OSU EXTENSION SERVICE

Klamath Basin Research & Extension

Grow It, Cook It, Like It

Farm to School and Nutrition Education Program

FoodCorps

Oregon State University

Hi, I'm Miss Anna!

Q: If you were a vegetable, what type of vegetable would you be?

If I were a vegetable, I would be a pea! Special bacteria can live on the roots of peas (and other legumes). These bacteria make a nutrient called Nitrogen for the soil. Nitrogen is one of the three key nutrients that plants need to grow.

I am like a pea because I build a welcoming and nourishing foundation that allows others to thrive and grow. Plus peas are delicious – I especially enjoy snap peas!

To the right is a picture of me at Henley Elementary asking students what they think of our local ground beef taste test. My Shasta Scorpions and Henley Hornets will recognize me from the cafeteria and maybe even your classroom!

Questions or comments about this lesson? Get in touch!

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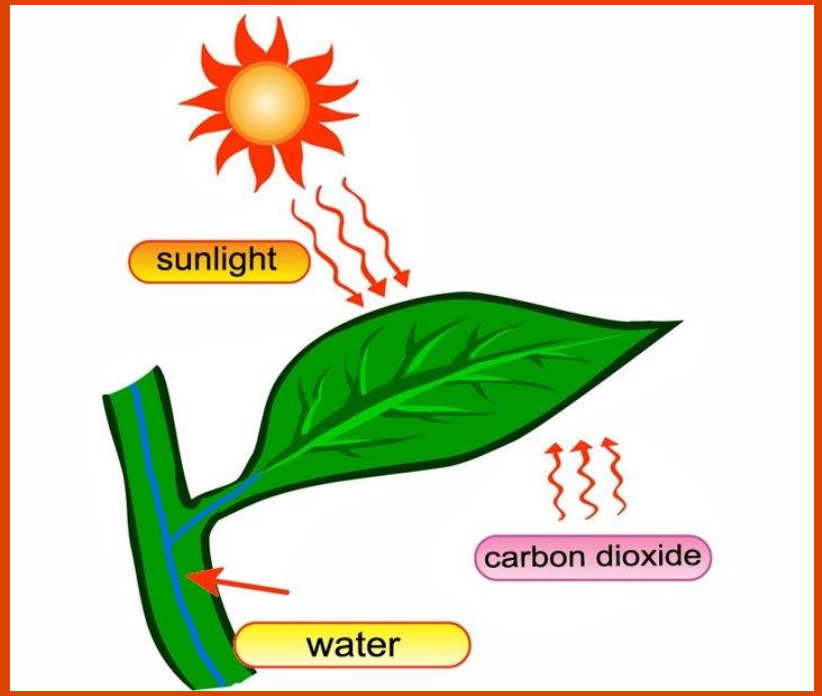
Lesson #4: The Magic of Photosynthesis

Today, we're going to learn about what plants need to grow and discover what photosynthesis is.

Q: What do plants need to grow?



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Review: Soil + Plants = Growth!

Over the past few experiments we learned the important things that soil provides for a plant so it can grow.

Soil has **nutrients** from organic matter that decomposers put into the soil.

It also has **water** that collects in the spaces between soil particles after a plant is watered or rained on.

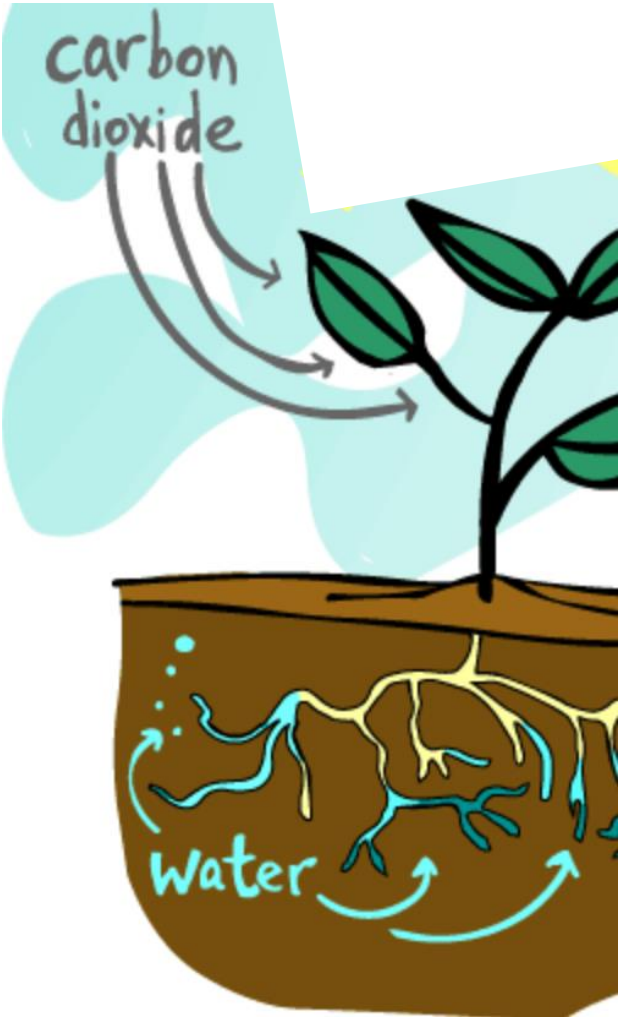
Plants *can* get water and nutrients from places other than soil (see the picture to the right), but soil is a natural and easy way for them to get these two important things together.

