

**4-H**  
**WHEAT**  
**PROJECT MANUAL**

UNIVERSITY OF CALIFORNIA • COOPERATIVE EXTENSION

FRESNO COUNTY

# 4-H WHEAT PROJECT MANUAL

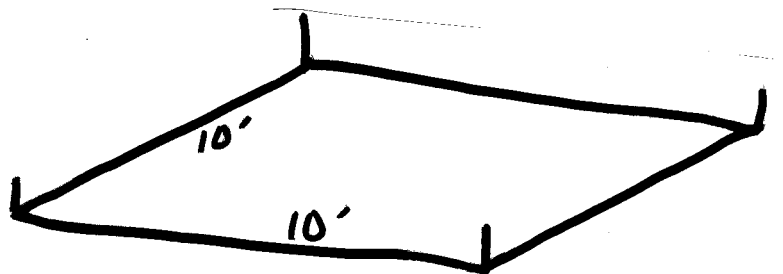
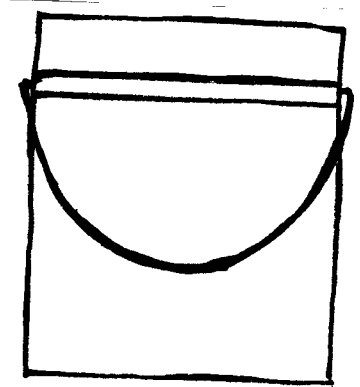
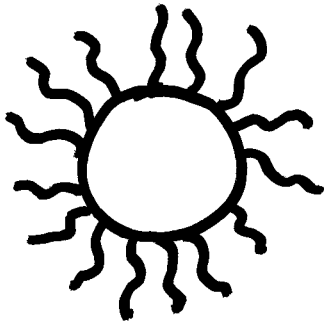
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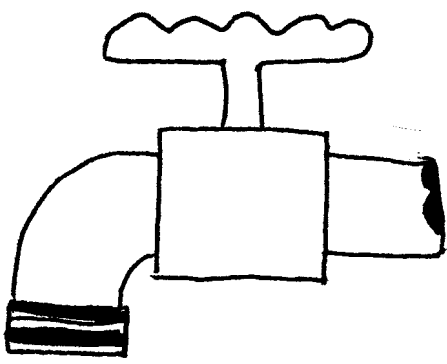


## INTRODUCTION

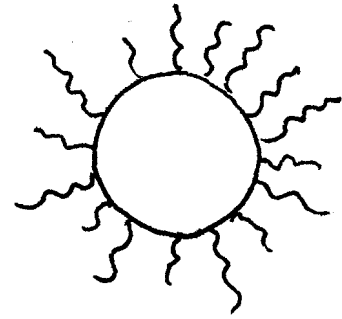
The 4-H Wheat Project is designed for young people to experience one of the most important commercial crops--wheat. They will be exposed to growing a demonstration plot of a variety suited to this area, harvesting and milling the grain, and utilizing it to bake their own bread. They will learn the basics of growing a crop, such as selecting their site, preparing the soil, planting, fertilizing, irrigation, pest management, and harvesting. They will utilize the grain from their plot by grinding it into whole wheat flour and using it in a simple, easy-to-make bread recipe. They will evaluate the quality of the bread they bake and learn about the nutrition of what they will eat.

They can have a project as small as a plastic bucket or a plot as large as 10 ft. x 10 ft. They can do the project as a group or as an individual.





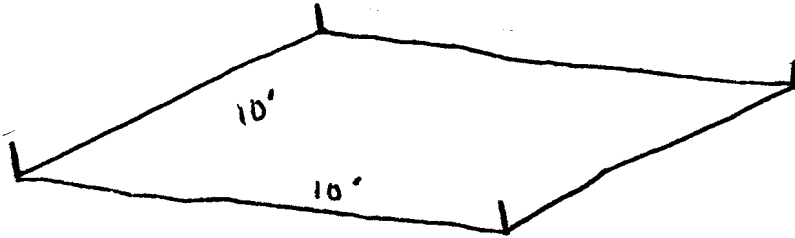
## SELECTING A SITE



### TOOLS

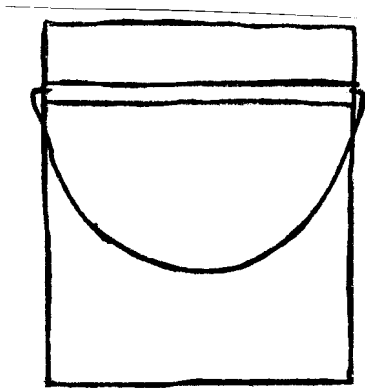
Tape Measure

### REQUIREMENTS FOR A GOOD PROJECT:



1. **SIZE** - You will have to explore the areas available to you. You can have a project as small as a plastic bucket or as large as a 10 ft. x 10 ft. plot. The table below will give you an idea of the needs and expectations of different size plots so you can plan ahead.

2. **LOCATION** - Sunny, unshaded, close to water faucet, and fairly level.

