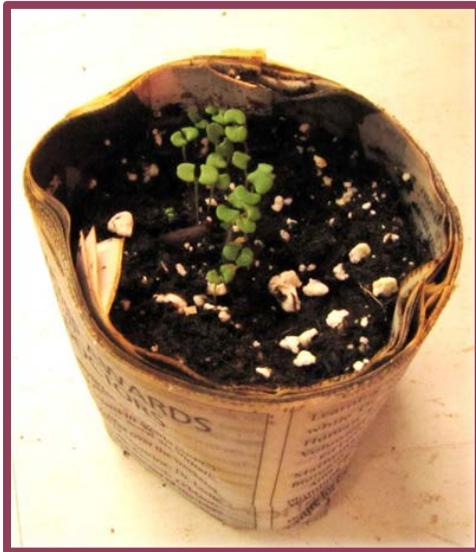


Propagating Seeds

Botanists in Training

Germinating Seeds – Going Green Without a Green House



Propagating is the process of increasing your volume of plants and it is commonly done by germinating seeds, and through divisions and cuttings. All of these activities can easily be done in the classroom or at home and are useful when learning about plants.

Sprouting Seeds

Planting seeds may seem simple (drop a seed in soil, water it, and watch it grow) but our experience has been, that unless a teacher has had previous experience, they are very hesitant to try this in the classroom. Most are worried about “getting it right”, but there is no better way to act like a scientist than with a little trial and error.

Below are a few tried, tested and true ways we have sprouted seeds with all ages in all settings. Nothing is 100% guaranteed and failure may often not be your fault (seeds aren't perfect either), but the excitement of seeing a little green sprout pop through the dark soil is worth the effort.

Sprouting Seeds: Method #1

Sprouting seeds in a clear container lets you see the roots and leaves emerge from the seed. Although this may not guarantee the long-term success of your plant, it allows you to watch the normally hidden process of germination.

Materials:

- A clear container made from glass or plastic, such as a disposable cup or a jar
- Paper towel
- Three or four large seeds: dried, un-cooked beans such as kidney beans are our favourite*
- Spray bottle with water

*Dried peas and beans from the grocery store can be safer for young children to handle, as packaged seeds may be treated with fungicides to increase germination rates.

What to do:

1. Place a strip of paper towel all the way around the inside of the jar.
2. Scrunch up some more paper towel and put it inside the first strip so it fills up the jar.
3. Spray the paper towel until it is damp but not wet. If you can see standing water at the bottom of the jar, it is too wet. Drain out any excess water.
4. Place the seeds between the paper towel and the jar so you can see them clearly.
5. Place your container in an area that is free from drafts and keep damp.



Figure 1: A kidney bean (seed) has just sprouted roots inside a clear plastic cup with wet paper towel. Cellophane was used to help keep the paper towel moist over a weekend.

What you will see:



Figure 2: A ten day old kidney bean sprout is starting to lose its seed coat because the leaves are emerging.

As the beans absorb water they will get bigger until a little root comes out. Then the bean will start to send up little leaves. When the leaves poke out above the paper towel, you can carefully take out the whole plant and plant it in some potting soil. Be sure to put it in a sunny location and keep watering as necessary.

Sprouting Seeds Method #2:

Another way to watch seed sprout is in a clear plastic bag.

Materials:

- Seeds
- Plastic bag (does not need to be sealable)
- Paper towel
- Spray bottle with water

Place a folded piece of paper towel inside the bag, and spray until damp, but not too wet. Place the seeds on the paper towel and put in an area that is free from drafts and keep warm. Check the bag daily to ensure the paper towel does not dry out. Within a few days the seed will start to send out little roots and shoots. At this point you can plant it in some potting soil where it will continue to grow.