Have you ever heard of hydroponics? It's the process of growing plants in water – so they get their nutrients from things floating in water instead of soil.

What else does a plant need to grow?

- ✓ **Water**
- ✓ **Nutrients**

Air – plants **breath in air** from their surroundings, just like you. Humans and other animals breath in a gas in the air called Oxygen, but plants breath in another type of gas called **Carbon Dioxide**.



What else does a plant need to grow?

- ✓ **Water**
- ✓ **Nutrients**
- ✓ **Air (Carbon Dioxide)**

Sunlight – plants use their leaves to soak up sunshine, just like you at the beach.

But...*why* do they need sunlight? Why does this help them grow?

Let's find out!

Q: Why do plants need sunlight?

Let's get ready for our next experiment!

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Time for our experiment!

Gather the following materials before you begin:

- ✓ **Two medium cups** - pick something that sunlight will not pass through easily, like colored plastic.
- ✓ **Quick sprouting seeds –** sunflower, peas, and grass seeds are some examples – but anything that sprouts and grows in the 3-10 day timeframe will work just great!
- ✓ **Soil –** healthy soil is preferred here since it tends to be high in nutrients, which as you know is good for growing.
- ✓ **Water** – to keep your soil moist so your seeds can grow.

All my materials except the water!

Step #1 – Plant Your Seeds

1. Label one cup with sunlight or an "S" so you can tell them apart. Leave the other cup blank.
2. Fill both cups up about half way with soil.
3. Add in about 5-7 seeds in each cup if you're using a larger seed, a pinch or two for smaller seeds.
4. Add enough water so the soil is moist.
5. Add a little bit more soil on top.

My two cups with soil and seeds.

Step #2 – Find a Spot to Rest

1. For your cup labeled with sunlight, find a sunny spot near a window, on a porch/front step, in a window box or in a yard/garden.
2. For the blank cup without a label, put it in a dark spot (no natural or electric light). A cabinet or closet that you rarely open or dark spot in a basement would work great!
3. Wait about 5-14 days or until your sunlight plant is sprouting (growing green leaves). Throughout this waiting period, be sure to add some water to both your plants (the soil should feel moist to the touch).

My non-sunlight cup sitting in the cabinet before closing it up.

Step #3 – Results

1. After 5-14 days (or when you see sprouts in the sunlight cup) compare the two cups.
2. Answer the following questions using full sentences: What happened to the cup in the dark? What does the cup in the light look like? Why do you think you got the results you did?

Note: this is not my experiment – I'm still waiting for my seeds to sprout! But this is what I expect the results to sort of look like...