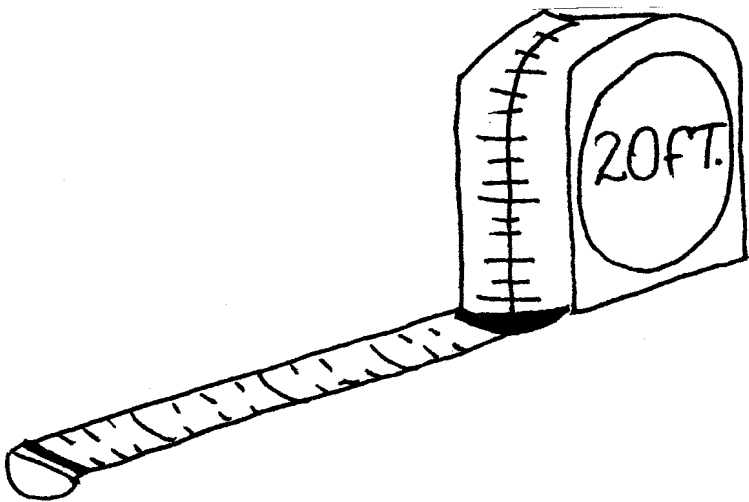


3. **SOIL** - Free of rocks, junk, or chemicals (don't plant where someone has dumped used oil.) Look at the type of soil--is it very sandy or very hard clay? This will determine how you will prepare the soil and water the crop. *If you foresee problems, call your local farm advisor.*

4. **PETS AND OTHER ANIMALS** - Plot should be guarded or out of reach of dogs or other large animals. Some type of fencing would be good.

5. **TIME SITE WILL BE AVAILABLE** - Will not be needed for anything else for the entire season (approximately December to June.)

**NOTE** - *Try to find a spot that includes all of the above items, but if you don't and still want to use it, ask for advice.*



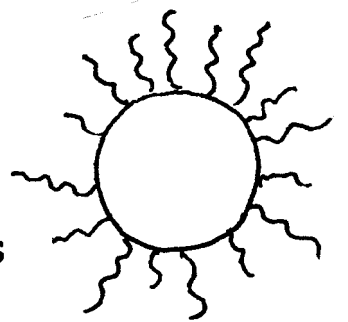
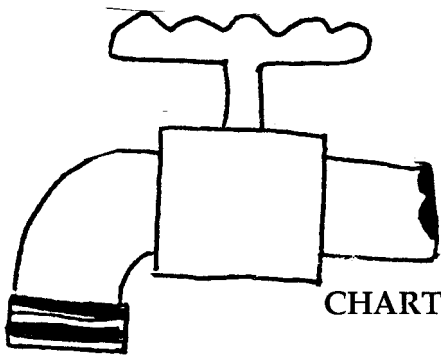
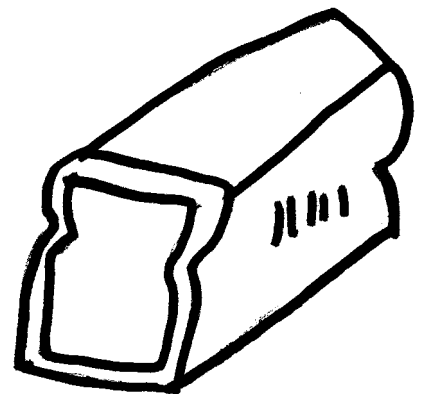
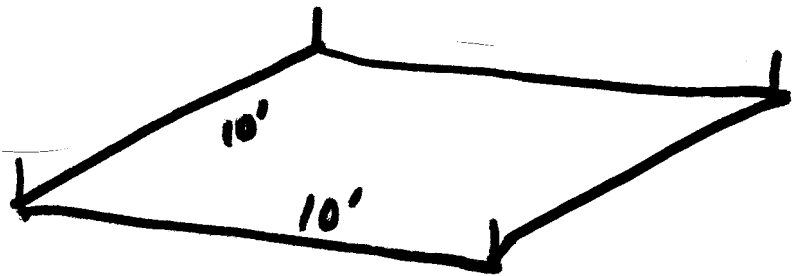
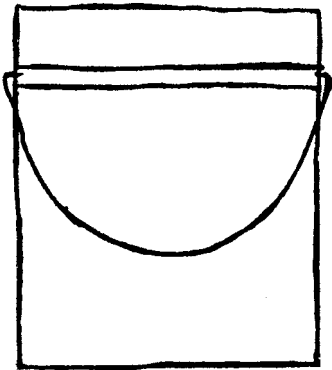
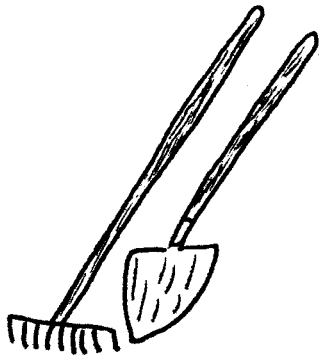


