GrowJourney's Complete Guide to Seed Starting

using organic & permaculture methods





CHAPTER INDEX:

- Chapter 1: *Should You Start Garden Plants From Seed?*
- Chapter 2: *From Germination Day to Transplant Day*
- Chapter 3: *The Do's and Don'ts of Transplanting Your Seedlings Outdoors*

This GrowJourney ebook was created by **AARON VON FRANK**, cofounder & CEO of GrowJourney, and **ELIZA HOLCOMBE LORD**, Master Gardener, Master Naturalist, Permaculturist, & Education Director at GrowJourney. To get more organic/permaculture educational resources go to: https://www.growjourney.com/blog/.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Chapter 1: Should You Start Garden Plants From Seed?

Before we jump into the how-to's of starting garden seeds indoors and outdoors, we wanted to go over the "why."

Why should you learn to start your own seeds instead of just buying seedlings from a garden center?

Here are 5 reasons WHY you should learn to grow garden plants from seed:

1. **More Choices**
   If you go to a garden center, you're going to be very limited in what species and varieties of plants you can grow. They're going to tend to be more common "vanilla" varieties, rather than new and interesting varieties that you might like much better. **It's like listening to what's on the radio instead of picking out your own music.**

   Once you learn how to grow your own seeds, there are no limits to the possibilities of what you can grow in your garden. And as you explore the vast world of heirloom seeds, you'll find an unbelievable variety of options that you'll never see in a garden center.



Photo: heirloom pumpkins, watermelons, peppers, horn melons and other goodies.

2. **Cost Savings**

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Let's say you go to a garden center and buy a tomato plant. How much did that plant cost? Depending on where you live, the size of the plant, the variety, and whether it was grown organically or not, the price may vary. Regardless, for the same price of that single plant, you could buy enough tomato seeds to grow an acre of tomato plants. Yes, you'll probably need to invest in seed-starting supplies, but those are things you can reuse over and over again. If you were to add up the value of the produce you grow in your garden, you'd find that you'd probably easily be able to pay off the cost of your seed starting supplies within a single growing season.



Photo: Heirloom tomato seedlings. If you were to buy these from a local nursery at 8 weeks old, the plants in this image would likely cost you hundreds of dollars.

3. **Healthier Plants**

   Have you ever seen a dried, wilted seedling at a garden center due to one of the employees forgetting to water? This causes extreme plant stress. Then the worker comes through with the sprayer and the plant perks back up, and someone buys it. Unbeknownst to the buyer, as a result of that stress, the plant is now more likely to get a disease. If it was a variety like lettuce, that plant is also probably going to permanently take on a bitter taste and likely go to seed very quickly. When you're raising your own seedlings, you can ensure that your plants don't experience this type of stress.

4. **No Poison**

   Unless you're very lucky, the chances of you finding an organically-raised seedling at a big box garden center or local nursery are very small. Often, they use treated seeds,

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

synthetic nitrogen fertilizers, and even systemic pesticides when growing their seedlings. Recently, scientists tested plants labeled as “bee-friendly” at various big box garden centers and found that over half of them had been treated with neonicotnoids, a systemic pesticide that can remain in the tissue of your plants or in your soil for years. Even in small amounts, neonicotinoids can be extremely harmful to birds, reptiles, amphibians, and insects like our native pollinators. Research is also indicating that neonicotinoids are the primary culprits of colony collapse disorder in our honey bee populations. When you grow your own seedlings, you’ll know exactly what was used on them.



Photo: Your garden also feeds trillions of other above and below ground organisms. Lately, scientists have been warning that both native and non-native bee populations that we rely upon for crop production are declining rapidly and (in some cases) on the verge of extinction.

5. **Joy and Pride**

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

There's something indescribably amazing and rewarding about watching a plant sprout from seed and then growing it all the way to the point that it produces food for you and your family. Maybe it's sort of like having your own child and watching him/her walk across the college graduation stage. "That's MY tomato!"



Photo: Mmm. Homegrown, organic, heirloom tomatoes!

