

# Kitchen Counter Salad Science (Sample Lesson)

## Introduction

“Blessed is the man who trusts in the Lord,  
whose trust is the Lord.  
He is like a tree planted by water,  
that sends out its roots by the stream,  
and does not fear when heat comes,  
for its leaves remain green,  
and is not anxious in the year of drought,  
for it does not cease to bear fruit.”

—Jeremiah 17:7–8

Welcome to Kitchen Counter Salad Science. In this unit study, you and your family will learn about the fundamentals of plant growth by growing salad greens on your kitchen counter. You’ll get to see things that are usually hidden from you underground, and even better, at the end you’ll have delicious, nutritious greens to enjoy together.

Why do this? Why is it important?

Several hundred years ago, what we call “Science” was more properly known as “Natural Philosophy”, that is, the study of nature for the love of wisdom (Gk. philo, “love”; sophos, “wisdom”). Natural philosophers like Isaac Newton would have said with confidence that philosophy, including natural philosophy, was the handmaiden of theology. That is, our search for wisdom in the study of God’s creation serves us best only as we strive to know and love God better.

Why study God’s creation? How does it do anything to serve our knowledge of God? For one, God created it! And when He did, He called it good. What’s more, the apostle James tells us, “Every good gift and every perfect gift is from above, coming down from the Father of lights, with whom there is no variation or shadow due to change.” The good that we enjoy in this world is a gift from God, and the gift tells us about the Giver. In nature we find invariant rules: apples fall to the ground, and plants seek the sun. This reflects God’s unchanging nature!

All the wonders of medicine and technology that we enjoy today rest on the foundation of God’s good and unchanging nature. They are gifts from our Father in heaven. But in our modern age, our society has lost sight of the Giver, and selfishly focused only on the

gifts. We look to Science to save us, and not God. In our foolishness and pride, we believe that we are the source of the good things we enjoy!

It is right to desire the good gifts of God, but we must not lose sight of the Giver. We must restore Science to its proper place: as a humble servant, not a proud master.

How can we do this? At Oak River Press, we believe that the best solution is to return to the humble beginnings of science, and faithfully practice the old scientific method:

1. observe God’s creation carefully
2. appreciate the intricacies and order of God’s creation
3. learn to interact with God’s creation respectfully.

In all of this, we aim to cultivate a sense of wonder at God’s greatness, and gratitude for His generosity in allowing us to participate in all His many works.

And where is the best place to participate in the wonders of God’s creation?

In our own homes and yards, of course!

We don’t need to travel to exotic locations to find God’s creation. It’s all around us every day. We are His creations, in fact.

So join us in the following pages as we relate to you just some of the intricacies and wonders of God’s creation in the plant world.

## Who We Are

We are David and Susan Eyk, the founders of Oak River Press. (“Eyk” rhymes with “like”, and it’s derived from the Norwegian “eik”, meaning “oak”.)

Susan taught English for three years in the public schools, before changing careers to follow God’s calling to work with refugees as a vocational trainer. When our son was born, she left that to become a full-time homemaker and homeschooling mom. She leads music at our church and loves studying Scripture and learning more about how God calls His people to build His kingdom through worship, doing justice to our

neighbors, and walking humbly in all our ways before Him.

David is an amateur naturalist and professional software engineer who has spent more than a decade in the publishing industry. He writes science fiction and loves studying God's creation as a gardener and orchardist. He's spent three decades thinking about the intersections of faith and science, and he's really excited to share the fruit of it with others.

We both have B.A.s from Wheaton College, where we each studied English Literature and Susan obtained her teaching license in Secondary Ed.

## Unit Overview

In this unit, students will have the opportunity both to learn the science behind how seeds germinate and grow. They will also grow their own lettuce to enjoy and share with others. Moreover, Scripture meditations will aid in making connections between Jesus' illustrations of how we are like seeds that are planted. We hope that through this study, students will grow in their walk with Jesus, deepen their understanding of how God's creation works, and develop their abilities to grow their own food.

## Age Range

Our goal is always to create materials that can be used across the ages. You will notice two different sections in most of the readings: The Basics and Going Deeper.