CHART OF APPROXIMATE NEEDS AND EXPECTATIONS

SIZE	SQ. FT.	FERTILIZER (ounces)	SEED (ounces)	YIELD	BREAD RECIPE (loaves)
Plastic Bucket	3/4 <i>or 12" Dia.</i>	1/2	75 seeds	2 oz. =	1/4
3 ft. x 3 ft.	9	3	3/4	18 oz. =	2 1/4
5 ft. x 5 ft.	25	8	2	3 lbs. =	6
10 ft. x 10 ft.	100	32	8	12 lbs. =	24





## PREPARING THE SOIL

### TOOLS

Shovel  
Garden Rake  
Hose  
Garden Trowel

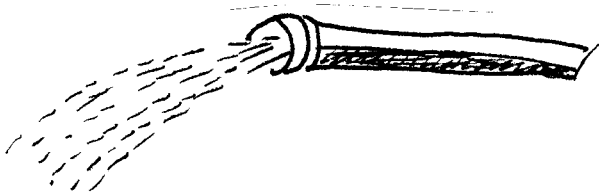
### MATERIALS

Using Plastic Bucket:  
Bucket  
Soil (good topsoil)

### THINGS TO DO:

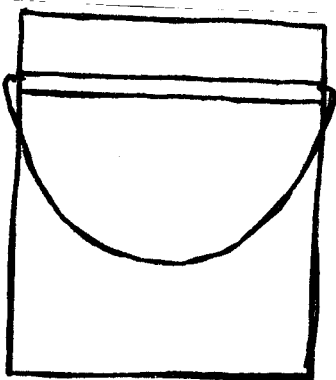
1. Using the shovel, completely dig up and turn over soil to a depth of six to eight inches. Check for hard layers below by digging in one spot deeper to about two feet

In a plastic bucket, fill topsoil up to about four inches of top and work soil down so no large clods are present and soil is level. Pack soil slightly, you will get some more compaction when you first irrigate. Keep soil within three inches of top.



2. Using garden rake, smooth and level soil surface until you have no large clods.

3. Check the moisture level of your soil, you may need to irrigate (water) before planting. Take a handful of soil and with your fingers squeeze tightly into a ball. Release the soil ball in the palm of your hand. **See below results:**



- a. Soil ball is muddy and slick with moisture seen on the outside--let soil dry out for a while before further tilling and planting.
- b. Soil ball stays together but will crumble if touched--soil is ready to plant.



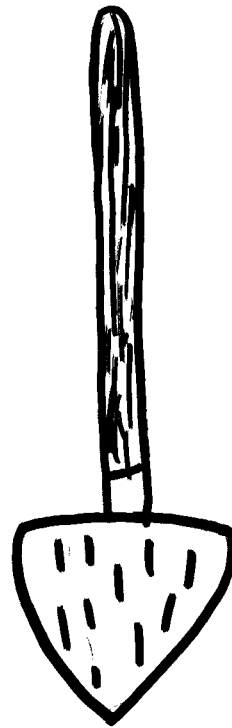
Too Moist

- c. Soil ball falls apart when you open hand--soil is too dry. Add moisture by sprinkling lightly with hose and working with rake until soil is like "b" above.

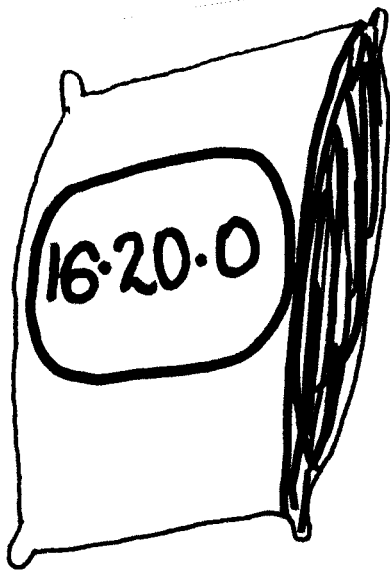
- 4. If your plot has lots of leaves, and weeds, (organic matter), make sure you spade it under and mix in the soil thoroughly. You should remove as much bermuda grass as possible.



