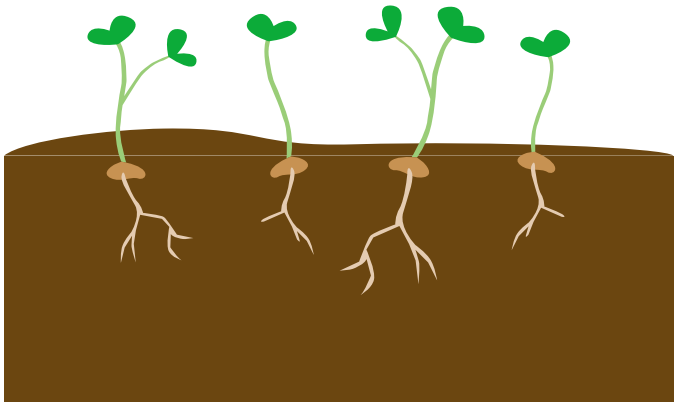
Back to the Roots Garden Toolkit

Unit 6: A Seed's Journey

Overview

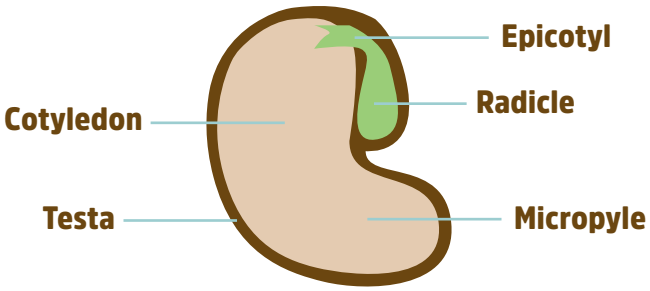
Back to the Roots is on a mission to help every kid experience the magic of growing. We're bringing this mission into your home or classroom with Unit 6 of the Garden Toolkit — A Seed's Journey.

In this unit, we'll learn about the journey a seed takes to grow from a tiny speck into a hearty plant. We'll explore the anatomy of a seed, what they need to germinate, how they continue to develop, and what it takes for them to reach maturity. What are you waiting for — let's explore the life cycle of a plant!



Anatomy of a Seed

Despite their tiny size, seeds are incredibly complex organisms with different parts that perform essential functions. Some parts help to keep the seed safe before it grows, while others help it grow well once you've planted it in the garden! Just like with a human — every part of the seed plays an important role in turning it into a thriving plant. Check out the diagram to see just a few of the important parts of a seed!



Testa — The testa is the hard outer coat of the seed. It protects the inside parts of the seed from harsh conditions that could cause damage before it has a chance to grow.

Micropyle — The micropyle is a tiny opening in the testa that let's water reach the inside of the seed. Without the micropyle, the seed would never know when to open up and start growing!

Radicle — The radicle is the baby root of the plant. When the seed germinates, the radicle emerges from the seed first and becomes the primary root for the young plant.

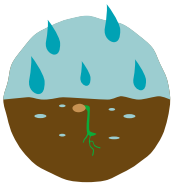
Epicotyl — The epicotyl is the baby stem of the plant. Shortly after the radicle, it emerges from a germinated seed and extends upward toward sunlight.

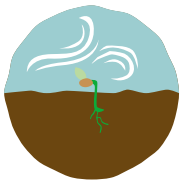
Cotyledon — Cotyledons (pronounced "kaa tuh lee duns") are the first leaves that grow out of the epicotyl when a seed germinates. They store energy for the young plant to use as it grows. Some seeds have two cotyledons, while others only have one.

Growing Seeds

What a Seed Needs to Germinate

So how does a seed go from just a small little speck to a full sized plant? Well, the first thing it has to do is **germinate**. Germination is the process by which a seed opens up and begins to use its stored energy to grow. So how do we "unlock" a seed? It starts with two important ingredients — water and air!





Water

The first important ingredient is water. Most living things on earth rely on water to help them grow, including humans! After a seed has been planted in soil, water molecules help initiate the germination process — they open up the protective shell that seeds have, and they also tell the seed to start releasing energy to grow. Some seeds take a long time to germinate, but others can start to grow in just a few days.

Air

The second important ingredient is air. The air all around us has essential molecules that seeds need while they grow. After water has helped open up a seed, the air around it is used by the seed to grow. The soil that you plant seeds in actually has lots of air molecules in it, too, which is very important for their growth! If a seed did not have air, it would not be able to poke its head out of the soil and spread its first set of leaves. As mentioned in the first section, these first leaves are called **cotyledons**.

Young Seedlings

With water and air, a seed has what it needs to start to grow! But most plants can't thrive on water and air alone, though — as they get larger they need to produce their own energy to continue to grow. In order to create energy, young seedlings need one more important ingredient — sunlight!

After emerging from the soil, a young seedling will spread its leaves and enter the next growth stage known as **Vegetative Growth**. During this stage, a young seedling needs a large amount of energy, so it starts to perform a process called **photosynthesis**. Photosynthesis takes all of the elements we've discussed — water, air, and sunlight — and converts them into energy for the plant to feed on. Want to learn more about how photosynthesis works? **Watch this video!**

In addition to the energy from photosynthesis, young plants will also need nutrients present in the soil to keep growing. Plants take up elements like nitrogen, phosphorus, and potassium through their roots, and use them to produce new leaves and thicker stems. This growth process continues until the plant is nearly full-grown!

Mature Plants

At this point, a plant has been growing for quite a while, producing lots of green leaves that are helping turn more and more sunlight into energy using photosynthesis. It has also been using many of the nutrients present in the soil, as well. In order to reach mature size, many plants will need additional nutrients. The process of introducing more nutrients to a growing plant is called **Fertilization**.

Once a plant reaches its mature size, it will undergo the next plant growth stage — **Flowering**. In this stage, a plant produces a large number of flower buds that open up and pollinate each other. It is only after flowering that certain plants will begin the last stage of growth — **Fruiting**. This is the most exciting and rewarding part of growing plants, as they will produce lots of delicious fruits and vegetables to eat! As a gardener, be sure to keep feeding plants with fertilizer and water during these growth stages, as plants will need lots of energy!

Activities & Questions

Discussion Questions

1. What is your favorite vegetable to eat? Draw a picture of the plant that it comes from at all its different growth stages.

2. Sometimes plants aren't so lucky and do not make it through all of the growth stages we just discussed. Can you think of some reasons that a plant may not grow to maturity?

3. **FIELD TRIP!** Head to your local Farmers Market and ask a farmer how they feed their plants. What nutrients are important for their crops to grow?

Key Vocabulary

Germination — the process in which a seed opens up and begins using it's stored energy to grow.

Cotyledons — a plant's first set of leaves. They store energy when inside the seed, and begin to produce energy once they emerge.

Vegetative Growth — an important early growth stage for plants where they produce new leaves and stems.

Photosynthesis — The process in which plant leaves convert sunlight, water, and air into energy for the plant to grow.

Fertilization — the process of introducing more nutrients like nitrogen, phosphorus, and potassium to a plant so it continues to grow.

Flowering — the plant growth stage where plants produce flower buds to initiate the fruiting process.

Fruiting — the final plant growth stage where plants produce multiple fruits for people to eat.