

Make a Mini Greenhouse

With

BROOKHAVEN
NATIONAL LABORATORY



What do you know about plants?

Plants come in all different shapes and sizes! There are over 400,000 different types of plants and scientists find new types all the time. Take a look outside your window. How many different types of plants do you see? Can you spot: moss, trees, flowers, grass, bushes, weeds, vegetables? Did you know plants are alive?

Plants have different parts, can you match the description of each plant part to the picture below?

>This part anchors the plant into the soil and draws water from the ground into the plant

>This plant part supports the plant. It can be short or tall, woody or non-woody

>This part is often colorful, contains male and female cells, and produces seeds

>This part uses sunlight to make energy the plant needs to grow

>This part contains the seeds, protecting them. People and animals often eat this part!

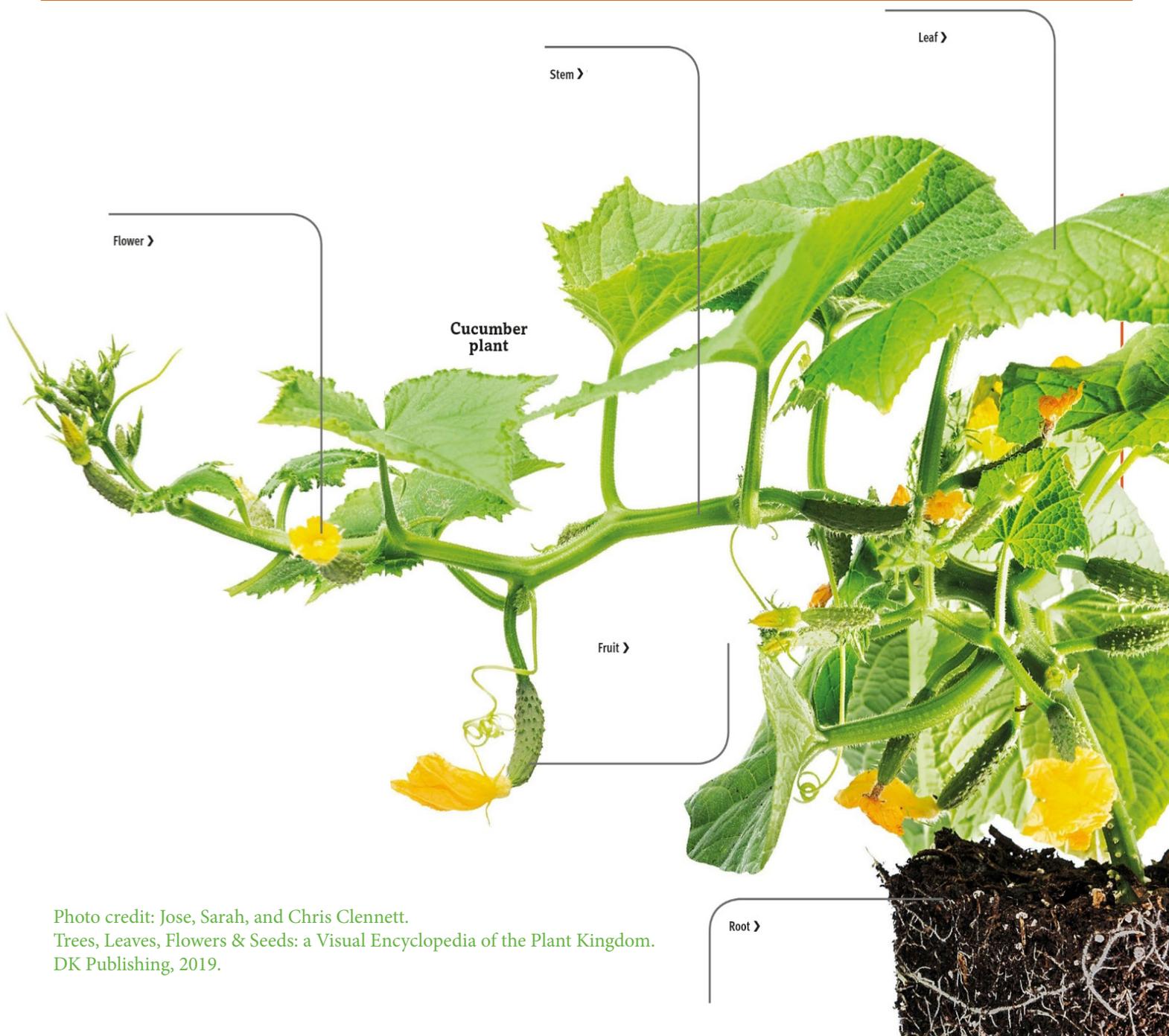