Too Dry



Ready for Planting



## FERTILIZING



### TOOLS

Scales (able to weigh ounces)  
Container  
Garden Rake

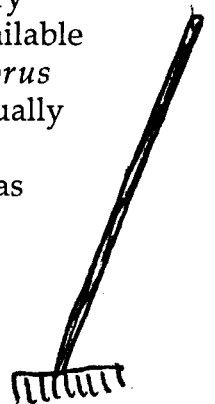
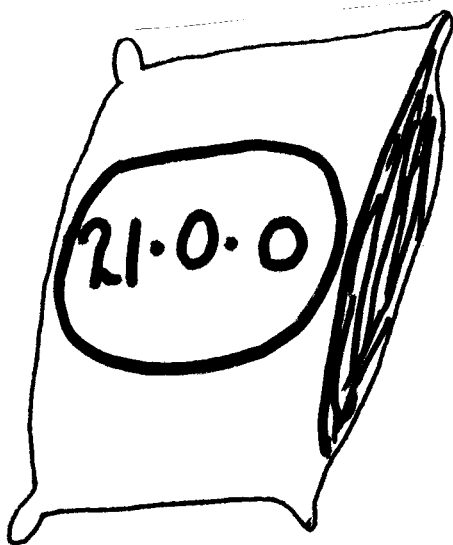
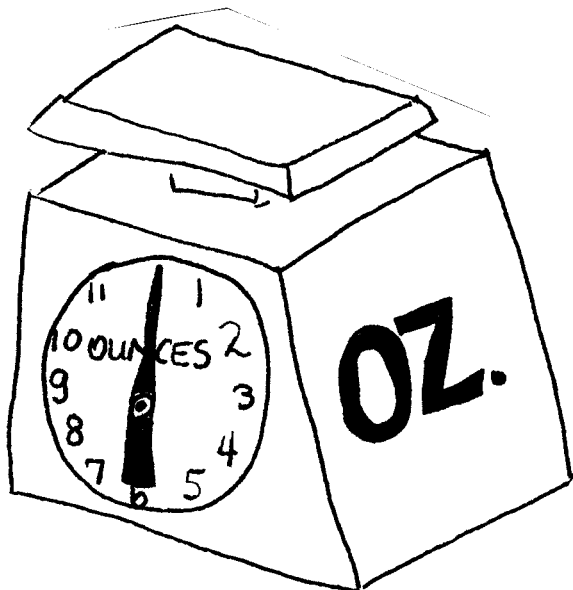
### MATERIALS

Ammonium Sulfate (21-0-0)  
Ammonium Phosphate (16-20-0)  
(or a blend of both)

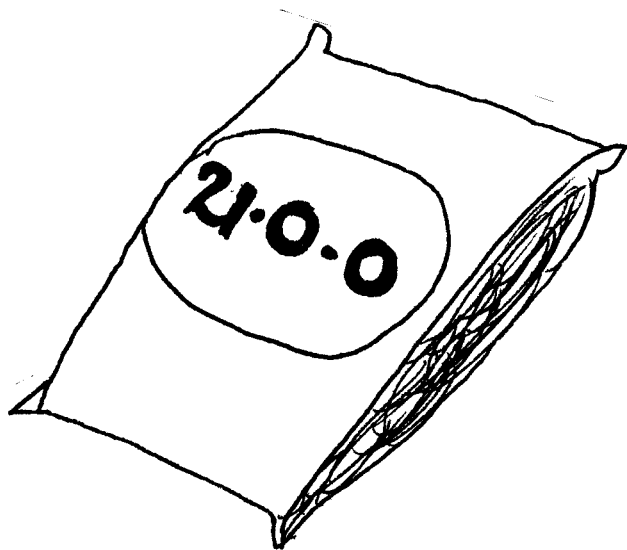
### THINGS TO KNOW AND DO:

1. Your wheat plants need food just like you do, but their food is a lot different. Your plants need basic building materials so their leaves can manufacture food. This manufacturing process is called "*photosynthesis*" and is carried on in the tiny cells that make up the leaves of the plant. An essential for this process is the green *chlorophyll* in the cells. This is what makes your plants green. It takes light from the sun, and using these building materials, manufactures food for the plant to grow and store just like you eat food and live and grow.

2. These building materials are mineral nutrients such as *nitrogen*, *phosphorus*, *potassium*, *iron*, *zinc*, and many others. *Nitrogen* and then *phosphorus* are the major nutrients that are needed to supplement your plants. All necessary nutrients are needed and will cause problems in the plant if they are not there. Most are needed in only very small amounts and are readily available in the soil. *Nitrogen* and *phosphorus* are needed because there is not usually enough in the soil to provide for a productive crop. These are added as chemical fertilizers.







3. *Ammonium Sulfate (21-0-0)* and *Ammonium Phosphate (16-20-0)* are granular chemical fertilizers readily available in garden shops or hardware stores. What are the numbers 16-20-0? Sixteen means there is 16% nitrogen in the chemical, 20 means there is 20% phosphorus and 0 means there is no potassium in the fertilizer. These numbers appear in this order on chemical fertilizer bags to describe the amounts of these three nutrients.

4. Your wheat crop needs an additional amount of *nitrogen and phosphorus* added to the soil to attain its productive capability. *Potassium and the other lesser nutrients are usually in sufficient supply in our soils in California.* The recommended rate for fertilizing wheat is 150 pounds Nitrogen (N) and 50 pounds Phosphorus (P<sub>2</sub>O<sub>5</sub>) per acre.



5. To obtain the right type of fertilizer for your wheat you need to blend **Ammonium Sulfate** at two parts to one part **Ammonium Phosphate**. Use your scales to weigh them out.

6. After you blend your fertilizer you need to weigh the amount needed for your project. Below is a chart giving these amounts for the different size projects.

