken or broken kernels?

6. What is the grade based on defects? _____

7. What is the grade based on contrasting classes? _____

8. What is the grade based on wheat of other classes? _____

9. What is the grade? _____

10. What are the reasons? _____

Check for answers to Quiz C at the end of this section.

Practice these kinds of exercises with others in your club to prepare for participating in state fair activities.

Contestant No. _____

Grade Requirements for Wheat

		Minimum limits of						
		Defects					Wheat of Other Classes	
Grade	Minimum test weight per bushel	Heat damaged kernels	Damaged kernels (Total)	Foreign material	Shrunken & broken kernels	Defects (Total)	Contrasting classes	Wheat of other classes
		pounds	percent	percent	percent	percent	percent	percent
1	60	0.1	2.0	0.5	3.0	3.0	1.0	3.0
2	58	0.2	4.0	1.0	5.0	5.0	2.0	5.0
3	56	0.5	7.0	2.0	8.0	8.0	3.0	10.0
4	54	1.0	10.0	3.0	12.0	12.0	10.0	10.0
5	51	3.0	15.0	5.0	20.0	20.0	10.0	10.0

Sample Grade: Wheat which does not meet the requirements for any of the above grades; or which contains stones; or which is musty, or sour, or heating; or which is otherwise of distinctly low quality.

Sample	Grade	Reason
A.		
B.		
C.		

ANSWERS TO QUIZ A

1. Grade 1
2. Grade 3
3. Grade 2
4. Grade 1
5. Grade 1
6. Grade 3
7. Moisture

ANSWERS TO QUIZ B

1. Grade 2
2. Grade 1
3. Grade 2
4. Grade 3
5. Grade 3
6. Grade 1
7. Grade 2
8. Grade 1
9. Grade 3
10. Heat-damaged kernels and foreign material

ANSWERS TO QUIZ C

1. Grade 2
2. Grade 1
3. Grade 1
4. Grade 1
5. Grade 1
6. Grade 1
7. Grade 1
8. Grade 1
9. Grade 2
10. Test Weight



12. How Do You Know If A Plant Is Diseased?

In Unit 1 you learned that the study of plant diseases is called plant pathology, and that plant doctors are called plant pathologists.

Now you will learn some of the ways to tell if a plant has a disease.

When you are sick you do not feel good, you may have a fever, cough or stomach ache. These are called symptoms. Symptoms are things that let you know when you are sick.

Plants also have symptoms when they are sick (diseased). However, plants cannot tell you when they are sick so you must learn to look at the plant and tell if it has a disease. Listed below are some symptoms and what they mean.

<u>SYMPTOM</u>	<u>WHAT IT IS OR DOES</u>
Chlorosis	Yellowing of tissue that is normally green
Die back	A slow gradual death of leaves, stems and branches.
Blight	A disease that causes rapid dying of leaves and twigs.
Gall	A swelling on roots, stems, leaves or branches.
Ooze	A wet or waxy leak from the plant.
Wilt	Plant leaves and shoots or twigs become limp and droop.
Necrotic	Dead and discolored areas on leaves and stems.
Leaf spot	A small, dead area on a leaf.

HOW DO YOU KNOW IF A PLANT IS DISEASED?

Some plant diseases are often given common names that reflect the appearance of the disease on the plant. Damping-off is a disease that kills seedlings before or just after they emerge from the soil. Frequently, the stem dies at the soil line or the roots die. Seeds and soil are often treated before planting to prevent damping-off. The stem appears damp at the soil line where it falls over. When seeds are treated to prevent damping-off it is called seed treatment.



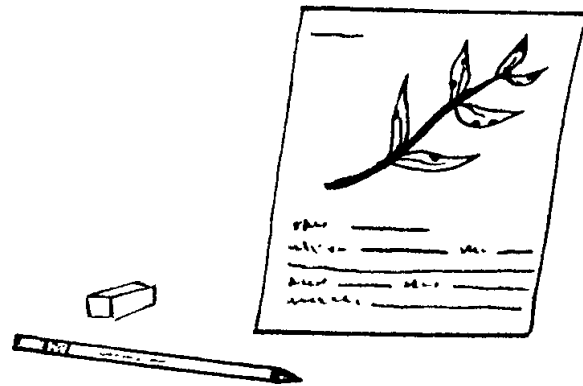
Damping-off causes the seedling to rot near the soil line.

Mildew is a term that often refers to the gray or green discoloration seen on painted walls, stale bread, or leather. Mildew is also a name of several plant diseases characterized by white or gray, powdery fungus growth on the surface of leaves, young stems and flowers. Roses, crepe myrtle, zinnia, squash, cantaloupe and soybeans often have powdery or downy mildew.

AN ACTIVITY

Using 4-H Literature, school science books, library books and extension publications as a guide, make a collection of as many plant diseases as you can. Collect plants that have disease symptoms, press and label them and list the controls.

Collect publications and pictures of diseases and learn to identify them and list their controls.



LET'S REVIEW

1. What is a symptom ?

2. Name 3 plant disease symptoms.

A. _____

B. _____

C. _____

3. Chlorosis is a disease that causes rapid killing of leaves and twigs.

(True or False)

4. Draw a line from the symptom to the correct matching statement.

SYMPTOM

WHAT IT IS OR DOES

Chlorosis

Dead and discolored areas on leaves and stems.

Die back

Plant tissue becomes limp and droops.

Blight

A slow gradual death of leaves, stems and branches.

Gall

A disease that causes rapid dying of leaves and twigs.

Ooze

Yellowing of tissue that is normally green.

Wilt

A small dead area on a leaf

Necrotic

A wet or waxy leak from the plant.

Leaf spot

A swelling on roots, stems, leaves or branches.