Photo credit: Jose, Sarah, and Chris Clennett.
Trees, Leaves, Flowers & Seeds: a Visual Encyclopedia of the Plant Kingdom.
DK Publishing, 2019.

How do plants grow?

It all starts with a seed

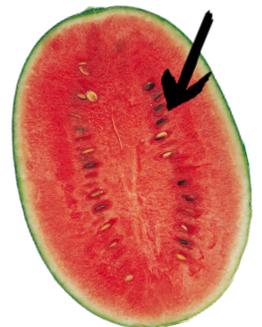
All of these pictures are seeds or fruit that contain seeds. Did you know acorns, coconuts, beans, and corn kernels are all seeds? Its true! What do seeds need to grow?

Germination

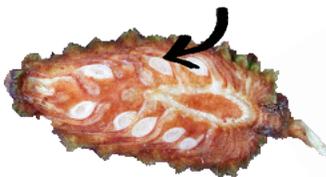
Seeds need the right temperature, water, and light to grow. When a seed starts to grow into a plant, this is called germination.



Watermelons have seeds on the inside of the fruit.



Pine cones are not a fruit but they contain seeds. Some pine cones need fire for their seeds to sprout!



Strawberry seeds are on the outside of the fruit

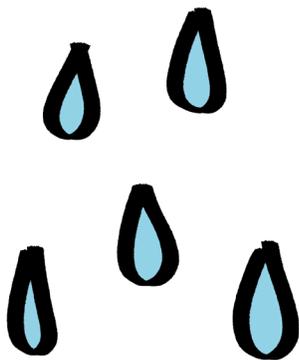
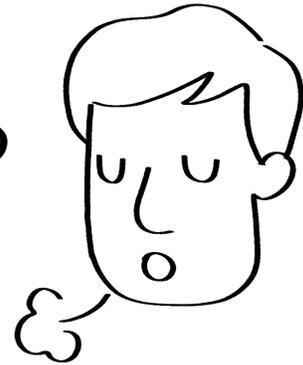
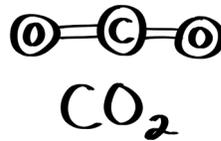
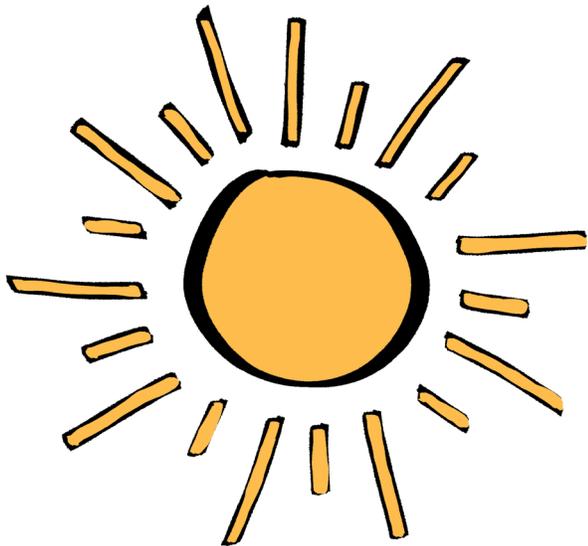


Dandelion seeds can travel by wind!