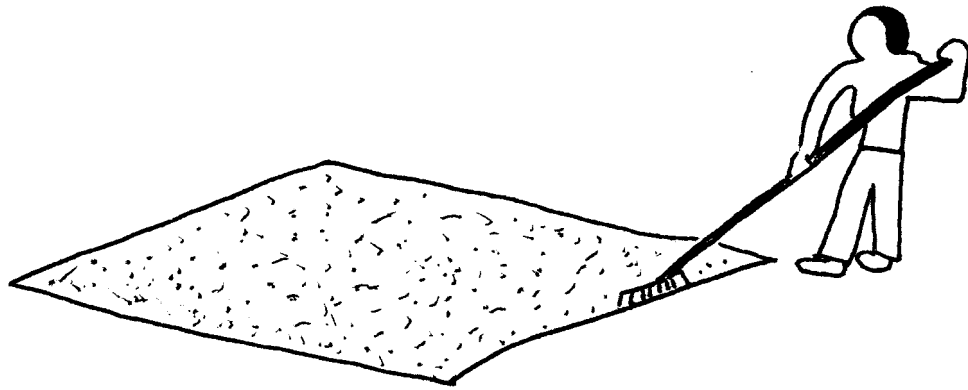
SIZE	SQUARE FEET	FERTILIZER BLEND (in ounces)
Plastic Bucket	3/4 or 12" Dia.	1
3 ft. x 3 ft.	9	3
5 ft. x 5 ft.	25	8
10 ft. x 10 ft.	100	32



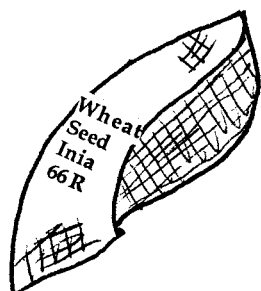
7. Before planting, spread the granular fertilizer evenly over your project by sprinkling with your hand.

8. Then use the garden rake to incorporate (mix) the granules into the soil as deep as you can with the rake tines.

9. Wash your hands thoroughly after handling the chemical fertilizer.



## PLANTING

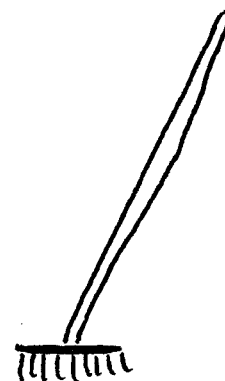


### TOOLS

Garden Rake  
Scales (able to weigh ounces)  
Container

### MATERIALS

Wheat Seed



### THINGS TO KNOW:

1. You will be using **Inia 66R**, a variety of wheat suitable for the San Joaquin Valley. It is a *hard red wheat* used for making bread products. It is **early maturing** and should be harvested by late May or early June depending on the weather.

2. Your wheat project should be planted anytime between Thanksgiving and the middle of January. The earlier you plant the more possibility of diseases and the later you plant the later you will harvest and have lower yields. *The best time to plant is just before Christmas.*

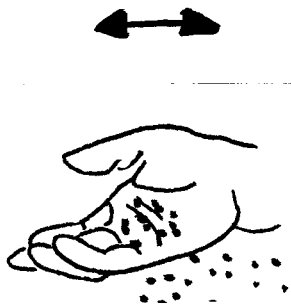


### THINGS TO DO:

1. Weigh out the amount of wheat needed for your project.

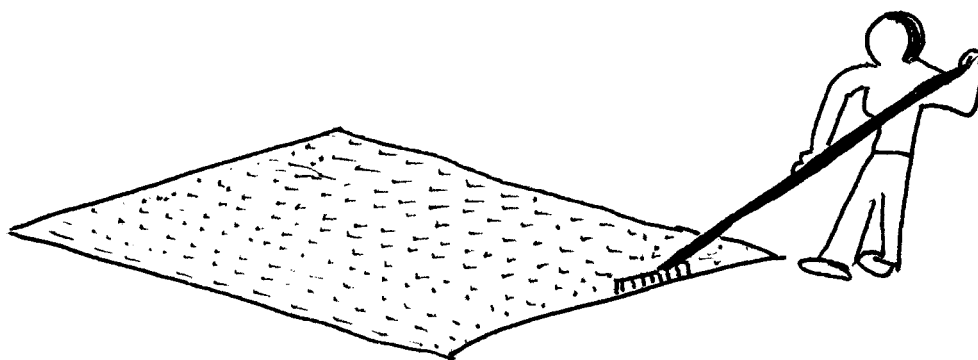
Size	Sq. Ft.	Wheat Seed (in ounces)
Plastic Bucket	3/4 or 12" Dia.	75 seeds
3 ft. x 3 ft.	9	3/4
5 ft. x 5 ft.	25	2
10 ft. x 10 ft.	100	8





2. Sow (sprinkle) the seed evenly over your project. Use one hand, palm up, with a small amount of seed in the palm and release a small amount of seed every time you swing your hand. Practice with soil until you can do it evenly before using seed. Wash hands thoroughly after handling seed because they are treated with chemicals.

