

**RELAX!  
HERE'S A LESSON  
WORTH TEACHING.**



## **RESOURCES AVAILABLE TO TEACHERS**

Other teaching aides are also available including:

- Videos
- Posters
- PowerPoint Presentations
- Visual Aids
- Full Curriculum for Teachers
- Activities

Visit our website to order your support materials today. The time you invest in our cause will come back to you many times over as you see the eyes of both young and old audiences respond to the information you share.

[www.nutrientsforlife.org](http://www.nutrientsforlife.org)

## **YOUR VOICE OUR RESOURCES**

Nutrients for Life is a nonprofit organization that provides information and resources to educators and individuals like you, to help inform the public about the vital role that fertilizer plays in feeding the world.

The information we have compiled is science-based and user-friendly. It has been successfully implemented by educators across the country.

Through a grassroots effort, we can spread the word about soil health to students of all ages and to adult organizations that are always looking for programs. Our story is not only important, but it is interesting and serves a vital role in educating consumers and decision-makers in the future.

**IF YOU  
DON'T TELL  
YOUR STORY,  
WHO WILL?**

**Your story matters.  
Soil science matters.**



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# PROCEDURE



1) Ask the students, “How do water and nutrients get from the roots to the rest of the plant?” Active transport is the process used by cells to move molecules from an area of lower concentration to one of higher concentration. It requires energy. This is similar to humans’ circulatory system through our veins and arteries. Depending on the group size, you can do one demonstration or bring multiple supplies for students to break into groups.



2) Pour 10 drops of food coloring into the cup or enough to cover the base.

3) Place the piece of celery stalk into the cup of food coloring so that it is resting on its cut surface.



4) Ask students what they predict will happen to the food coloring.

5) Allow the celery to stand undisturbed for 10-15 minutes. During this time, talk about your job and the company you work for.

6) After 10-15 minutes, ask the students to comment on what they observed.

7) Reiterate the importance of the nutrients being brought up into the plant and conclude the activity.

# OVERVIEW

In order to understand how nutrients are transferred to a plant, students must first understand the interaction between the plants and the soil. Plants move water and nutrients through the root system either into the root cells from the soil by diffusion or by an energy-requiring process (active transport). This activity demonstrates transport of water through the xylem by using celery and food coloring.

# MAJOR CONCEPTS

- Water and nutrients are moved throughout plants by active transport or transpiration
- Xylem are the hollow tubes where you can see the food coloring. Plants contain many xylem vessels stretching from the roots to the leaves.



# From Root To Plant

Here is a quick, but effective lesson that you can use at a moments notice.

*Visual aids: Water glass, water, food coloring and celery stalk. Prior to the demonstration, cut the celery into pieces approximately 2 inches long. Make sure the cut surfaces are flat.*

*Optional: Nutrients for Life NPK poster.*

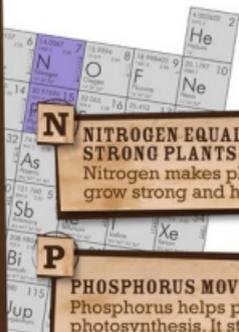
This lesson is found in NFLF’s curriculum, *Nourishing the Planet in the 21st Century*.

When going to the classroom, bring a copy of the curriculum and accompanying poster to gift to the teacher.

All NFLF resources are free.

# NUTRIENTS FOR LIFE

Humans and plants need many of the same nutrients to grow big and strong. Humans need a variety of proteins, carbohydrates, minerals, and vitamins to stay healthy. Besides the primary nutrients NPK, plants need small amounts of secondary nutrients, such as calcium and sulfur, and micronutrients, like iron and zinc.



**N**  
**NITROGEN EQUALS STRONG PLANTS**  
 Nitrogen makes plants grow strong and healthy.

**P**  
**PHOSPHORUS MOVES ENERGY**  
 Phosphorus helps plants with photosynthesis. It stores and moves energy around the plant.

**K**  
**WATER IS POTASSIUM'S FRIEND**  
 Potassium helps plants control and use water efficiently.



NUTRIENTS COME FROM THE SOIL THAT HELP THE PLANT GROW AND PRODUCE FOOD



NUTRIENTS COME FROM FOOD GROWN IN THE SOIL

**K**  
**POTASSIUM HELPS THE HEART**  
 Humans need potassium, like plants do. Potassium helps control muscles and the rhythm of the heart.

**Fe**  
**IRON HELPS MOVE OXYGEN**  
 Iron helps the body make hemoglobin that moves oxygen and hemoglobin through the blood. This is similar to phosphorus moving energy around the plant.

**Ca**  
**CALCIUM EQUALS STRONG BONES**  
 Calcium helps humans have strong bones, like nitrogen helps plants have strong stalks.



# NUTRIENTS FOR LIFE

FOUNDATION

## From Root To Plant: Celery Lesson

In order to understand how nutrients are transferred to a plant, students must first understand the interaction between the plants and the soil. Plants move water and nutrients through the root system either into the root cells from the soil by diffusion or by an energy-requiring process (active transport). This activity demonstrates transport of water through the xylem by using celery and food coloring.

Visual Aids: Water glass, water, food coloring, and celery stalk. Prior to the demonstration cut the celery into pieces approximately 2 inches long. Make sure the surfaces are flat.

Time: 15-20 minutes

- 1) Ask the students, “How does water and nutrients get from the roots to the rest of the plant?”

Active transport is the process used by cells to move molecules from an area of lower concentration to one of higher concentration. It requires energy. This is similar to humans’ circulatory system through our veins and arteries. Depending on the group size, you can do one demonstration or bring multiple supplies for students to break into groups.

- 2) Pour 10 drops of food coloring into the cup or enough to the base
- 3) Place the piece of celery stalk into the cup of food coloring so that it is resting on its cut surface
- 4) Ask students what they predict will happen to the food coloring
- 5) Allow the celery to stand undisturbed for 10-15 minutes. During this time, ..... (possibly part of Dee’s video or will create talking points)

We almost need something like minute 1:40

Check out this video: <https://www.youtube.com/watch?v=PdQsvW7QjIM>

- 6) After 10-15 minutes, ask the students to comment on what they observed.
- 7) Reiterate the importance of the nutrients being brought up into the plant and conclude the activity.

Note: For a more dramatic result, bring in a celery stalk that was prepared the day before OR consider using a white carnation. If using a carnation, cut the stem diagonally so the stem is about 6 inches long. Allow it to sit for at least two hours. Small colored areas will appear at the edges of the petals.