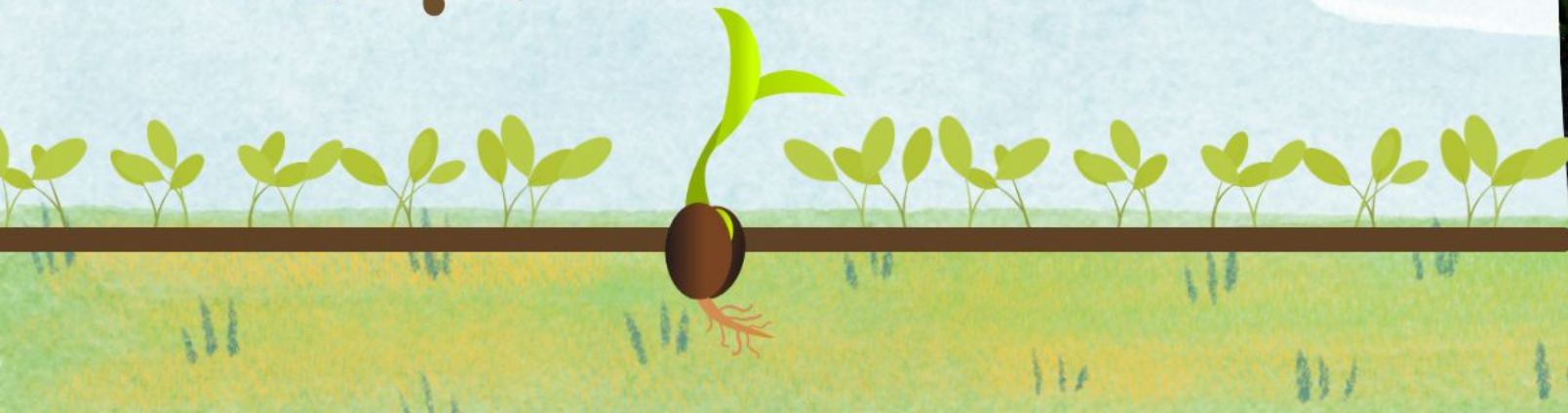
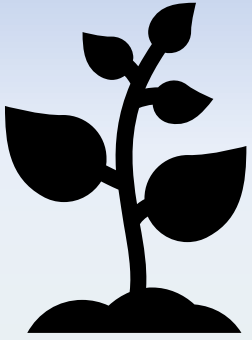


HAYES FARM TRAVELLING GARDEN TOOL KIT

SEEDS!
GRADES 3 - 5





Today we will learn about

What seeds are

The role of pollinators in making new seeds and plants

What seeds need to grow

How humans change seeds over time

How seeds move around

How seeds play a role in our diet

What is a seed?

A seed is a small *embryo* (baby that is not fully formed yet) of a plant.

Seeds are a small package containing all the genetic material necessary to grow into a new plant. This material is protected inside of a hard “coat”.

Genetic material is found in all plants and animals. This material contains information that gets passed from one generation to the next. It is kind of like an instruction manual for how to build the new plant.

Genetics in humans decide things like our hair or eye colour. In plants they determines things like height, colour and how hardy they will be (ex. able to grow well in dry conditions).

Pollination helps seeds to start growing.

