

# Young Naturalist Awards 2014

## How to Plan an Experiment

The question you choose to pursue, the hypothesis you formulate, and the prediction you make may require you to do an experiment. Below are steps to planning an experiment.

### 1. State your question

Example: Does fertilizer really help soil to grow more beans?

### 2. Formulate a hypothesis and make a prediction

Your hypothesis might be: Yes, fertilizer helps soil grow more beans. Based on your hypothesis your prediction might be: I predict the soil with the highest concentration of fertilizer will result in more bean seeds germinating. Make sure your prediction can be tested.

### 3. Choose the variables

An **independent variable** is the factor that you will change in your experiment. For the bean seed experiment the independent variable is the amount of fertilizer you put in the soil of each test pot. The **dependent variable** is the factor that you predict will change. For the bean seed experiment, it would be the number of seeds that grow in each test pot.

### 4. Choose a control

In a scientific experiment; the **control** is used as a standard of comparison. The control is treated the same way as the other experimental group, except for the independent variable. In the bean seed experiment, the control sample would not have any fertilizer added to the soil.

### 5. Conducting the experiment and collecting data

You must conduct your experiment in a careful manner to ensure that your data is not flawed. In the bean experiment you would need to provide the same conditions for all your test pots. They all would need to receive the same amount of sunlight and the same amount of water. You would need to collect data at regular intervals. If you collect data everyday, you would need to do it at the same time each day (for example, at 3:00 PM) for each of the test pots. It is also a good idea to learn beforehand how to care for the plants. Too much or too little water might kill them and your data would be flawed. Record the details of your experiment and each day's results in a chart, table or list. It is important to record your data neatly and accurately.

### 6. Analyze your results

Chart or graph the results of your experiment so that they can be easily analyzed. For the bean seed experiment, you could make a bar graph. On the x-axis (the horizontal axis), you would put your independent variable—the concentration of fertilizer in each of your experimental samples. These are the numbers that you know in advance. On the y-axis (the vertical axis), you would put your dependent variable. This is the factor you will be measuring in your experiment—the number or height of bean seeds that grow.