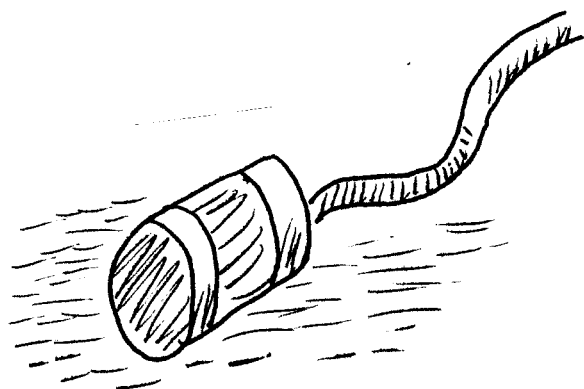
3. Use garden rake to cover seed. Pull through soil evenly and do not drag seed into piles.



## IRRIGATION

### TOOLS

Hose  
Can



Too Moist

### THINGS TO KNOW AND DO:

1. Your wheat plants need to have moisture (water) available to them in the soil at all times. *They should never be in a soil that has standing water for longer than eight hours. They do need a well drained soil.*
2. After planting, the winter months of December, January, February, and March usually provide enough rainfall and the temperatures are cold enough to provide the moisture for your wheat crop. As you move into the spring you will have to check your crop more often to see whether you need to water it. *Be sure to check soil moisture regularly.*
3. A very simple way to check the moisture availability in the soil is use the **Crumble test** described below:
  - a. Take a handful of soil from the top--down three inches and down six inches as samples for testing.
  - b. Squeeze the soil into a ball in your hand and then release with your fingers so the ball sits on your palm.
  - c. If the soil ball is muddy and slick with water and stay together in your palm, there is plenty of water in the soil. If this condition continues for more than a day you should consider draining the soil if possible.



Sufficient Moisture

d. If the soil ball stays together in your palm and only crumbles when you touch it, it has sufficient moisture for your crop.

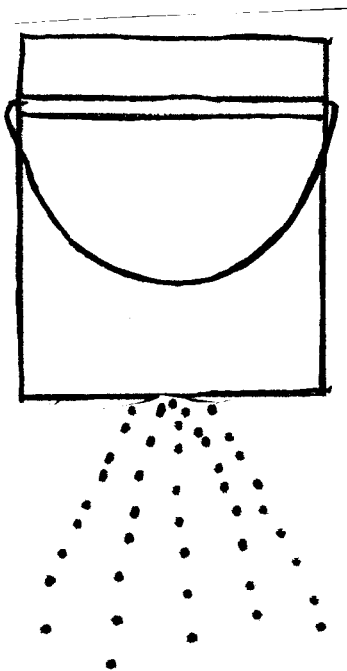
e. If the soil ball crumbles as soon as you release it, it does not have enough moisture for your crop and you should consider watering it.



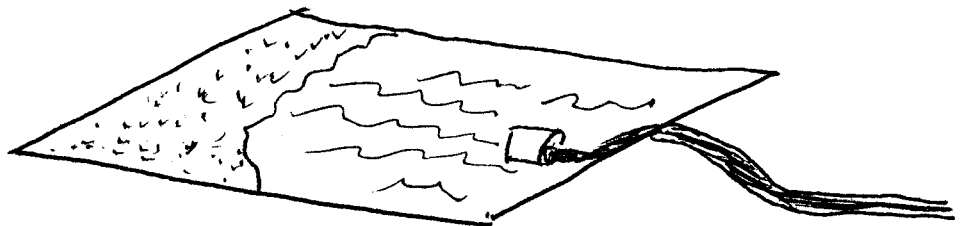
Too Dry

4. Water your crop by flooding the area with the hose. You should make small borders of soil around your plot to contain the water. *Fill to about two inches deep and let settle into soil and then repeat.* In the plastic bucket use the rim of the bucket about the soil. Be very careful to not put too much water in the bucket and *make sure to have a drain hole in the bottom.*

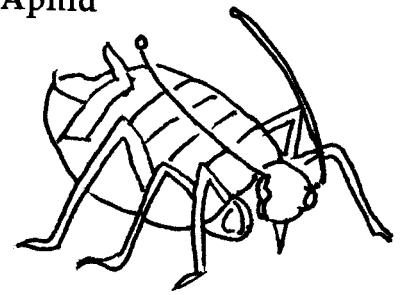
**NOTE:** The root zone is very restricted in a bucket and roots are unable to explore new soil for moisture. It is very important to watch watering closely so plants don't dry out.



5. To keep the hose from eroding the soil when you turn on the faucet, take a can with one end cut out and stick the end of the hose in it.



