



## Basic Vegetable Gardening

### Lesson 6: Experiments in the Garden

**Lesson Summary:** Boys and girls will learn the steps to doing experiments.

**Intended Learning Outcomes:**

Boys and girls will list the steps to experiments.

Boys and girls will explain the purpose of experiments.

**Length:** 45 minutes

**Materials:**

Teachers Manual

6 cards or pieces of paper. Each card should have one of these words or phrases on them: Problem, Hypothesis, Design, Observations, Analysis of Data, Draw Conclusions

**Background:** As members learn gardening skills and connect classroom theory to the garden, they may have questions about why some garden practices are recommended. This lesson could be taught at any time during the growing season.

**Lesson Steps**

**1. (5 minutes) Introduction**

**Ask the members to think of gardening practices that their elders may not have used.** After members list some examples, such as rotating crops, ask the members how farmers came to believe these practices were better.

*Answer:* The farmer or perhaps some researchers tried the new practice and compared it to the traditional way. This is called an experiment.

**2. (5 minutes) Explain what an experiment is:**

Much of our knowledge of science – including agriculture and nutrition – comes from experimentation.

An experiment is a test of a hypothesis or prediction. The result of this helps us understand something. A true experiment always compares one test with another. Without a comparison, it is not an experiment. We need a comparison to know why something did or did not happen.

*Note:* Sometimes in chemistry classes, for example, we might mix one chemical with another to see what the reaction is. This may be called an “experiment” but it is really a “test.” Calling this and the activities described in this lesson both “experiments” confuses students. It may help to call the activities in this lesson “applied experiments” as they are applying basic chemistry or science to an everyday event or problem.



**3. (5 minutes) Explain the purpose or value of experiments:**

**3.1 (3 minutes) Ask the students to brainstorm about some inventions or practices that may have come about as a result of an experiment.** Some examples might be: vaccinations against diseases, nutrition, composting, crop rotation, irrigation methods, seed variety propagation. The list is endless.

**3.2 (3 minutes) Tell students the value of experiments:**

- Experimentation is a common and respected way to test a theory or practice. The results of the experiment help us choose to adapt new practices or to change our behavior.
- When we do, see, or learn from an experiment, we can solve problems and improve the way we do something.
- For example, experts at universities do experiments to learn the best way of teaching boys and girls maths in primary schools. Experiments in nutrition told us that foods like carrots help our eyes to see at night.
- Other benefits of experiments include: to help us to think critically, to question, to observe, to keep records, to apply scientific or mathematical theory, and to be better consumers of information.
- Experiments help us apply theory from the classroom. When you do an experiment, you remember the scientific theory better.

**4. (20 minutes) Explain the steps and parts of an experiment.**

**4.1 (5 minutes) Divide the students into six groups. Give each group one of the cards and have them discuss what it means.**

**4.2 (5 minutes) Have each group arrange themselves (or put the cards in order) according to the steps of an experiment.**

**4.3 (10 minutes) Have each group tell the rest of the students the meaning of the term on their card.** Then, as the facilitator, discuss and clarify.

1. Problem – This is something that needs to be solved or changed. It does not have to be difficult. It may be easy as wanting a plant to grow.
2. Hypothesis – A hypothesis is a prediction that something will or will not happen as a result of a change we use in an experiment.

Note: If a hypothesis or prediction does not come true, it does NOT mean the experiment failed. It means the experiment told us there is no difference between the two tests. The experiment was a success because we learned something – that there is no difference. This is important.

For example: We do an experiment comparing artificial and natural fertilizer. We predict tomatoes grown with artificial fertilizer will grow bigger than tomatoes grown with natural fertilizer. But after an experiment we find there is no difference. Therefore, the hypothesis did not come true. But experiment was successful because we learned that it is not necessary to spend money on artificial fertilizers to grow big tomatoes.



3. Design – The design is how an experiment is set up in order to test the hypothesis. Remember that experiments always have a comparison group. Any experiment needs an experimental group and a control group to compare. With the control group, you practice or do something as you always have. The experimental group will change just ONE thing.

For example: If we want to see how covering a compost heap affects the decomposition rate of the materials, we need to have one compost heap with a cover. Right next to it, we would make a heap with the exact same materials, but not cover it. The second heap is the “control”. EVERYTHING is the same except the cover.

The design also tells us what we are going to look at and how often during the course of the experiment.

4. Observation – We need to observe and then record what we see so that we can analyze what happened. When we observe we don’t make judgments, just record facts. We might measure, see, smell, taste, or touch, depending on what we are measuring.

Use a notebook or something similar to record observations and the date that the records were written.

5. Analysis of Data – Data is all the things we observed and wrote down. Compare all the data from the experimental group with the control group. Is it different or the same? Why or why not? The data either proves or does not prove your hypothesis.
6. Draw Conclusions – Using the data, decide if the prediction or hypothesis was proven or not. As a result, what would you conclude?

Remember that there is no “failed” experiment or data that is wrong. It just is.

## 5. (5 minutes) - Summary and Debrief

Summarize by asking:

- What is an experiment? Answer should include mention of a control or comparison.
- Why do we experiment?
- What are the 6 steps to an experiment?
- Can an experiment fail? Answer: No.

## 6. (1 minute) – Close

Explain that at the next lesson, the group will design an experiment that they will do in the garden. Encourage them to think about possible experiment topics or problems they’d like to explore.