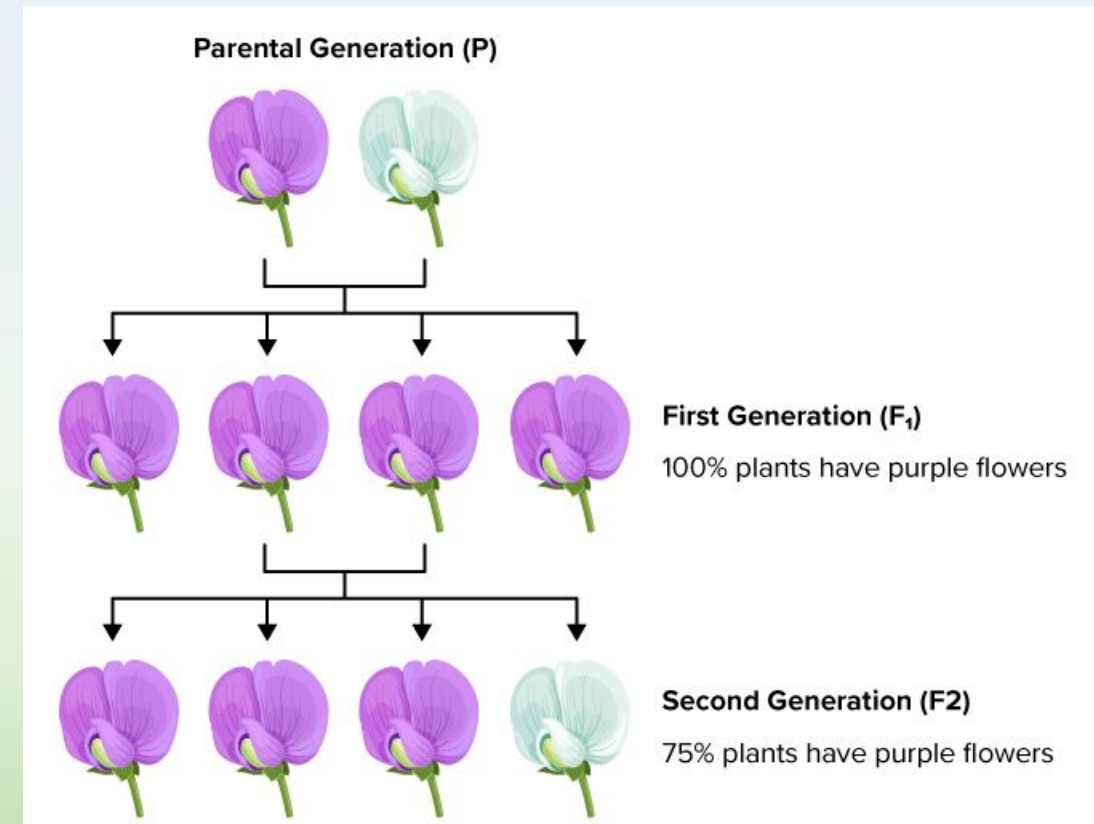


Photo: CK12 Student Tutor

What is pollination?

Plants need to be *pollinated* to make seeds.

There are insects that move from plant to plant looking for food (very sweet nectar).

As they move around, they get covered in pollen which is a powder that is needed for plants to produce seeds.

- Pollen can also travel on wind, water, feathers or fur.
- Bees aren't the only pollinators; butterflies, moths, wasps and hornets, bats, birds, flies, etc. all help out.
- **Cool fact** – Fossilized pollen is often used to learn which kinds of plants were growing long ago and what the weather and environment would have been like.



Photo: Ingo Arndt, A wild bee in Germany



Photo: Amy Floyd

What is Germination?

Germination is when a seed starts to grow after being *dormant* (asleep).

There are many steps, but this is the simple version of germination:

1. Activation: Seed absorbs water and activates.
2. Growth: Embryo inside the seed begins to grow.
3. Emergence: Shoot (top) and root (bottom) emerge from the seed.
4. Photosynthesis starts: The plant can now produce its own food

Seed germination

Don't worry about the big words, this is just to help you see what the stages of germination look like.