The Basics provides a general introduction to the concepts. The writing style is geared a bit more towards

a younger audience. However, concepts in The Basics are still important for older students.

Going Deeper does just that, it goes deeper into the weeds of the material. This section is aimed at either older students or younger students who are especially interested in the topic.

If you have children with a range of ages, you can invite your older child to read aloud The Basics to the younger children. They will then gain from the information without feeling "spoken down to." They also might enjoy some of the questions and humorous comparisons between humans and plants.

## Timeframe

As with most curriculum you can draw out or shorten up this unit study, making it fit within your unique schedule. However, it is important to note that seeds will not be rushed! The Germination Project (growing microgreens) will take approximately two weeks, while the Mason Jar Hydroponics Project (growing lettuce) could take anywhere from 30–60 days to be ready for harvest.

## Topics Covered

We will be covering Biblical concepts as well as practical hands-on gardening topics. There will also be readings that address the science behind plant growth. Following are the science topics we will be covering:

- ▷ Seed Germination
- ▷ Plant Structure: Roots
- ▷ Plant Nutrients
- ▷ Plant Structure: Leaves and Stems

# Simple Seed Germination (Lessons 1–5)

## Objectives

- ▷ To observe seed germination as it happens
- ▷ To understand the process of germination
- ▷ To learn patience when dealing with growing things
- ▷ To enjoy a harvest of delicious and nutritious microgreens

In these lessons, your students will prepare a simple seed-germinating environment that allows them to observe the germination and initial growth stages of lettuce seed. They will grow the seeds to produce a small, tasty, and highly nutritious snack of microgreens. Seed germination takes time, and the topic introduction will focus on patience.

# Lesson 1: Simple Seed Germination (Part 1)

- ▷ **Read** through the *Introduction* and *Topic Introduction* with your students.
- ▷ **Optional: Math Activity** (see *Integrating Other Subjects: Math*)
  - Calculate Age in Days
  - Calculate Days to Maturity
- ▷ **Introduce** Bible memory verse and optional hymn.
  - Psalm 1 (see ideas in *Integrating Other Subjects: Bible* for how to memorize; use Psalm 1 handout)
  - “For the Beauty of the Earth” (use hymn handout; see ideas in *Integrating Other Subjects: Hymn Sing*)
- ▷ **Discuss** any bold words.
  - Look up unknown bolded words in the glossary.
  - *Optional Science Vocabulary Activity*: Require older students to make flashcards of all bolded words and give occasional oral or written quizzes.
- ▷ **Gather** the items needed for the Procedure to set up the germination jar in the next lesson.
  - This can be done with the help of your children to build anticipation if you have time in your lesson. Alternately, ask an older child to prepare the items or do so yourself if time does not allow for a group activity.

- **Optional**: For young children, you *may* want to pre-fold the paper towel and count out the seeds ahead of time for each child if time and concentration will be a problem.
  - Task: Prepare the Paper Towel, steps 1–6
  - Task: Plant the Seeds, step 1
- ▷ If you haven’t already, **plan** ahead of time where you are going to set up this project, and clear the space. Ideally you will want:
  - A sunny south-facing window
  - A location students will pass by regularly throughout the day

## Materials Needed for Tomorrow’s Lesson

- A wide-mouth pint mason jar, or a similar-sized glass, for each student and adult in the family
- Plastic wrap or a see-through cover for the jar
- A paper towel for each jar
- 1 cup of water per mason jar
- A small plate
- A butter knife
- A ruler
- Lettuce or salad green seeds (Use Arugula, especially the *Rocket* variety, if you’re in a hurry! Avoid head lettuces.)
- Your science journal

## Simple Seed Germination 1

### Topic Introduction

To start out, we’re going to **germinate** some seeds. **Germination** is the process that a plant seed goes through to awaken from its long sleep and begin to grow.

Do you like to go fast? How fast can you run? Do you like to ride your bike or your scooter? How fast can you go then? Have you ever noticed your heart pump faster when you do?