Figure 3: Seeds are placed on a wet paper towel to start germination

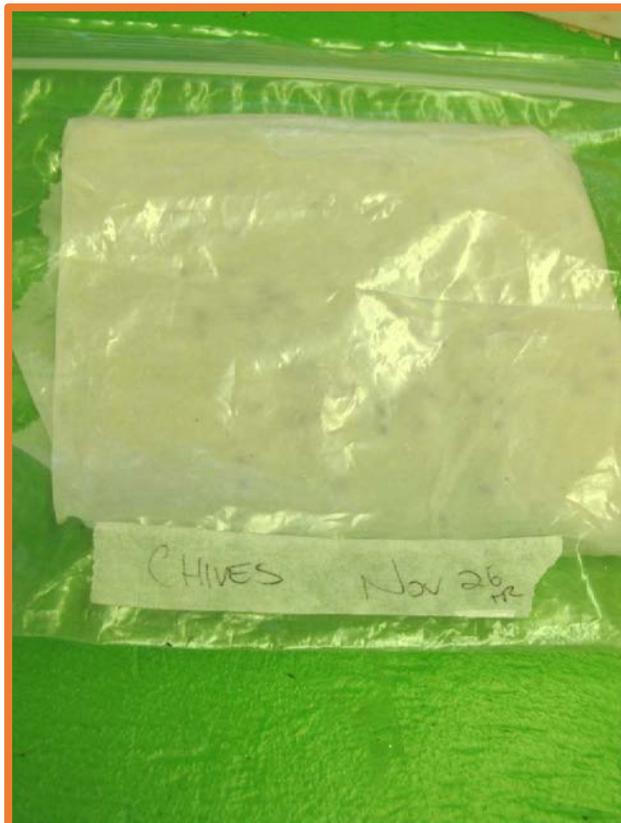


Figure 4: Chive seeds are small so the bag method helps you keep track of them

This method can work, but is not as favoured as the cup method by Garden staff. If the paper and seeds are kept too wet, without any airflow, then it is likely mould will appear.

Sprouting Seeds: Method #3 – Soil

The most common way to sprout seeds is by putting them directly into soil. Although you can't watch the beginning of the sprouting process, there are fewer disturbances to the plant by letting it grow where it sprouted.

Materials:

- Seeds
- Pot or Container (See *Recycled Flowerpots Activity*)
- Sterilized potting soil (*Figure 20*)
- Spray bottle with water

Fill your container with soil. We always encourage handling the potting soil with bare hands because it smells great, feels soft and gives everyone an opportunity to be allowed to touch dirt – dirt don't hurt!

Of course if someone has an allergy, eczema, or an open cut then we do offer disposable food-handling gloves. Fill the container to the top and press down gently with the back of your fingers to tamp the soil. Seeds, like us, need air to breath so a gentle tamping will remove the big spaces but allows little ones to remain.

Poke a hole in the centre of the soil with your finger. The hole should be about twice the depth of the width of the seed (i.e. a kidney bean is about 0.5cm thick – so plant it about 1cm down) but no more than half way down your pot. This does not need to be exact; it's more important to be sure the seed roots have space to go down, and enough soil above the seed to be sure it can be covered. Drop the seed in the hole and cover it up with extra or surrounding soil.

Figure 5: Potting Soil vs. Garden Soil

Potting soil can be bought from garden centers and most grocery stores. Do not use soil dug up from outside for indoor plants. Outdoor soil has bugs, microscopic organisms and possible plant diseases that could harm your young sprouts or the bigger critters may decide to leave your pot and head elsewhere in your classroom.

You can sterilize you own garden soil for indoor use by following one of the methods below.

Oven Method

Use a sieve with 5mm openings to sift moist soil into a deep dish baking tray. Remove and discard large debris. The soil can be up to 7.5cm deep in the pan. Bake at 400°F for 30 minutes.

Microwave Method

Sift moist soil as in oven method and place soil in a roasting bag. Seal it to stop soil from contaminating the microwave. Pierce a few small holes in the bag. Cook on high for 10 minutes.



Figure 6: A kidney bean emerges from the soil a week after being planted.

Place your pot where you will remember to take care of it and add enough water so that the soil is as moist as a rung-out sponge – damp feeling, but not sopping wet. If you accidentally over-water your pot, the water will hopefully run out the drainage holes. It is advisable to put a dish under the pot to catch any of this over-spill. If you haven't already, when your sprout emerges, put your pot in a sunny location or under a grow lamp if you have one.

