

# ***GREEN LIFE***

## Plants and Photosynthesis

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# Tennessee 4-H Youth Development

## *The Green Life* *Plants and Photosynthesis*

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### **Skill Level**

Beginner

### **Learner Outcomes**

*The learner will be able to:*

- Learn the six basic plant parts and the function of each.
- Identify the seven things needed for plant growth.
- Explain photosynthesis and its role in the plant.

### **Educational Standard(s) Supported**

- SPI 0407.Inq.1 and SPI 0507.Inq.1 Select an investigation that could be used to answer a specific question.
- SPI 0507.3.1 Identify photosynthesis as the food manufacturing process in plants.

### **Success Indicator**

*Learners will be successful if they:*

- Correctly label a diagram with the parts of a plant.
- Design an experiment to test how differing amounts of water, sunlight, nutrients and air affect the growth of a lima bean.

### **Time Needed**

15 minutes, not including grow time

### **Materials List**

Lima beans, zip-close bag, paper towel, potting soil, disposable cups, sprouted lima bean plants.

### **Introduction to Content**

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This lesson will focus on three broad topics: six basic plant parts, the requirements needed for plant growth, and photosynthesis.

The six basic parts of the plant include the roots, stems, leaf, flowers, fruit and seeds. Each performs a specific function that helps the plant.

The requirements needed for plant growth include room to grow, right temperature, sunlight, water, nutrients, air and time.

### **Introduction to Methodology**

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Each of the topics above will be discussed before students begin to design an experiment to test the things needed for growth. Students will also take home a simple terrarium made of a zip-close bag, a paper towel and a lima bean to show how a lima bean seed begins its growth.

### **Author**

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Prepared using research based practices in youth development and experiential learning.

## Terms and Concepts Introduction

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- Roots — Provide support by anchoring the plant; absorbs water and nutrients needed for growth.
- Stems — Carry water and nutrients taken up by the roots to the leaves; provide support above ground for the plant; provide a place for the growth of leaves and flowers.
- Leaf — Where food for the plant is made.
- Flower — Reproductive part of the plant; produces pollen that attracts and feeds certain birds, insects and other pollinators.
- Fruit — Develops from the flower; protects seeds; helps seeds disperse.
- Seeds — Found in the fruit; what most new plants grow from; provides food for young plants.
- Photosynthesis — Process in which the plant makes food to survive. The plant uses carbon dioxide, water and sunlight to produce glucose and a byproduct, oxygen.

### Tips for Engagement

After setting the stage, have students label draw a plant and then correctly label the six basic parts. They can do this on a clean sheet of notebook paper.

## Setting the Stage

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Say: **“I am sure you have noticed many types of plants growing around you. Flowers, shrubs, trees, and grasses are all around your home. Farmers grow many different kinds of plants, some of which are used for food such as wheat, corn, tomatoes, potatoes, apples and peaches. Cotton is used for clothes, and trees are grown for shade, lumber and paper. Even though there are many different types of plants, all plants have six basic plant parts in common. Each performs a specific function that helps the plant.”**

## Opening Question

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- What are the six basic parts of a plant?
- Do you know what the function is for each part of the plant?

## Experience

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Go over each part and its corresponding function(s):

- Roots — Provide support by anchoring the plant; absorb water and nutrients needed for growth.
- Stems — Carry water and nutrients taken up by the roots to the leaves; provide support above ground for the plant; provide a place for the growth of leaves and flowers.
- Leaf — Where food for the plant is made.
- Flower — Reproductive part of the plant; produces pollen that attracts and feeds certain birds, insects and other pollinators.
- Fruit — Develops from the flower; protects seeds; helps seeds disperse.
- Seeds — Found in the fruit; what most new plants grow from; provides food for young plants.

Go over the seven things needed for plant growth:

- Room to Grow — The aboveground portions of the plant need space so leaves can expand and carry out the job of making food. Roots also need room to grow. Plants growing in small spaces will have their roots crowded, and that results in smaller amounts of growth.
- Right Temperature — Most plants like temperatures that most humans like. Some may like warmer temperatures while others may prefer cooler temperatures for best growth. Most plants like to have cooler temperatures at night and don't like to be in a drafty spot.

## **Experience (Continued)**

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- Air — Plants use carbon dioxide in the air and return oxygen. Smoke, gases and other air pollutants can damage plants.
- Light — Some plants need lots of direct light and others need indirect sunlight. Most plants need 14-16 hours of sunlight each day for photosynthesis to occur.
- Water — Water is important in the plant's ability to make and move nutrients. Without water or with too much water, a plant dies. How often you water depends on many things. Plant size, time of the year and type of plant are just a few. If you stick your finger 1 inch into the soil and it is dry, then water your plant.
- Nutrients — Most of the nutrients that a plant needs are dissolved in water and then taken up by the plant through its roots. Fertilizers will help to keep the soil supplied with nutrients a plant needs. The three most important nutrients are nitrogen, phosphorous and potassium.
- Time — It takes time to grow and care for plants. Some plants require more time to grow than others. Getting plants to flower or fruit at a certain time can be hard. Plants that grow outdoors need a certain number of days to flower or fruit.

Explain photosynthesis:

- Photosynthesis is necessary for plants to survive. It produces the food that a plant needs to grow. Photosynthesis occurs in the chloroplasts of the leaves. A pigment called chlorophyll that is found in the chloroplast takes in sunlight. The plant uses the sunlight plus water and carbon dioxide taken in to produce glucose, food for the plant. In addition to food, oxygen is also produced.

To tie in all concepts, use sprouted lima bean plants to test how the conditions of light, air, nutrients and water affect growth. Plant one sprouted lima bean plant per disposable cup. You will need five total plants for the experiment. One plant will be a control. For the other four plants, you will vary the conditions and note the effects. Have students design their own experimental procedure for each condition. It will take several days and/or weeks to see results. Have students monitor and record results at regular intervals, such as every three days. Results can be reviewed at a follow-up meeting.

## **Share**

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Have students answer: **“What are the requirements needed for plant growth?”**

Ask students: **“What does the process of photosynthesis produce?”**

Have students identify the “ingredients” needed for photosynthesis to happen.

## **Process**

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Ask students to describe why each plant growth requirement is important.

## **Generalize**

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Have students brainstorm about this topic: **“Do you think that one of the seven things needed for plant growth affects growth of the plant more than its counterparts?”**

## Apply

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Discuss with students how they could design an experiment to show how light, water, nutrients and air affect the growth of a lima bean plant.

## References

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- Got Dirt? Garden Initiative. *Lesson Plans: What a Plant Needs to Live*. Retrieved August 20, 2016. [http://www.co.brown.wi.us/i\\_brown/d/uw\\_extension/plant\\_needs\\_6-22-2010.pdf](http://www.co.brown.wi.us/i_brown/d/uw_extension/plant_needs_6-22-2010.pdf)
- University of Illinois Extension. Great Plant Escape. Retrieved August 20, 2016. <http://urbanext.illinois.edu/gpe/case1/c1facts2c.html>
- University of Tennessee Extension (1999). *Introduction to Soils and Plants, 5th grade unit* (UT Publication PB 1430 1999). Knoxville, TN: University Printing & Mail Services.

### Life Skill(s)

#### Fourth Grade

Participate in 4-H club meetings by saying pledges, completing activities and being engaged.

Identify at least four project areas to consider as a project area for future 4-H work.

#### Fifth Grade

Participate in 4-H club meetings by saying pledges, completing activities and being engaged.