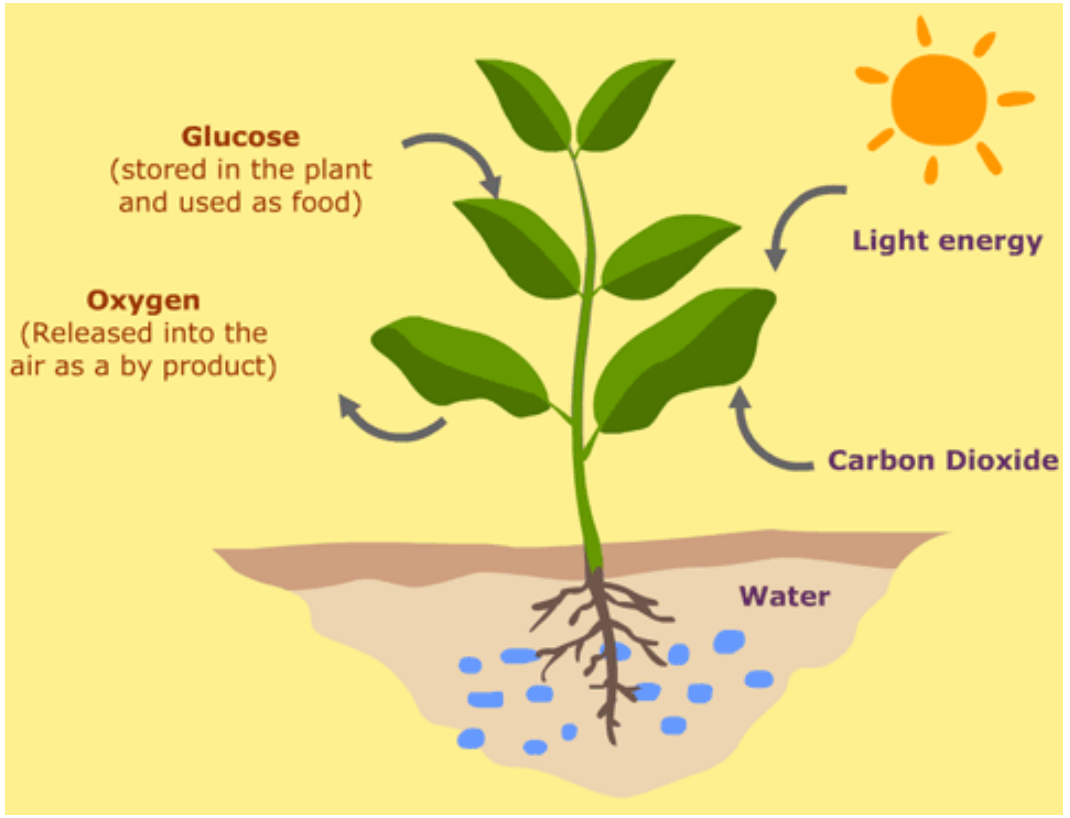
What did we see and learn?

- You should have seen that your plant growing in the dark doesn't look very healthy. It may be smaller with fewer sprouts or leaves than the plant growing in the sunlight. It also may be very tall, but looks dead and is lacking a green color.
- This is because plants need sunlight to grow!
- Plants actually use sunlight as their source of energy – they are able to take sunlight and convert it into sugar to give them energy to help them grow.
- This important plant process of converting sunlight to energy is called **photosynthesis**.

Q: Can you imagine what it would be like if you could convert sunlight into energy for your body? Instead of eating, you'd just have to take a nap in the sun!

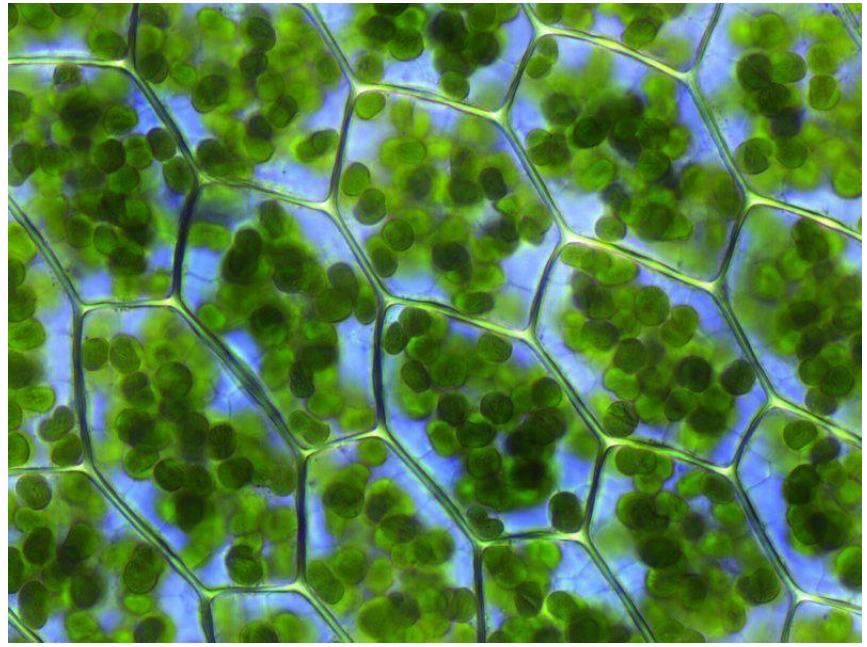
Photosynthesis

- To start photosynthesis a plant needs **water**, **air/carbon dioxide**, and **sunlight** (a few of the things we said plants need to grow).
- With these 3 inputs, plants go through many complicated steps in their cells to create two important things: **sugar, also known as glucose** and **Oxygen**.
- They store some of this sugar (and that's why we eat plants like strawberries or rice to get energy), but also use some of this energy to grow.
- At the same time, they release Oxygen back into the air.