Aphid



## PEST MANAGEMENT

### THINGS TO KNOW AND DO:

1. *Pests that can hurt your crop are listed below:*

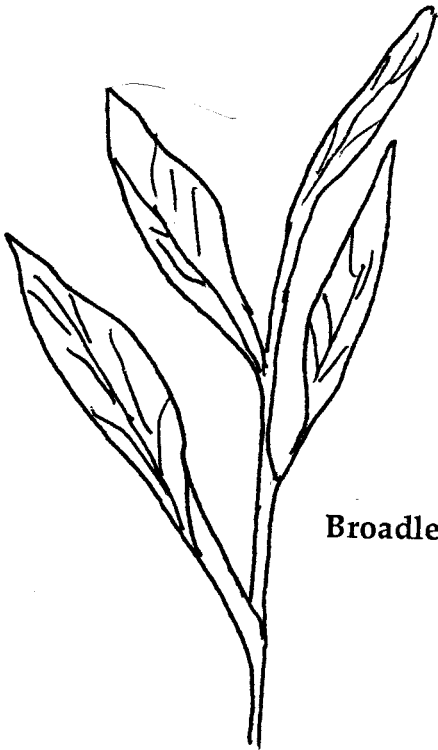
**WEEDS** - *Broadleaf weeds are the major weed pests. They can be pulled out of the project as you see them. However, do not walk out into your crop to pull the weed. You will damage more plants than weeds.*

Grass weeds are hard to identify because wheat is also a grass. You will probably have to *wait until they get closer to maturity before pulling.*

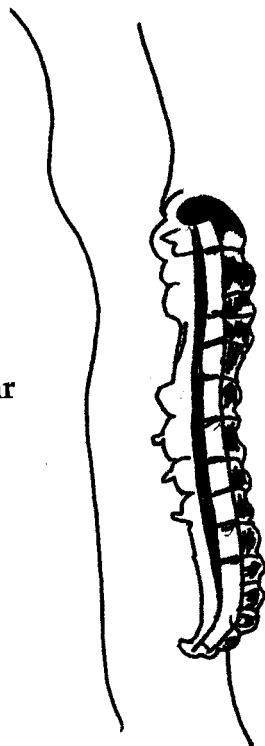
**INSECTS** - *Aphids in the spring are occasionally a problem. They are small roundish insects clinging to the leaves of the plant at the base. They suck the juices out. Damage such as holes chewed in the leaves is caused by grasshopper or caterpillars. You usually have to have a lot of damage before it hurts your crop.*

**If you see any of these insects or their damage, see your 4-H leader or teacher.**

**DISEASES** - *Any of the diseases possible on your wheat crop will show up as discolorations on the leaves. These might also be caused by deficiencies in nutrients, insect damage, or other physical damage. If you see any discolorations, see your 4-H leader or teacher.*



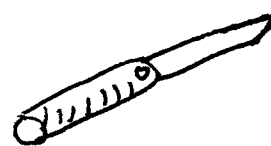
Broadleaf Weed



Caterpillar



## HARVESTING



### TOOLS

Knife  
Wood Block  
Large Shallow pan  
or container  
String

Plastic Tarp  
(12 ft. x 12 ft.)  
Stick  
Container (plastic  
or metal and  
sealable)

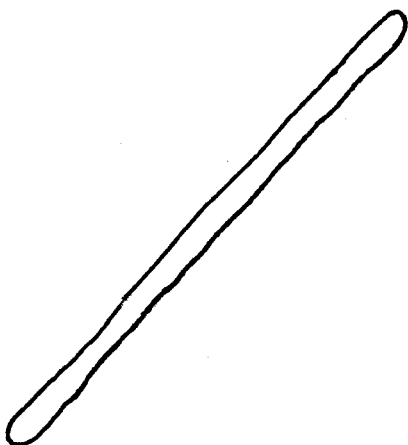
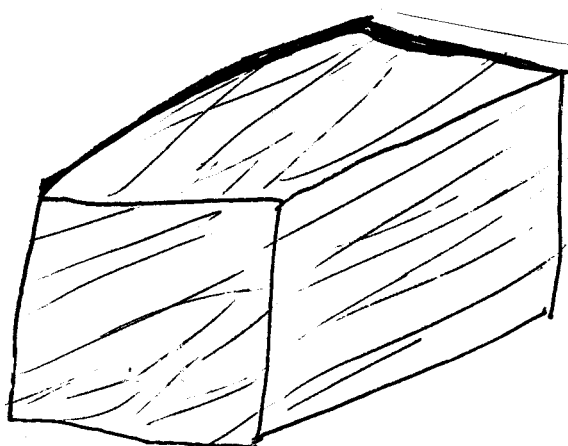


### THINGS TO KNOW AND DO:

1. *Your wheat is ready to harvest when the kernels are hard to crush between your fingernails. Test them by pulling a kernel from the wheat head and squeezing it between your fingernails. If it is green and you get clear liquid coming out, it is in the bloom stage. If you get a milky liquid, it is in the milk stage. If you get a thick pudding like substance, it is in the dough stage. If you can hardly crush the kernel and it breaks, then it is ready for harvest. Your plant, by that time, will almost all be yellow. You should make sure your grain is dry enough so it will not spoil if stored.*

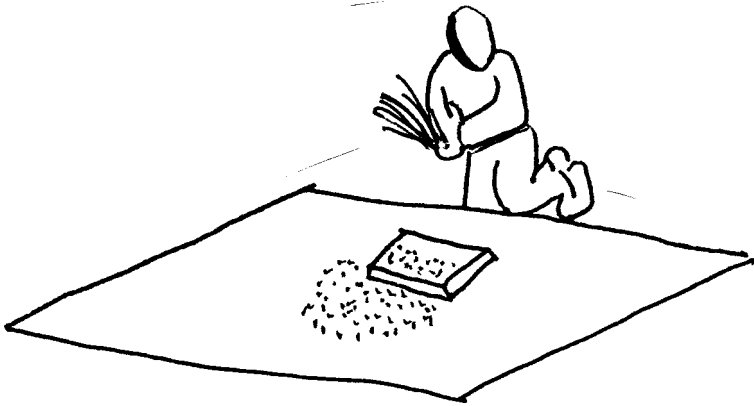
2. Lay out your plastic tarp in an open area.