Ok, so that's the WHY. Now it's time to move on to the how-to's of seed starting!

In a short ebook, we can't possibly show you exactly how to start *every* seed variety, but we can help you see generally how the process works.

*Note: If you're already a GrowJourney member, you can access seed-starting instructions for every seed variety you receive from us by logging into your account and going to your

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

QuickGuides to get basic seed-starting information or your GrowGuides to get really in-depth growing instructions.

Seed Starting: Lessons From Learning to Ride a Bike

It's important for you to remember that even if it seems hard at first, after a few times through, the process of seed starting will become intuitive to you. It's like the whole "riding a bike" analogy - you're going to make mistakes and fall down a few times as you're learning, but expect that and invite it in. That's how you learn and get better at anything, seed starting and organic gardening included. But once you harvest and eat that first veggie or fruit that you grew from seed, you're going to be hooked.



Photo: Heirloom organic watermelons. We love the taste of fresh watermelon straight off the vine that is still warm from the sun.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

First Question: Should I start my seeds indoors or outdoors?

It depends. (We know you hate that answer, but it's true!) Every seed variety is different. Some varieties are better to start indoors, some are better to start outdoors.

Seed Variety

Let's quickly talk about a few common seed varieties that are going to do best **started outdoors**. You can start these varieties indoors, but it's a little trickier and you might not get the best growing results. These include root crop plants like beets, radishes, parsnips, and carrots. A few other seeds that we prefer to start outdoors in our garden are peas, corn, squash, cucumbers, melons, and beans.



Photo: Heirloom beans. Beans have large seeds and fast-growing seedlings. We prefer to start them outdoors.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

What seeds do we like to **start indoors**. In particular, we like to start our summer nightshades indoors, including tomatoes, tomatillos, peppers, ground cherries, etc.



Photo: One of our absolute favorite summer heirlooms: ground cherries.

As you're getting started, make sure to look at the seed starting instructions on your seed packets or using online resources (especially if you're a GrowJourney member because we provide more detailed growing instructions than other seed companies).

Whether you start a seed indoors or outdoors might also depend on:

1. **Your Ag Zone**
   What Agricultural zone you live in (just do a google search for "plant hardiness zone" if you don't already know your Ag Zone). If you live in Florida and you want to grow

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

tomatoes, you have a much longer growing season to do that than if you live in Minnesota. So if you live in Minnesota, you can get a 6-8 week jumpstart on your short growing season by starting your tomato seeds indoors. In Florida, you might just want to stick your tomato seeds in the ground.