Have you ever felt your heartbeat? Here’s how to find your pulse:

1. Make a loose fist with your left hand and set it on the table with the thumb on top.
2. With the index and middle finger of your right hand, find the bump on your wrist and lay the tips of your index and middle finger on top of the bump.
3. Turn your left wrist so the knuckles of your left hand are on the table.
4. Let your right hand fingertips slide down into the trough between the bone and the muscle. If you feel carefully here, you should be able to feel your pulse.
5. How many beats do you feel in fifteen seconds? Multiply by four, and that’s how many times your heart beats every minute.
6. Now, get up and dance, or do jumping jacks, or run around the room.

7. Stop, and check your pulse again. Did it get faster?

You're *fast*, but plants are *slow*. Plants don't measure time in minutes but in days and seasons. In this activity, you'll be watching a baby plant grow from a tiny seed. You're going to need patience, because plants are slow!

There's one way that a plant is faster than you, though. When did you first learn to walk? Maybe you were 18 months old, or about 548 days old. Once you learned to walk, you were no longer a baby, but a toddler, right?

Plants don't walk, of course, but they do grow leaves. You'll be germinating some sort of "salad green"—lettuce, arugula, or something like that. If everything goes according to plan, you'll probably see the first leaves in a week or two. Fourteen days compared to your 548 days. That's fast!

How many days have you been alive? To get a rough estimate, take your age and multiply by 365. Now, subtract that number from 6,570. That's roughly how many days are left until you reach "maturity"—until you turn eighteen years of age.

Greens like lettuce typically reach maturity—when they're old enough to begin picking leaves—in 40–60 days. Really fast-growing varieties like Rocket Arugula might be mature in as few as 35 days. It's good you won't have to wait 18 years to have your first salad!

In fact, for this first activity, you won't have to wait that long. You're not going to grow a big salad this first time. Instead, you're going to grow a tasty *micro salad* made from **microgreens**. It should be ready to harvest and eat in a few weeks.

So remember that as you work with lettuce, you'll have to be patient. This is good practice for those of us who find it easy to be impatient. Let's keep in mind just how patient God is with us as we grow and mature and learn to be fruitful people in His kingdom.

Now it's time to help gather everything you'll need for the Seed Germination Project.

### What You'll Need for the Next Lesson

To start, you will need:

- A wide-mouth pint mason jar, or a similar-sized glass, for each student and adult in the family
- Plastic wrap or a see-through cover for the jar
- A paper towel for each jar
- 1 cup of water per jar
- A small plate
- A butter knife
- A ruler
- Lettuce or salad green seeds (Use Arugula, especially the *Rocket* variety, if you're in a hurry!)
- Your science journal

## Lesson 2: Simple Seed Germination (Part 2)

Today, we are ready to start the seed germination process. You will want to:

- ▷ **Review** Bible memory verse and hymn.
- ▷ **Review** definition of germination.
  - **germination** *n.* The process whereby seeds or spores sprout and begin to grow.
- ▷ **Follow** the Procedure to set up the germination jar.
  - We recommend one jar for each student, and one jar for each other person (like yourself!) who wants to enjoy a taste of microgreens.
  - The initial germination of the seed will take a few days, assuming the conditions are right: moist and warm. A cold room will slow things down. A sunny south-facing window will help.
- ▷ Once planted, set the jars up somewhere your students pass by regularly throughout the day, if at all possible.
- ▷ Have them closely **observe** the germinating seeds at least once a day until harvest (approximately

2 weeks from planting). Refer to the *Ongoing Care & Observation* section of the step-by-step guide for questions to answer. Younger students should give a brief oral narration of what they observe, and older students should keep a written observation journal. There will be many days where not much appears to be happening. Do not become discouraged.

- ▷ We have included the *Harvest* section of the project so that you can **review** with your children what to be looking for. However, you will not need to implement the steps yet.
- ▷ *Optional:* Invite your children to learn how to talk about science in other languages by using *Integrating Other Languages: Languages (Latin, Spanish & French)*. See ideas for how to teach.