And after that?

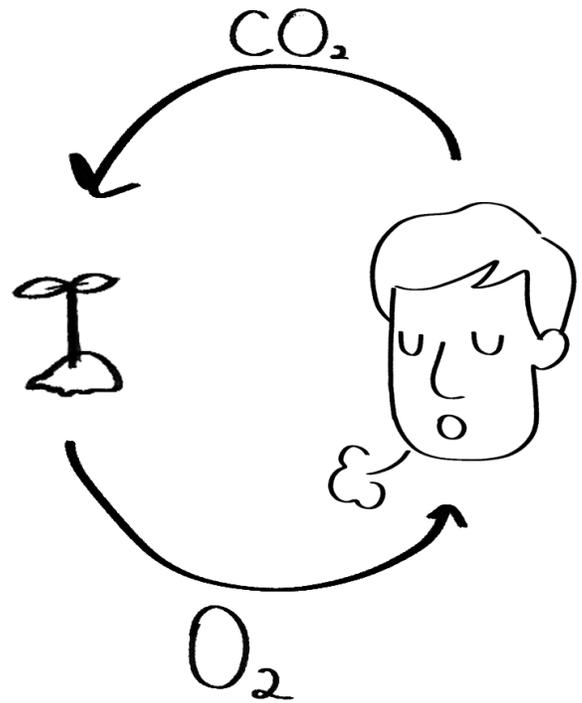
After germination plants need sunlight, water, and a chemical called carbon dioxide to grow. Carbon dioxide or CO₂ is in the air we breath out.



Photosynthesis

These three things, water, sunlight and carbon dioxide are ingredients needed to make sugar! That's right! Plants make their own food, this process is called photosynthesis. Plants release oxygen during this process that we can use to breath.

Pro tip: You breathe out CO₂ when you talk. Talking to your plants isn't a bad idea.



Have you ever noticed how sweet fruits are? This is because they contain sugar the plant made. High fructose corn syrup is a sweetener that is made using corn. This orange soda gets its sweet taste from corn, or high fructose corn syrup, not oranges.



Plant Scientists At Brookhaven National Lab

Scientists at Brookhaven National Lab study plants because there is still so much more to learn about them! Below are some pictures of scientists in action!



Meet Dr. Angie Burnett! She is a scientist at BNL and grows different plants to study how drought, or lack of water, affects plants. In this picture she is holding a computer to collect data or information. To learn more about data at BNL check out our make your own video game activity.



This is Dr. Burnett's team! Scientists always use teamwork to get the job done. Notice they are standing in a field of zucchini! The team measures a lot of things about the plant including temperature, how much water is in them, how tall they are, and more!



Here are Dr. Kewei Zhang and C.J. Liu. Both are studying how to use plants for energy, or biofuel. If you have ever made a campfire, you have used biofuel, because the energy for the fire came from the logs of a plant.



The picture on the left shows several BNL scientists including Dr. Alistair Rogers and Dr. Shawn Serbin who are hanging from a crane to study a tropical rainforest in Panama. In the picture above you can see a strange set up that Dr. Burnett's team uses to collect plant data. They use something called a spectrometer to measure the light that bounces off the leaves of plants. To learn more about this process, check out our spectroscopy activity.

What is a Greenhouse?

Remember there were a few things plants need to germinate and grow. Which season do most plants germinate or sprout? Spring! This is when the Earth heats up and we have more hours of sunlight for photosynthesis. But what if a scientist wants to grow plants for experiment in the winter? This is where the greenhouse comes in. Greenhouses are made of glass and can let light inside while keeping plants warm enough to grow! Guess what! You can make your own greenhouse at home too!

Plants growing in a greenhouse at BNL. Look at the cool machines used to study the plants!



What season is it in this picture? Even though it is winter you can still grow plants in this greenhouse!



Make your own Greenhouse!