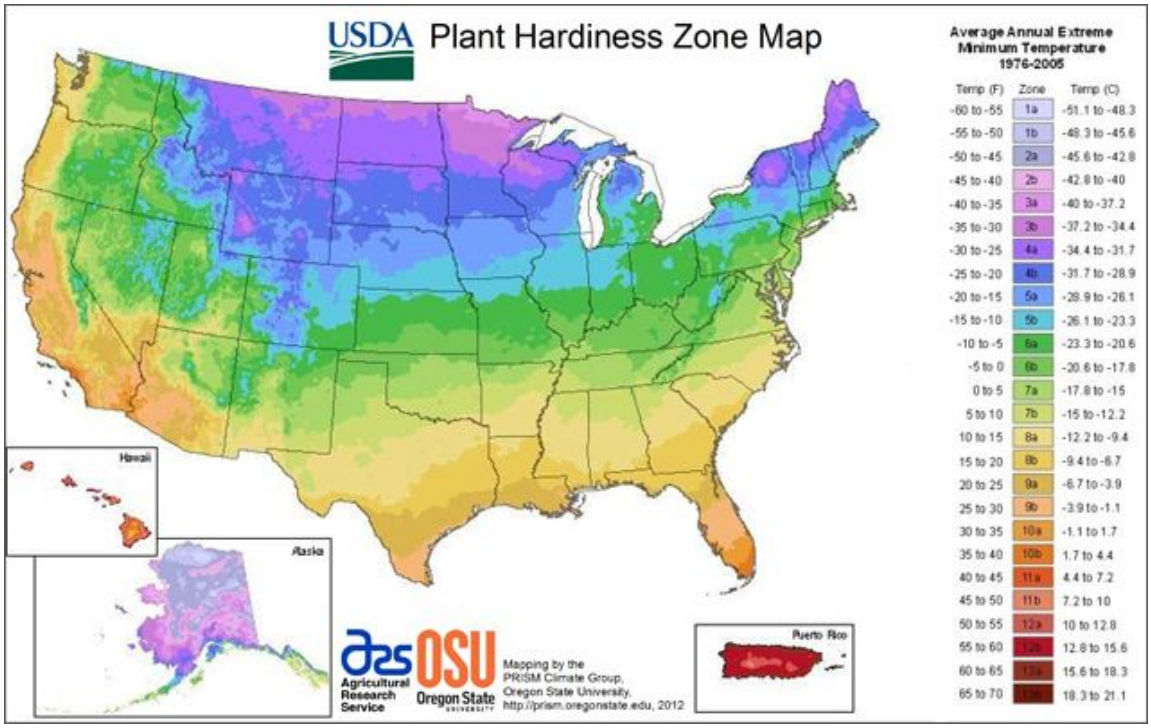


Image: USDA Agricultural Zones, aka plant hardiness zones.

2. **First Frost Date & Last Frost Date**

   Knowing WHEN to start your seeds is also important, and will vary depending on your first or last frost date.

   - **First Frost Date** means the **first** normal average date that you can expect a light freeze or frost (32˚F) in the fall or winter. In our Agricultural Zone, our first frost date is Oct 28. So if a fall or winter seed variety we're growing says "sow outdoors a minimum of 8 weeks before first frost," that means we need to start those seeds in the ground no later than the end of August.
   - **Last Frost Date** means the **last** normal average date that you can expect a light freeze or frost (32˚F) in the spring. In our Ag Zone, our last frost date is April 12. So if a seed variety says "start indoors 6-8 weeks before last frost and transplant out after last frost," that means we'll start that seed indoors between mid-Feb to early March, then transplant it outdoors after April 12.
   - Google "your town last frost date" or "your town first frost date" to find this information.

3. **Your Resources**

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Do you have a greenhouse? If not, do you have a spot in your house where you can start your seeds? To get best results, you're going to need grow lights. (We made our own affordable grow light setup using supplies from Lowes and Home Depot and if you want to use our grow light setup, you can read about here on the GrowJourney blog to get a how-to guide and materials list.)



Photo: Our grow light setup, with materials that can be found at Lowes or Home Depot. Get the plans and materials list here.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

A bright sunroom that gets direct sunlight will also do. At a minimum, you're going to need a room with a big south-facing window that gets direct sunlight throughout the day. If you don't have those things, it might be best to plan to start your seeds outdoors instead, otherwise they won't get enough light to grow well.

4. **Time Availability**
   Starting seeds indoors is going to take a bit more time than if you start your seeds outdoors BUT when you start seeds indoors you can control the temperature, light, and watering schedule. PLUS you don't have to worry about a hungry critter coming along and eating the entire seedling or a bad storm damaging or killing them. So plant loss isn't as big of a risk when you start your seeds indoors.

5. **Personal Preference**
   Just because I like cherry ice cream doesn't mean you should. You might find that you have a preference for starting seeds indoors or outdoors, and that's perfectly fine.

Three Common Seed Starting Methods

We're expert organic gardeners with many years of growing experience, so we use three different seed starting techniques. We're going to quickly go through those, but don't feel like you have to use all three of these techniques, especially when you're just getting started.

1. **Biodegradable Pots**
   The first method is starting seeds in biodegradable pots. If you're just getting started, this is a pretty easy way to start all of your seeds. We recommend cowpots and coconut coir pots since they're made of renewable resources. Peat pots work great too, but peat bogs aren't really a renewable resource, although there are sustainably-harvested peat pots.