*Note: Because there are no nutrients in the water, the plants will probably never develop true leaves, but will eventually appear to pause in their development. If not harvested or given nutrients, they will sicken and*

die within a few weeks. So don't forget to harvest your microgreens!

*Plan ahead:* The next lesson will have a longer reading section for the older kids. Younger children may enjoy the *A is For* activity from *Integrating Other*

*Subjects: Writing.* Prepare materials for that if you wish to use it.

*Note:* Aim to start the next lesson before the first root appears (the first root appears within 2–3 days from “planting”). Also, wait to read the *Conclusion* lesson until after the harvest of microgreens.

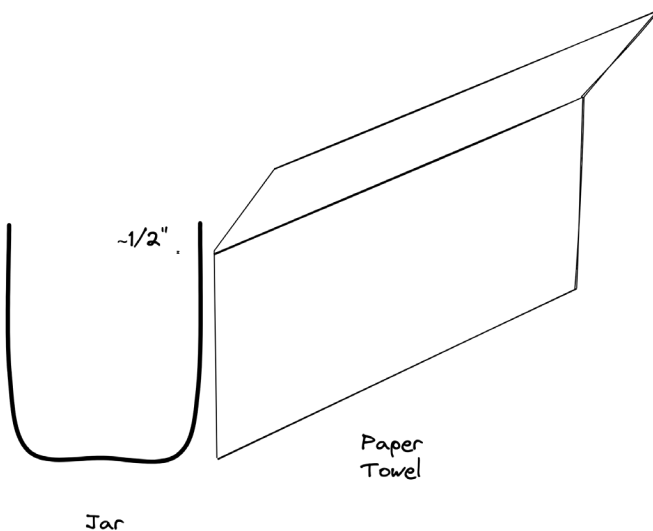
## Simple Seed Germination 2

### Preparation

*For young children, you may want to pre-fold the paper towel and count out the seeds ahead of time.*

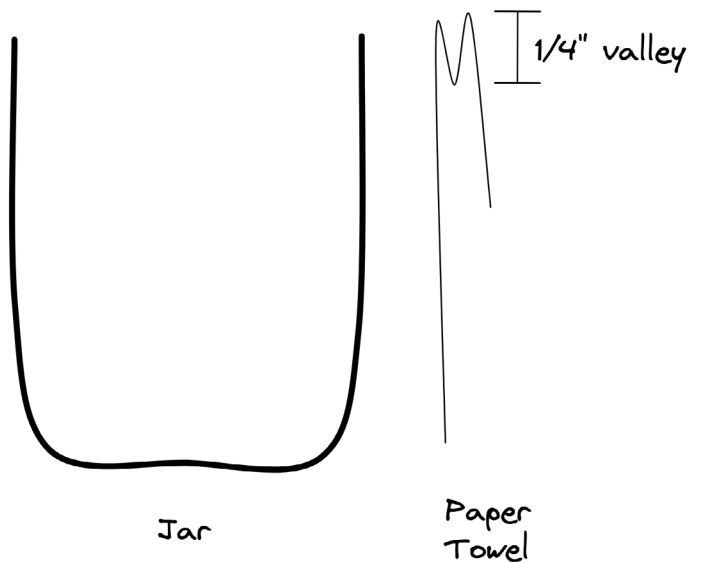
### Task: Prepare the paper towel

1. Set the mason jar on the counter, and hold the paper towel lengthwise against the jar, as if you were going to wrap the jar.
2. Crease the paper towel about half an inch below the top of the jar, and fold the paper towel there like a hot dog.