Even if it warm out you can encourage seeds to germinate by planting them in a warm environment. Follow along to create your own greenhouse out of everyday items.

You will need:

A plastic container or bag with a cover



Soil to plant your seeds in. This can come from your yard- ask a grown-up before digging any holes!



Water and a place that gets sunlight (windowsill or outside)



Seeds



Note: If you cannot find an acorn or other seed, you can also try planting some seeds from birdseed or vegetable scraps including celery and carrots. For more information check out the links in the reference section.

Instructions:

You will need to find the items listed on the previous page. The goal of our experiment is to have seeds planted and then covered with a plastic cover. There are many ways to do this, but you might need to get creative with materials around your house.

Step 1: Fill base of your container with soil



Step 2: Plant seed into soil

Use your finger to put a small hole in the soil, about half an inch deep. Then add the seed to the soil and cover.

Step 3: Water & Cover

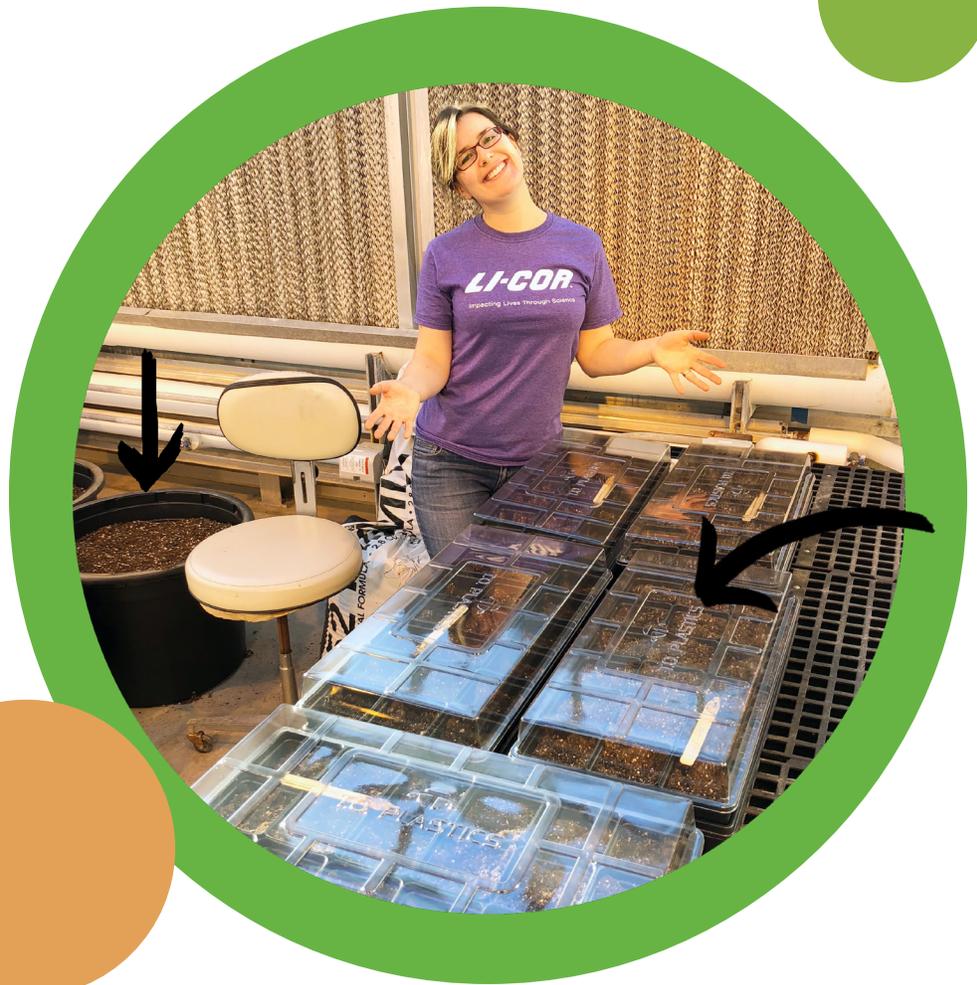
Add some water to the soil until it is moist.