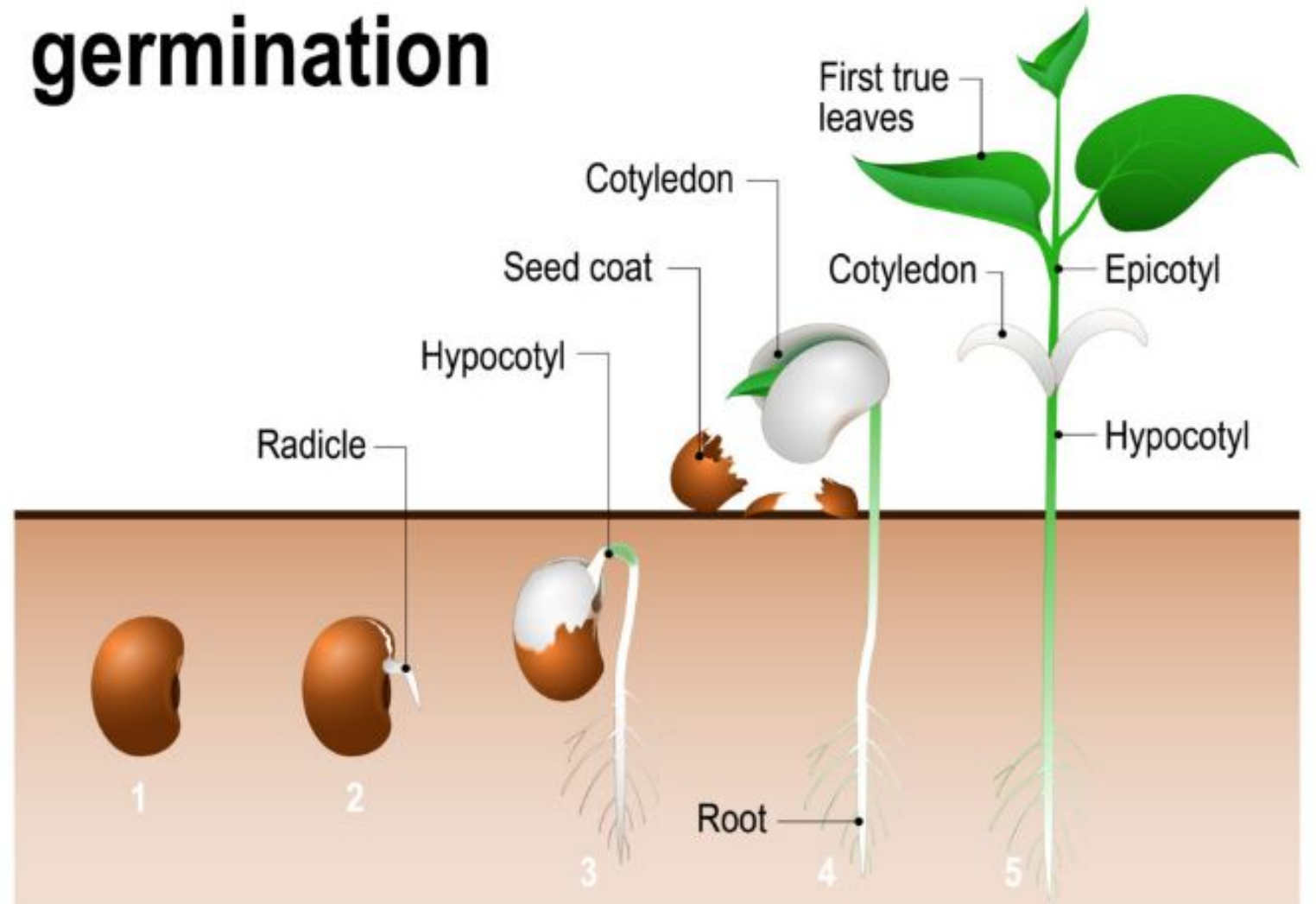


Photo: Seed Parade Seed Company (UK)

Corn seedling



Photo: Amy Floyd

Even though this seedling is only about 10 cm long, its roots are 33 cm long! That is more than 3 times the plant material below the ground as compared with above ground. You can see why plants are important for holding soil together.



What do seeds need to grow?

There are five things – let's see if we can think of them all.

What Seeds Need to Grow into Plants

Sunlight

- Energy source for photosynthesis (making food).
- Stimulates plant growth and development.

Water

- Helps chemical processes happen.
- Transports nutrients.

Air

- Oxygen for respiration (breathing).
- Carbon dioxide (what humans breath out) for photosynthesis.

Nutrients

- The foods that plants need to be healthy and free from disease. This can be things like nitrogen that gets release from dead plants/ bugs/ bacteria, poop, etc. What seems kind of gross to us, is kind of great for plants ;)

Soil

- Provides an anchor and support to keep plants from falling over in the wind and rain.
- Supplies essential nutrients like minerals (magnesium, calcium, phosphorous).

Seed Travel



*How do seeds move
from place to place?*



Seed Travel

Methods of seed *dispersal* (*how things are dispersed is how they move around*)

Wind: Seeds equipped with wings or hairs and catch a ride on a breeze!