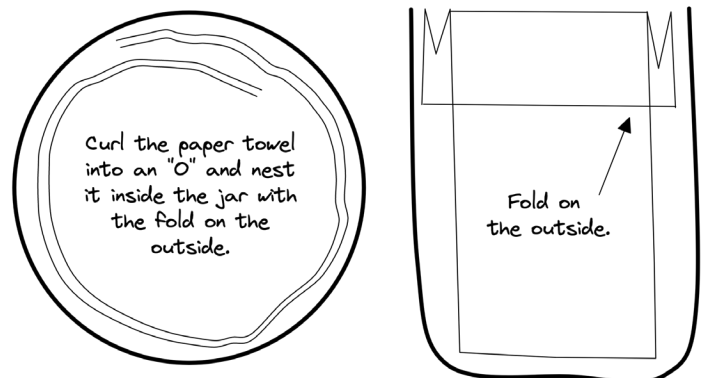


3. Take the shorter flap, and fold it up about a quarter inch below the previous fold.

4. Fold one more time to make a lop-sided “M” with a quarter inch valley:



5. Take the folded towel, and curl the long ends around to make an “O” shape, with the “M” fold on the outside.
6. Place the O in the jar so that the mouth of the little “M” pocket is lining the top rim of the jar.



## Task: Plant the seeds

1. Open the packet of seeds, and pour a small amount of the seeds onto the small plate. Count them, and make note of how many you are planting in your science journal.
2. Use your finger or a butter knife to hold open the “M” pocket of the towel. Pinch a small amount of seed with your other hand, and drop it into the trough of the “M”. Be careful not to get any seed in the bottom of the jar!
3. Continue placing seed all around the pocket of the “M”. Where the ends of the paper towel overlap, only place seed in the first half of the outer overlap and the first half of the inner overlap. (This keeps seed from falling out the ends of the “M”.)



## Task: Fill planted jars with water

1. Add a cup of water to the center of the jar, being careful not to disturb the seeds in the paper towel. Watch the paper towel for a little bit. What do you see happening?

2. Once the entire paper towel is damp, take 4–6 seeds and sandwich them between the paper towel and the glass at about the same level as the other seeds, so you can easily see the seeds through the glass. (Be sure to add these seeds to the total count in your journal.)
3. Cover the jar with plastic wrap.
4. Set the jar in a warm place: a sunny windowsill or brightly-lit room where you will see it every day.

## Ongoing Care & Observation

1. Every day, take note in your science journal of what you see happening. Once you start to see growth, use a ruler to measure:
  - the length of roots
  - the heights of stems
  - the number and sizes of leaves.
2. When you see green leaves appearing in the “M”, take off the plastic wrap. This should take 4–6 days.
3. Don’t let them dry out! You may need to add another half-cup of water as the water level drops.

## Harvest

1. When the leaves seem to have stopped growing after a few days, take out the paper towel. The roots will be interwoven into the towel.
2. Count how many plants you have, and count how many seeds are left ungerminated. Add the number of plants to the number of ungerminated seeds, and divide by the number of plants. This is the **germination rate**.
3. Use scissors or a kitchen knife to cut the leaves and stems free of the roots.
4. Enjoy your **microgreens** by eating them on their own, in a salad, on crackers and cheese, or sprinkled on your meal as a garnish.

## Lesson 3: Simple Seed Germination (Part 3)

The next few lessons are focused on reading and understanding what is happening with the seeds that are germinating.

▷ **Review** Bible memory verse and hymn.

- ▷ **Observe and care for** seed germination project. Every day, **record** in your science journal what you see happening.
  - *Optional:* Math activity *Integrating Other Subjects: Math, Measuring*.
  - Once you start to see growth, use a ruler to measure:
    - the length of roots
    - the heights of stems
    - the number and sizes of leaves.
  - When you see green leaves appearing in the “M”, take off the plastic wrap. This should take 4–6 days.
  - Don’t let them dry out! You may need to add another half-cup of water as the water level drops.
- ▷ *Optional:* **Begin** art project *Integrating Other Subjects: Art, Drawing Plants at Different Stages of Development*.
  - This project can be used to different degrees for all ages and should be started now and worked on progressively as students watch the seed germinate and reach harvestability.
- ▷ **Read** *Seed Germination*.
  - *The Basics* (for younger kids or those needing a shorter, simpler lesson)
  - *Going Deeper* (for older kids or those wanting a more in-depth lesson)
    - For younger kids: **Color** with *Integrating Other Subjects: Writing, A is For*
- ▷ *Optional:* **Discuss** any bold words.
  - Look up unknown bolded words in the glossary.
  - *Optional Science Vocabulary Activity* (see Lesson 1)
- ▷ *Optional:* **Pick** a book from *Integrating Other Subjects: Reading & Literature* to read aloud or assign as independent reading.

