

# Hydroponic Nutrient Solution

## A Carolina Essentials™ Investigation

### Student Worksheet



#### Overview

What's unique about this picture? Is this the way you would think of growing a plant? Do plants need soil to survive? Plants need the nutrients typically found in soil more than they need the soil itself. Although soil provides a supportive substrate for growth, plants require 5 other things to survive: water, light, oxygen, carbon dioxide, and nutrients (including nitrates, phosphates, calcium, magnesium, and potassium). To thrive, plants also need space to grow and an environment that stays within a suitable temperature range.

Hydroponics is the process of growing plants using a nutrient-rich water solution instead of soil. This may be accomplished either in aqueous systems or in aggregate systems in which plants are placed in a soilless medium—for example, vermiculite, sand, gravel, peat, or rock wool.

Hydroponics is one of the fastest-growing areas of agricultural science. Growing food hydroponically tends to take up less space than traditional farming methods. It also uses less water, because the water in these systems is reused and not lost to the ground. Plant diseases often originate from contact with organisms in soil, so the occurrence of disease is greatly reduced in hydroponics systems. It is far easier to control weeds and pests in a hydroponic system. With traditional farming methods, sediment and groundwater runoff from farms may pollute nearby bodies of water. With hydroponics, there is no sediment or water runoff, so there is less chance of pollution.

For this investigation, you will design an experiment to test hydroponic nutrient solutions. Include a testable question, background research on plant nutrient solutions, hypothesis, materials, variables, a procedure, data, data analysis, and an evidence-based conclusion

#### Essential Question

*What nutrients are necessary for plant growth?*

#### Investigation Objective

Design and carry out an investigation to test hydroponic nutrient solutions.

#### Activity Procedures

1. Brainstorm ideas for a testable question to investigate the hydroponic nutrient solution's effect on plant growth. Write the ideas down.
2. Complete background research on hydroponic nutrient solutions and water-soluble fertilizers. Attach the research notes to the lab report.
3. Select the idea to test and rewrite the idea in question format. The question should include the topic and variables to be tested.
4. Identify the variables: independent (include a control group), dependent, and controlled. You are limited by the number of available hydroponic kits.
5. Write a step-by-step procedure.
6. Make a materials list.
7. Create a data table.
8. Describe how you will analyze the data.
9. Get project approval from the teacher. Teacher initials \_\_\_\_\_
10. Conduct the experiment.
11. Analyze the data.
12. Make an evidence-based claim.
13. Write a formal lab report.
14. Share the results with the class.

#### SAFETY REQUIREMENTS



#### MATERIALS

The following materials will be available. If you need additional equipment or supplies, ask your teacher.

Visual Desktop Hydroponics Kit or other hydroponic system

Variety of seeds

Aqua Vega hydroponic nutrient solution

Water-soluble fertilizer

Distilled or deionized water

Tap water

pH paper

Thermometer

Ruler

*Continued on the next page.*

## Data and Observations

Create a data table here.

## Analysis and Discussion

Describe data analysis here.