Extend the learning:

- Germinate the seeds under different conditions to see how abiotic (non-living) factors affect growth. For example, germinate the seeds in light, in darkness, at varying temperatures or depths in the soil, etc.
- Try this activity with a variety of seeds; younger children find larger seeds easier to handle. A soup mix containing a variety of dried beans is fun to use, as are sunflower seeds, and dried corn. If there are no peanut allergies, try growing bird seed. Packaged seeds are also easy to use; be sure to wash hands after handling.
- Younger children may enjoy testing objects to see if the objects are indeed seeds. Watch non-germinating objects carefully for mould and discard if mould appears.
- Test to see if a seed came from a monocot (the embryo has a single cotyledon or seed leaf) or a eudicot (the embryo has two seed leaves or cotyledons). Germinate corn (monocot) and peas or beans (eudicots) and compare the differences.



Figure 7: The fruit (the green bean) of a kidney bean plant

- Allow your plant to grow; water and tend it, including providing a tall stick for your climbing plants to wrap around and take hold. Vary the growing conditions (i.e. abiotic or non-living factors) for the plant to see if you can affect growth (i.e. temperature, light, nutrients, water, etc.).
- When the flower is produced, examine it with a magnifying glass. Can you see the male and female parts of the flower? Please see Chapter 3 for a diagram. If you brush the male pollen onto the female part of the flower (pollination), a fruit (i.e. a pea or bean pod) will form. Examine the seeds inside the fruit. If you grew peas or beans, you can even eat them!
- When students are caring for the plants, encourage them to measure and chart the changes and growth. Record findings with digital photography and drawings.
- Discussions of the changes can lead to opportunities for more science experiments. Encourage the students to ask questions and test their hypotheses.
- Try planting the same type of seed at different depths to see what works best.
- Water your plants different amounts to see what it likes best.
- Try different soil types.
- Put garden soil in a pot, water it and see what magically appears (dormant seeds).



Figure 8: The flower of a kidney bean plant

Divisions

Dividing is the process of taking an original plant and splitting it into two plants at the root level. In your garden this works well for hostas and lilies, but in the classroom there are a few more children friendly plants that this works for.

The aloe plant is a great one to have around because its leaf juices can be used on any accidental burns to cool the skin. The aloe doesn't need much extra care and with little effort will start to send up new shoots around the base of the original plant.

To divide a small potted plant, use a sharp knife and cut down into the soil between the parent plant and the new shoot. Lift the new shoot out of the soil holding it by the leaves. Compact the soil of the parent plant where you took out the shoot, so there isn't a hollow around its base.

Repot the new shoot in a new, clean pot by adding soil and then poking a finger or pencil into the dirt to make space for your new shoot. Drop the new shoot into the soil so that the surface line will be the same as it was before. Compress the soil around the shoot to hold it in place. Water and provide sunlight as you would with any plant.



Cuttings

Getting cuttings is the best way to share a favourite plant. Some plants work better than others, but you may be able to get many plants to root with a little rooting hormone. Getting and using rooting hormone may not be possible in the classroom, so you can attempt to grow cuttings with something that will root easily. One common plant in Newfoundland that will root quite easily is the willow.

To take a cutting of a willow use sharp pruners or secateurs to snip off a branch no thicker than the size of your index finger. Cut the branch where it divides from the main stem to cause the least amount of disturbance to the plant.

Figure 10: For the best health of your cutting and the original plant it is important to have a sharp clean cut



Figure 11: Cutting a willow branch

If your branch is long you can cut it into multiple pieces, but always make sure each piece has a bud closer to the tip. Roots will start growing at a leaf node – the bump on the branch where leaves branch off, so cut with a node close to what will be the bottom of your plant.

Figure 12: Various sized willow branches cut and put into jars of water

Your branches can be put into either water or soil. When in water you can start to see the roots growing, but planting the branch in soil will cause less disturbance if you want to continue growing the willow. When putting the branch into soil, be sure to remove any leaves that may be at the node and plant the branch so the leaf node is under the soil.