## Simple Seed Germination 3

### The Basics

A seed is alive, but asleep. Just like you, it needs something to wake it up. *What wakes you up in the morning?*

Lettuce seeds need three things in order to wake up or **germinate**: light, moisture, and warmth. These three things tell the seed that winter is over. It’s now safe to wake up and start growing!

*What do you do when you wake up?*

Imagine you’re waking up in the morning. You’re tired, and you’re not ready to sit up yet, but you know it’s time to get up. So you stick one foot out from under the covers and try to find the floor. Once you find the floor, you sit up, but your blankets come with you! You stretch out your arms, yawn, and shake off the blanket. Then you open your eyes, stand up, and stretch tall. You’re ready for the day.

When a seed wakes up, it opens up its husk a little bit and sends a root down to find water and food. *Did you know that plants eat and drink with their feet?*

Then, the seed sends two little seed leaves up into the air to look for light. Sometimes, the seed husk goes with the leaves, like your blanket. The leaves stretch

and shake off the husk. Now, the baby plant is ready to grow into a mature plant.

### Going Deeper

A seed has everything inside of it that a baby plant needs to start its life, including the baby plant. We call this baby plant the **embryo**.

When a seed awakens, the embryo absorbs water through a small pore (the **micropyle**) in the seed wall. It uses this water to build up **turgor pressure** in its cells to puff up and split the seed’s husk (or **testa**). Turgor pressure (from Latin *turgēre* “to be swollen”) is when plant cells pump themselves full of water, causing them to swell. This same pressure is what allows tree roots to push up concrete sidewalks.

After splitting the testa, the embryo uses some of the nutrients it has stored away to start growing a root. The embryo begins with a tiny little proto-root called the **radicle**. It sends this root out to find more water and nutrients, and to anchor itself for the next task.

A lettuce embryo has two tiny little seed leaves, called **cotyledons**. (Because it has two seed leaves, we call lettuce a **dicot**, *di-* meaning “two”. Plants with only

one cotyledon, like grass, we call **monocots**, *mono-* meaning “one”.) Cotyledons don’t look like the plant’s regular leaves—they usually look smoother, rounder, and more unfinished. In most plants, the cotyledons store quantities of starch to fuel the plant’s initial growth. (In other plants, like corn and wheat, the seed’s initial starches are stored in a separate **endosperm**.)

Once it’s established its first root, the embryo sends its seed leaves up away from the root, seeking air and sunlight. It uses turgor pressure again, this time to push its way through the soil. Often the husk of the seed will remain caught on one of the seed leaves, but as the leaves begin growing and expanding, the husk will fall off.

With two leaves out in the light and air, the plant can begin the process of **photosynthesis**, a process that uses light to turn air and water into sugar. (Yes, really!) We’ll explore photosynthesis in detail later on.

Now that the baby lettuce plant can produce sugar with its leaves and gather water and nutrients from its roots, it can really start growing. It starts growing more roots down below to seek more water and nutrients. It grows a **stem** up above. When the stem gets long enough, the plant will begin growing **true leaves** at regular intervals along the stem. More leaves means more photosynthesis. More roots bring more water and nutrients.