One of these is not like the other…

- You may have noticed that the dark plant turned a yellowy tan color, while the sunlight plant looks green.
- There's a special substance inside plants called **chlorophyll,** giving plants that green color. Chlorophyll also **helps the plant absorb sunlight** and start photosynthesis.
- When there is **no sunlight** to absorb, the plant stops making chlorophyll…and it loses that beautiful bright green color!
- Your plant growing in the dark may also be very tall compared to your plant in the sun. This is the plant using every bit of energy in the seed to grow as quickly as possible hoping that it will reach some sun if it gets tall enough.



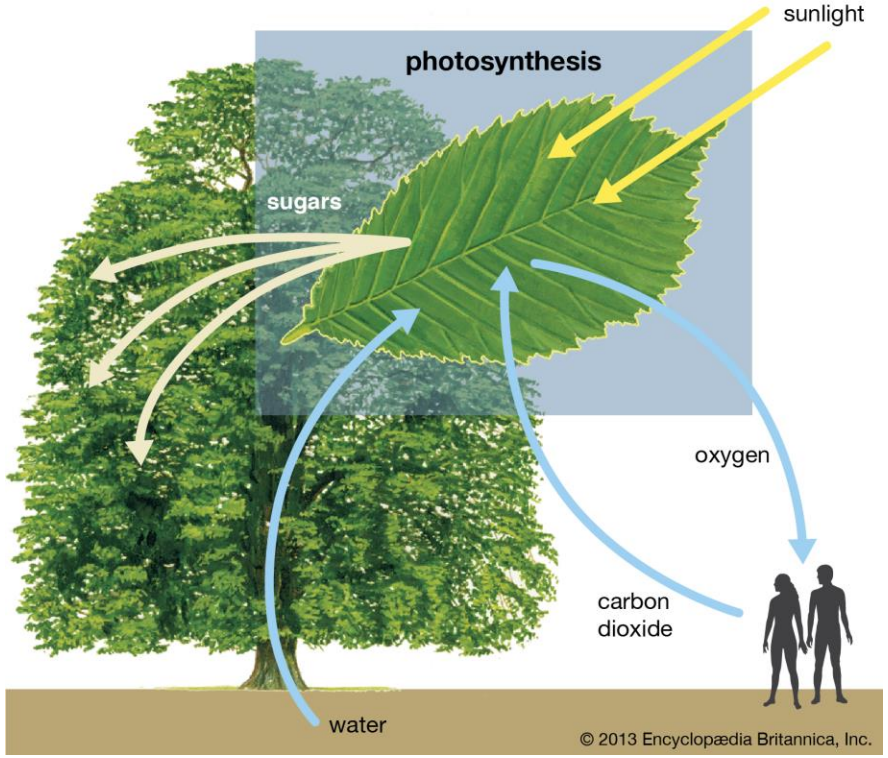
Close-up view of chlorophyll in a plant.

Why is photosynthesis magical (and important)?

We should be **very thankful for plants** for a lot of reasons, but two important ones are:

1. Unlike humans, plants can take sunlight and turn it into sugar (glucose). This is a form of energy humans and other animals can use – **so we can thank plants for <u>all</u> our energy we get from food**. Even if you're eating an animal product like meat or eggs, the energy initially came from plants.

2. Plants **take in carbon dioxide** (what humans breath out – our air "waste") and **release oxygen** (what humans breath in and need to survive). Sounds like a pretty great relationship to me – our trash is a plant's treasure...that they eventually turn into treasure (clean air) for us!



Knowledge Check!

- ✓ Send an email to anna.barlowe@foodcorps.org with a picture of your two plants after the growing period!
- ✓ I will respond and let you know if you can check off the "Magic of Photosynthesis" lesson/activity on your Bingo Board.
- ✓ Congratulations - you are one step closing to earning prizes and have some new knowledge about soil types and water!
- ✓ Be sure to also create a drawing representing photosynthesis to check something else off your bingo board!

Thanks for joining me!

Want more fun farm to school and wellness activities? Want to earn awesome prizes? Visit our website to learn more!

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Learning Objectives & Science Standards

Overall Program Learning Objectives:

1. Label the life cycle of plants/animals and describe the role humans have
2. Safely prepare a recipe with ingredients from food grown in Oregon
3. Describe what a plant needs to grow and how humans can assist
4. Identify where and how food is grown in Klamath/Oregon
5. Identify an Oregon grown food and taste it.

NGSS Standards Used in Garden Education 3rd Grade:

3-LS1-1 From molecules to Organisms: Structures and Processes
Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3-1 Heredity: Inheritance and Variation of Traits
Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS4-3 Biological Evolution: Unity and Diversity
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4 Biological Evolution: Unity and Diversity
Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-ESS2-1 Earth's Systems
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Engineering Design 3-5

3-5-ETS1-1 Engineering Design
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3 Engineering Design
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.