

# Is There Ever Too Much of a Good Thing?

## Background Information:

As our population grows, so does the need to grow more food to feed all the people. Farmers must grow food on the same land over and over again. It is easy to think of soil as a “grocery store” for plants. The plants go “shopping” in the soil to retrieve what they need. When plants grow, they remove nutrients from the soil. What happens if our grocery stores don’t restock their shelves after people buy food? What happens to nutrients in the soil after plants grow and are harvested year after year?

To maintain healthy soil, farmers must replace the nutrients that plants remove from the soil. There are many ways to do this. A fertilizer is a substance added to the soil or water to make sure necessary nutrients are available to plants. Fertilizers can be man-made or natural substances. Manure, fish emulsion, composted plant materials, and store-bought products are all types of fertilizers.

Plants require 17 chemical elements for successful growth and reproduction. Of these elements, Nitrogen (N), Phosphorus (P), and Potassium (K) are the most likely to be deficient in the soil, as plants take up a lot of N, P, and K as they grow.

- **Nitrogen (N)** is important for plants to grow strong stems and healthy green leaves. It also is involved in making important proteins and is found in chlorophyll, the pigment that helps plants capture sunlight energy
- **Phosphorus (P)** is known as the energizer because it helps the plant store and transfer energy. Phosphorus stimulates root growth and helps flowers bloom.
- **Potassium (K)** protects plants against diseases and hot and cold weather.

If plants don’t get enough of the required nutrients, they will not grow well, and may become diseased and die. If plants get too many nutrients, the plants get poisoned, just as a vitamin overdose is unhealthy for humans. Many fertilizers draw water out of the roots of plants. If too much fertilizer is added to the soil, too much water is pulled from plants, which will dehydrate and die. This is often referred to as plants being “burned” by fertilizer. Overuse of a fertilizer of any type is not only harmful to the plants, but if used improperly, can contaminate waterways, streams, and oceans. Ongoing research and new farming techniques help farmers precisely monitor and amend soil nutrients to save on the cost of fertilizers, produce healthy crops, and protect the environment.

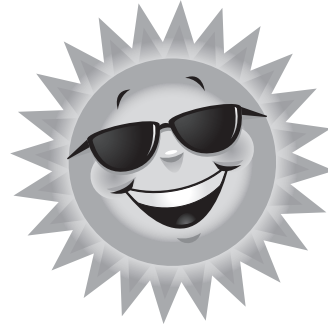
# Is There Ever Too Much of a Good Thing?

Name: \_\_\_\_\_

## Materials

Obtain the following materials for your group:

- ▶ 9 bean seeds
- ▶ 3 cups
- ▶ 3 labels
- ▶ 1 marker



## Procedure

1. Create three labels, and place one on each of your three cups, as follows:
  - ▶ **Distilled water only**
  - ▶ **Distilled water + fertilizer**
  - ▶ **Distilled water + extra fertilizer**
2. Poke three small drain holes in the bottom of the cups using a pen or similar pointed object.
3. Fill each cup nearly to the surface with the soil and vermiculite mixture, leaving a two-finger width space at the top.
4. Plant three beans in each cup, one inch below the soil surface.
5. Water each cup with the correct liquid as demonstrated by your teacher and place in the pie tin or container on the windowsill.
6. Fill in the “My Hypothesis” section of the worksheet.
7. Water and observe plants every other day for two weeks and fill in the “My Results” section of the worksheet at the end of the experiment. *Make certain that you water each plant with the correct liquid every time you water and pay close attention that your soil stays moist between watering.*



**Is There Ever Too Much of a Good Thing?** *(continued)*

	<b>Cup #1 Water Only</b>	<b>Cup #2 Water + Fertilizer</b>	<b>Cup #3 Water + Extra Fertilizer</b>
<b>My Hypothesis</b>			
<b>My Results</b>			

1. What do your results show you about plant growth using different amounts of fertilizer?

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2. Why are Nitrogen, Phosphorus, and Potassium so important to plants?

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3. Some people may think that adding extra fertilizer would help their plants grow even better. What would you say to this person based on your experiment results?

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4. What are some different types of fertilizer?

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