## Lesson 4: Simple Seed Germination (Part 4)

- ▷ **Review** Bible memory verse and hymn.
- ▷ **Observe and care for** seed germination project. **Record** in your science journal what you see happening.
  - Once you start to see growth, use a ruler to measure:
    - the length of roots
    - the heights of stems
    - the number and sizes of leaves.
  - When you see green leaves appearing in the “M”, take off the plastic wrap. This should take 4–6 days.
  - Don’t let them dry out! You may need to add another half-cup of water as the water level drops.
- ▷ **Review** concepts from *Seed Germination* reading.
  - What is required for germination to happen?
  - What is turgor pressure?
  - What are cotyledons?
  - When the seed leaves reach the light, what do they allow the plant to do?
- ▷ **Sing** *The Germination Song*.
  - There are several musical interludes scattered throughout the lessons. These songs are written in common meter and may be sung to a number of common tunes and hymns. For ideas on song tunes to use see *Tunes for Common Meter* in the Appendix.
- ▷ **Read** *Seed Germination, More Questions*.
- ▷ **Optional: Discuss** any bold words.
  - Look up unknown bolded words in the glossary.
  - Optional Science Vocabulary Activity (see Lesson 1)
- ▷ **Optional: Introduce** spelling list from *Integrating Other Subjects*.
  - Depending on your children’s age and other spelling lists, consider adding 5–10 words per week.
  - See list for ideas in teaching spelling.

## Simple Seed Germination 4

### The Germination Song

*Note: See Tunes for Common Meter in the Appendix*

When circumstances are just right,  
A seed will germinate.  
When soil is moist and air is warm  
All sleep it abnegates!



The embryo, the baby plant  
Will drink some water in,  
Then swell with turgor pressure's might  
And split its testa skin.

First the radicle, the root  
Will push out of the shell.  
In soil or paper towel and cup  
This root is pleased to dwell.

The radicle will find its path  
E'en if it's upside down!  
With geotropist statocytes  
It wends its way to ground.

Water, air, and nutrient  
This root is keen to find.  
And when it does it soaks it up  
Then looks for more in kind.

The seed has not been lazy while  
This miracle takes place.  
Two cotyledons it has  
Prepared for sun to face.

With anchored root, the seed leaves rise  
And push and shove their way.  
It's air and sunlight that they want:  
The warm bright face of day.

With root and leaf established so,  
The seed is just a shell.  
It falls aside, all needs supplied,  
Now sure that all is well.

**geotropism** (Greek *geo-* for “earth”), that is, how roots grow down. Scientists don't fully understand exactly how it works, but we do know that root tips have special cells called **statocytes** that contain special **organelles** called **statoliths**. Statoliths are little starch-filled balls that sink to the bottom of the cell. Scientists think that where statocytes settle affects the production of growth-related hormones like **auxins** within the root tip. The flow of auxins causes the top of the root to grow a little more, the bottom of the root to grow a little less, and overall the root tends to grow down.

Gravitropism was first demonstrated by Thomas Knight in 1813, when he germinated seeds on a turntable spinning at 150 revolutions per minute. The seeds sent their roots to the outside of the turntable and their shoots to the inside.

The second way that plants tell up from down is called **phototropism** (*photo-* for “light”). Again, the growth-related hormone auxin is involved, this time responding to photosynthesis in the green parts of the plant, causing the cells in the darker parts of the plant to *elongate* (grow longer). This results in the plant bending towards the light.

You can easily see phototropism at work in a house plant, which will tend to grow toward a sunny window. If you turn the plant around and wait, you will see the growth reverse and begin to point toward the window again.

In experiments in space, with the absence of gravity, roots have been shown to be *negatively* phototropic—that is, they grow *away* from light. On Earth, this tends to keep shallow roots from popping out of the soil.

*Where do the nutrients in the seed come from?*

A seed is a little package containing everything needed to get a new baby plant started. When a mature plant **sets seed**, it gathers nutrients from its roots and sugars from its leaves to grow the seed, forming the **embryo**, and storing energy and nutrients in the **cotyledons** or the **endosperm**. Setting seed takes a lot of energy away from the rest of the plant and requires more nutrients than normal **vegetative growth**. In **annuals**, setting seed is the last thing the plant does before it dies back at the end of the season.

## More Questions

*So how does the plant know which way is down?*

People know up and down because of the semicircular canal in our inner ears. Fluid movement in there is detected by small hairs, allowing our brains to orient us to which way is up and which way is down.

Plants actually have two ways of telling up from down.

