Name:_____

Student Project Sheet

Project Title: It Begins With Soil

Materials Needed:
Internet Access / Permanent Marker / Ruler / Teacher-Provided Supplies

Introduction – Background Information

For many of us, food originates in a grocery store – maybe even in the kitchen, on a plate, or in some cases, in a fast-food container. A surprising fact for many is that the French fries didn't really begin in any of those places. They originated in a potato field, probably planted by a grower who was trying to provide healthy food and make a profit. That overly simple description of growing potatoes could be used to describe almost any agricultural product. Agriculture and food production is a big industry! And it's the industry that is the source of any food that you enjoy.

As the industry has grown, the challenges have also grown. Costs have increased for both equipment and labor. Small operators find it difficult to make profits that will support a comfortable lifestyle. Profits come from producing larger crops. Science and technology provide the way to make that production happen.

So what's the issue? Just get on with production, right? Well, it really isn't quite that simple. Growing crops requires water. Growing more crops requires more water. Rain doesn't always come at the time crops need water. The answer for some time now has been irrigation. Keep that thought while you consider some news headlines:

Lake Mead Is Drying Up
Ogallala Aquifer: Saving a Vital U.S. Water Source
Water Crisis Hits Western Cities and States
Water Shortage Declared for Southwest Florida
The Devastating Shrinkage of the Aral Sea

continued ▶

Even a quick look at water resources leads to the fact that we cannot continue depleting the water supply without finding new ways to manage. Most large and small irrigation systems have functioned on the premise that more is better. In this new day, everyone will benefit when agricultural producers irrigate with a plan. Think about it. Even house plants thrive when they get the right amount of water. Too much water is as bad for the plant as too little.

Understanding Soil Moisture

At this point, understanding more about moisture in the soil goes a long way toward finding a win-win solution. It's a fact that different plants suffer stress at **different soil moisture levels.** Imagine soil that is completely saturated. It can hold no more water, and any added water will run off. As the water evaporates or gets used by plants, the depletion percentage (the percentage of available water remaining from the maximum the soil can hold) is a critical factor for making irrigation decisions. At 45% depletion, 55% of the moisture in the soil is still available. Exact percentages are important for individual crops, but for the purposes of this project, we're going to focus on the process of what producers need to know in order to manage irrigation responsibly. Of course, in the industry, soil moisture measurements are performed with sophisticated technology, including satellite sensors. You will have an opportunity to test the process using the following Moisture Content Test, low-tech materials and some hand calculations. You will record your results on the **Moisture Content Chart.**

Moisture Content Test

Materials needed for each student:
Measuring cup – ½ cup dry measure
1 plastic drinking cup large enough to hold the soil
Water
Permanent marker
Ruler or other straight-edged tool

Materials needed for the class:
Soil, enough for each student to have ½ cup
Rack for draining cups
Scales to weigh cups with soil in them
Access to water source (sink or use pitchers and bowls to catch excess water)
Needle or other sharp object

Preparation:
Puncture the plastic drinking cups by making 6-8 small holes in the bottom of each.

continued ▶

Procedure

Follow these instructions to determine moisture content in soil over a period of 5 days.

Day One:

- Write your name on the plastic drinking cup using a permanent marker.
- Measure ½ cup of soil. Use a straight edge to level the soil.
- Place soil in plastic drinking cup.
- Weigh and record results. This number becomes the value for "dry soil weight."
- Fill the cup with water held over a sink or container that will catch excess water.
- Allow excess water to drain from the cup.
- Weigh the saturated soil and cup after the water has stopped draining and record results. This number becomes the value for "soil with moisture."
- Use the following formula, your "dry soil value" and your "soil with moisture" value to calculate the moisture content of your soil sample.

$$\text{Moisture Content} = \frac{(\text{weight of the soil with moisture}) - (\text{dry soil weight})}{\text{dry soil weight}}$$

- Convert your results to a percent.
- Record results in the chart.
- Place cups in the open air to stand for 2 days.

Day Three:

- Weigh your soil sample and cup. Use your results and the formula to calculate the current moisture content of the soil.
- Record results in the chart.
- Return cups to the open air and let stand for 2 more days.

Day Five:

- Weigh your soil sample and cup. Use your results and the formula to calculate the current moisture content of the soil.
- Record results in the chart.

Moisture Content Chart

Moisture Content	Day 1	Day 2	Day 3
Weight of the soil with moisture			
Moisture content	%	%	%

Compare your results with others in your class. Then write a media message that would encourage anyone who grows plants to monitor the moisture content of soil. Identify an "audience" for your message – a local garden center, etc.