Water: Seeds float and are carried by water currents.

Animals: Seeds eaten by animals and spread around by poop

Get caught in animal fur or even our sweaters ! Like burdocks

Importance of seed dispersal for plant reproduction

- Increases chances of successful germination in new locations.
- Reduces competition among offspring (young plants).

The Travelling Burdock!



Photos: Facebook, L Carol Price, R Steph de Carteret

Ancient seeds

- Seeds change a lot over time, because people and save the seeds that grow best in challenging conditions (very hot, very wet, very dry, etc.)
- Seeds can last such a long time!
- Seeds can become *dormant* which is kind of like being asleep until the right conditions for growth happen.



Let's remember - What are those conditions for growth again...?

- Sometimes we find seeds that were stored in jars, buried in the ground for hundreds or thousands of year.
- Usually these seeds won't grow, but it is possible!

Amazing, Ancient Seeds

The oldest seed to grow...

The Judean date palm is thought to have gone extinct in the 1400's.

In the 1960's the seed of a Judean date palm was found in Israel.

It was nicknamed Methuselah and was about 2,000 years old.

After over 40 years in storage, in 2005 it was germinated and grew into a plant!



How corn has changed over time

“Wild Grass” Seed



Photo: Oikos Tree Crops Company (U.S)

Ancient Seed



Photo: Hayes Farm 2021

Modern Seed



Photo: University of Nebraska Lincoln

Traditional Corn, Ancient Seeds

- The original seed was a type of grass called teosinte.
- Teosinte was eaten and seeds for larger cobs were selected, which became Dent Corn (seeds are hard with a little dent in the middle)
- Teosinte and Dent Corn helped to feed hundreds of generations of indigenous people all across North America (Turtle Island).
- The new corn has gotten softer and sweeter. The stalks can also be shorter (less likely to blow down in hard wind or rain).
- The downside is that these new seeds sometimes need more care, more watering and more weeding to produce sweeter corn.
- At Hayes Farm we are very interested in traditional seeds.

Different Shapes and Sizes of Seeds

Seeds grow in many, many different ways

Let's look at a few...

Pine cones



- They are both male and female pine cones
- Pollen travels by wind
- We usually notice the larger female cones
- The woody structure of the cone keeps seeds safe
- It can take 2- 3 years for the seeds to grow!

Cool fact: Jack pine and lodgepole pine have a waxy coating on their cones. They need the heat from forest fires to melt it so their cones can open and seeds can grow.



Corn

- Corn is pollinated by wind too
- Corn has male “tassels” and female “silk”. These are the soft, silky, white strands just under the husk (green covering on the corn). Wind moves the pollen between the tassels and the silk.
- **Cool fact:** Each kernel is a single seed that can grow a new plant.



Squash and Pumpkins

This family is called *curcubits* and includes

Squash, pumpkins, cucumber, melon, zucchini

Cool fact: If different types of curcubits are near each other and get cross-pollinated the seeds in the next year will make a whole new plant! This is how we get gourds. Bottom photo.

If you have extra pumpkin seeds, they taste great roasted with salt!



Photo: Ryan Bomzer – Carved Culture



Photo: Wild carrot, Mark Zekhuis (EU)



Photo: carrot seeds Diyana Dimitrova, Gardening Know How.com

Carrots

Carrots are called *biennials*

This means that they don't make seeds until they are 2 years old!

We'll show you a fun carrot experiment at the end!

Seeds in our diet

Many of the things we eat today are seeds, but we don't think about them like that because seed is not in their name.

- Coffee beans
- Corn kernels
- Rice

Seeds provide a lot of protein in our diet

Protein helps to build muscles and tissues in our bodies

Activity Options

- Make seed bags to take home
- Start seeds in the classroom
- Grow a carrot plant from a whole carrot
- Grow an avocado plant from a pit
- Watch a video about how animals drink nectar and spread pollen

More information in the teacher's guide

Vocabulary

Biennial

Curcubits

Dispersal

Dormant

Embryo

Genetic material

Germination

Nutrients

Macronutrients

Micronutrients

Pollination

Protein