The first way is called **gravitropism** (Greek *gra-* for “gravity”, *tropos* for “to turn”), or sometimes

## Lesson 5: Simple Seed Germination (Part 5)

*Note: This lesson should not be completed until you harvest your microgreens. Skip to Lesson 6 and subsequent lessons if your microgreens are not yet ready to be harvested. Remember: it takes about 2 weeks for the microgreens to be ready to eat. Don't forget to come back to this lesson, however!*

- ▷ **Review** Bible memory verse and hymn.
- ▷ **Observe and Harvest** your microgreens. At this point, it should be obvious that the microgreens are ready to harvest. Here is what to do (see also step-by-step guide):
  - When the leaves seem to have stopped growing after a few days, take out the paper towel. The roots will be interwoven into the towel.
  - Count how many plants you have, and count how many seeds are left ungerminated. Add the number of plants to the number of ungerminated seeds, and divide by the number of plants. This is the **germination rate**. *Optional:* Older students can apply math

principles to create their own germination rate formula. See *Integrating Other Subject: Math, Germination Rate*.

- Use scissors or a kitchen knife to cut the leaves and stems free of the roots.
- Enjoy your **microgreens** by eating them on their own, in a salad, on crackers and cheese, or sprinkled on your meal as a garnish.
- ▷ **Sing** *The Germination Song*.
- ▷ **Read Scripture Meditation**, a devotional reflection that is aimed at helping children make spiritual connections with this tangible project.
- ▷ *Optional:* Assign writing project from *Integrating Other Subjects: Writing*
  - Preschoolers: *Simple Sentence Copy Work*
  - Elementary Students: *Simple Narratives OR Penmanship Practice*
  - Upper Elementary-High School Students: *Narratives OR Compare and Contrast*

## Simple Seed Germination 5

### Harvest

1. When the leaves seem to have stopped growing after a few days, take out the paper towel. The roots will be interwoven into the towel.
2. Count how many plants you have, and count how many seeds are left ungerminated. Add the number of plants to the number of ungerminated seeds, and divide by the number of plants. This is the **germination rate**.
3. Use scissors or a kitchen knife to cut the leaves and stems free of the roots.
4. Enjoy your **microgreens** by eating them on their own, in a salad, on crackers and cheese, or sprinkled on your meal as a garnish.

### Scripture Meditation

After Jesus entered Jerusalem for the last time and was preparing to give his life on the cross, John tells

us that some Greeks asked His disciples if they could come and see Jesus. This is how Jesus replied:

“The hour has come for the Son of Man to be glorified. Truly, truly, I say to you, unless a grain of wheat falls into the earth and dies, it remains alone; but if it dies, it bears much fruit. Whoever loves his life loses it, and whoever hates his life in this world will keep it for eternal life. If anyone serves me, he must follow me; and where I am, there will my servant be also. If anyone serves me, the Father will honor him.” (John 12:23–26)

What a strange answer! What did He mean by this?

Think of what you've seen in the past week or so. A tiny little lettuce seed transformed into a tiny lettuce plant. Was the plant anything like the seed? No. Would the seed have done you any good if you had eaten it? No. Was the plant good to eat? Yes!

What's more, if we'd fed the little plant and given it everything it needed, it would have grown and produced even more food for us. If we had let it go to seed, we would have enough seed for many more lettuce plants.

But none of this is possible unless the seed germinates and *stops being a seed*. Germination is the death, the end of the seed, but the beginning of new life for the plant.

When Jesus answered with this parable, He meant that the Greeks couldn't benefit from seeing Him yet. But it wouldn't be long before He would go to the cross and die, and be resurrected to a new life. At this point, He would become *extremely* beneficial to the Greeks, and much more, to the whole world.

He was also giving Himself, and the seed, as an example to His disciples: if you selfishly hold on to your life, you will eventually lose it. How many of your seeds germinated? It probably wasn't all of them. Seeds, even if they're kept in perfect conditions, eventually

lose the power to germinate. They remain dead seeds forever. People may try their hardest to live the best, most righteous lives possible. But if they refuse to follow Jesus through the cross into new and fruitful life, they will eventually die and lose the opportunity for new life altogether.

## Discussion Questions

- ▷ In your relationship to God, are you a seed still?
- ▷ Have you germinated?
- ▷ Are you growing toward the light? What does this look like?