Do not over-water!

Cover your container with plastic wrap, the cover your container came with, or a plastic cup. Set your greenhouse outside in the sun or by a window.



Here is Dr. Burnett inside of the greenhouse at BNL standing next to her own mini greenhouses! Dr. Burnett has planted seeds inside these containers to germinate them. Once they germinate she will move them into bigger containers, like the ones behind her.



Step 4: Watch and Record

A good scientist always records, or writes down, their data, or information they are collecting. Take a notebook and write down the day you planted your seeds and observations you make as your plant grows. You can try measuring your plant with a ruler once a week to see how quickly it is growing. Be sure to check the soil by touching it with your finger. If it seems dry add more water. Once your plant is tall enough you can plant it in a bigger pot, or remove the lid or your greenhouse.

Challenge!

Plant another seed (the same kind you planted before) but leave it uncovered. Which plant do you think will germinate faster?



These are pictures of plants growing in the BNL greenhouse

Example Data Sheet

DATE	Height (cm)	Notes	Sketch
4-15-20	0 cm	Just Planted an Acorn	
4-22-20	1 cm	my acorn germinated!	

Here is an example of what your data sheet can look like. It is important to include the date, your measurements in centimeters (the unit scientists use), your notes, and a sketch! Before cameras scientists would draw anything they discovered. The picture to left is a “botanical illustration,” or plant drawing made in 1833 by a scientist.

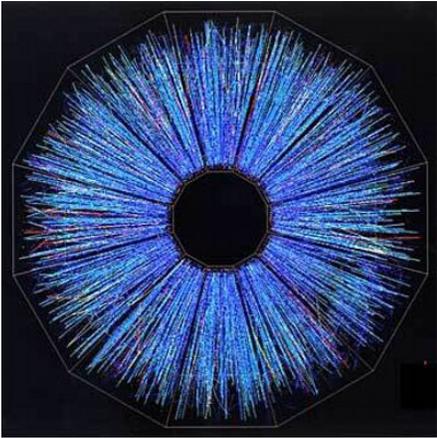
Challenge!
Can you label all the plant parts?



Picture from Biodiversity Heritage Library. Link in resources.

Show us what you grew!

Ask a parent to make a post



Look for us on all
of our social media



@brookhavenlab



@AngelaClaireW



#BrookhavenSciEd

Resources

BNL News:

<https://www.bnl.gov/newsroom/news.php?a=213279>

<https://www.bnl.gov/newsroom/news.php?a=216766>

<https://www.bnl.gov/newsroom/news.php?a=111439>

More greenhouse resources:

<https://outsidetheboxhomeschoolers.wordpress.com/2014/07/04/stem-activity-mini-greenhouses/>

<http://hazelandcompany.blogspot.com/2013/04/egg-carton-greenhouses.html>

<https://www.whatdowedoallday.com/plant-science-regrowing-vegetables-from-scrap/>

<https://www.playdoughtoplato.com/my-little-sprout-house/>

Plant videos:

<https://youtu.be/ls6wTeT2cKA>

<https://www.youtube.com/watch?v=pg92cspLy0I#action=share>

<https://youtu.be/tkFPyue5X3Q>

<https://www.youtube.com/watch?v=dJjNh2pMSB8&feature=youtu.be>

Parent and teacher resources:

<https://www.weareteachers.com/learning-about-seeds-in-third-grade-with-free-printables/><https://www.weareteachers.com/best-gardening-books-for-kids/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5524439/>

Jose, Sarah, and Chris Clennett. *Trees, Leaves, Flowers & Seeds: a Visual Encyclopedia of the Plant Kingdom*. DK Publishing, 2019.

Botanical Illustrations:

<https://www.flickr.com/photos/biodivlibrary/albums>