3. Using the knife, cut the plants off about four inches from the ground and bundle into *shocks of about five or six plants each*. Tie with string. Lay out on tarp and let dry for *about two days, or longer if not sunny*.

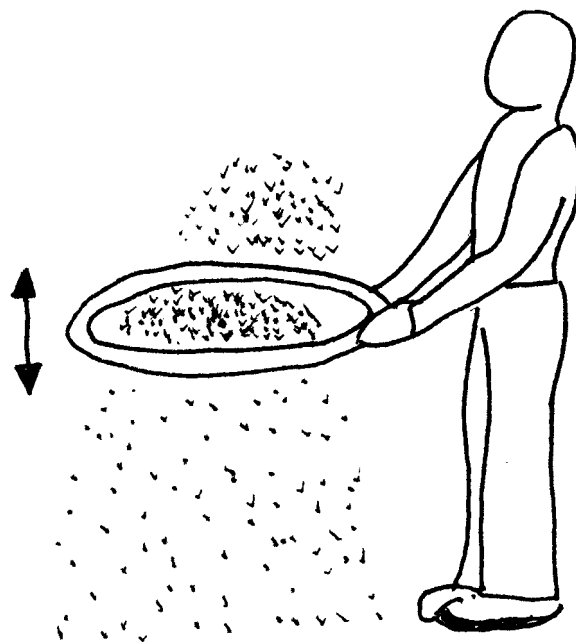


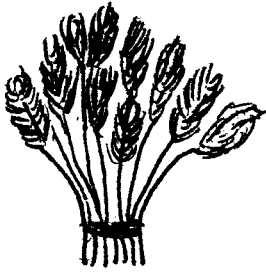


4. Then put wood block in middle of tarp. Take shocks of wheat by bottom end and hit against the block causing kernels to come out of the wheat head. To get all of them out, lay shock on block and hit with stick. As you finish with shocks, stack them off of tarp.



5. After you finish all shocks you will only have kernels and some chaff (leaves) left on tarp. Lift tarp up and gather into middle of tarp. Using the shallow pan or container, throw small amounts up into the air and separate chaff from kernels., A windy day is good. Pick out all straw or other things until you have only kernels left. Put in container and store.





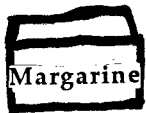
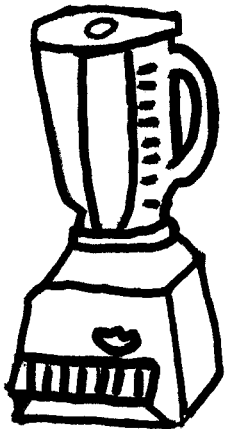
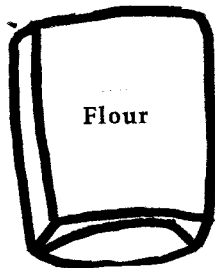
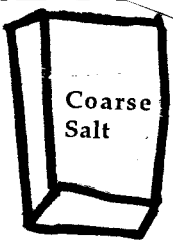
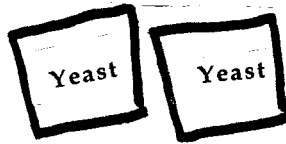
## MILLING AND BAKING

### EQUIPMENT

Electric Blender or  
Wheat Grinder  
Plastic Bags  
Measuring Cups and  
Spoons  
Baking Pans or Sheets  
Knife  
Pastry Brush  
Cooling Rack

### MATERIALS

Unbleached Flour  
Active Dry Yeast  
(Packages)  
Warm Water  
(105-115° F)  
Non-Fat Dry Milk  
Vegetable Oil  
Salt  
Coarse Salt  
Margarine



### THINGS TO DO AND KNOW

1. Flour can be made by taking the kernels you have harvested and grinding them into flour. A common electric kitchen blender can be used. The trick to using a blender is *not* putting very much wheat in it. Start with 1/2 cup and when it is ground remove from blender, add another 1/2 cup, grind; remove for another batch. Grind wheat until it is very fine and dusty. If you are using a wheat grinder follow the directions for that particular model.
2. Grind only enough wheat to use immediately. If you grind more, store it in a bag in the refrigerator. Wheat becomes rancid if it is in the pantry too long.
3. Included is the recipe for making Honey Whole Wheat Bread by the *Bread in The Bag* method. You can make loaves of bread or pretzels.