   The nice thing about biodegradable pots is that they really minimize root disturbance and transplant shock when you're transplanting your seedlings outdoors. We use biodegradable pots on seedlings that are very sensitive to root disturbance during transplant.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Biodegradable pots.

2. **Plastic Seed Cells**
   Plastic seed cells are great because they hold up nicely and can be reused from year to year. You can usually get several years of use out of them before they start cracking and breaking and need to be recycled and replaced.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Plastic seed cells.

3. **Ladbrooke Soil Blocks**
   This is a more advanced method, but we love it. Since we have a fully edible landscape, we start thousands of seeds throughout the year. Ladbrooke soil blocks are helpful to us because they're a space saver. **In a single tray, we can start 312 seeds using our ladbrooke blocks**, whereas it might take us 10 trays using biodegradable pots or plastic cells because they take up so much more room.

   On summer plants that like high soil temps of 80 degrees to germinate (tomatoes, peppers, eggplants, ground cherries), this means we can start a lot of plants using only one heat mat. Within a couple weeks after your seeds germinate, you will have to transfer the small Ladbrooke blocks into larger cells or soil blocks, so it does require some additional work. If you have a smaller garden or you're a new gardener, Ladbrooke blocks might not be the best method for you to use.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Ladbrooke soil blocks. This image shows the ¾" micro block set that is great for starting seeds, not the larger blocks that you'd pot your microblock seedlings up to after they get true leaves.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Chapter 2: From Germination Day to Transplant Day

Now it's time to talk about how to get your seeds from germination day (when your seeds first sprout) to transplant day (when you transplant them outdoors into your garden).

Remember at the end of Chapter 2 where we showed you the three seed starting options: biodegradable pots, plastic cells, or ladbrooke soil blocks? Well, each one is going to require a slightly different growing medium.

What do you fill your cells with or make your soil blocks out of?

Organic Seed Starting Mix (NOT Soil)
A really common mistake that new gardeners make is to go get soil from their garden to start their indoor seeds in. Then the soil soon turns into an impenetrable, compacted brick and their seedlings die.

When you're starting seeds indoors, you need a much lighter growth medium than garden soil.

If you're a new gardener, get a **certified organic seed starting mix**.



This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Image: There are lots of good pre-made seed starting mixes to choose from. Just be sure the one you get is certified organic and/or OMRI certified.

If you're a more advanced gardener or you're growing a bunch of seedlings, you might want to consider learning to make your own seed starting mix.

Seed Starting Recipes

Recipe for Plastic or Biodegradable Cells

Here's our recipe for seed starting mix for **biodegradable pots or seed cells** (we use a different recipe for Ladbrooke soil blocks):

- 1 part Coconut Coir
- 1 part Vermiculite
- (*optional) 1/2 part worm castings or fresh, pleasant-smelling compost (**don't use compost in your garden that smells bad since that means it contains anaerboic bacteria that will be bad for your plants.*)
- *optional - 1/8 part Diatomaceous earth (to control fungus gnats, although DE is not as effective when wet)
- **Example Mix:** 2 cups coconut / 2 cups vermiculite / 1 cup worm castings or compost (optional) / 4 tablespoons diatomaceous earth (optional)
- *Worm castings or high quality compost add biology and nutrition to your soil starting mix, but you can also fertilize your seedlings after germination with liquid fish, squid, or kelp emulsions.

Recipe for Ladbrooke Soil Blocks

Ladbrooke soil blocks need a different, heavier seed starting mixture since they don't have any structure around them. Here's the recipe we use for our Ladbrooke soil blocks:

- **Recipe for LARGE 2" Ladbrooke soil blocks:**
    - 5 Gal sustainable peat (we've found coconut coir is too crumbly to work well in soil blocks)
    - 5 Gal Compost (fresh, pleasant-smelling compost - again, if it smells bad, it's high in anaerobic bacteria and needs to be stirred and aerated daily until the bad smell has dissipated)
    - 3/4 Gal Sand
    - ¾ Gal Vermiculite
    - screen peat and compost through 1/4" screen or hardware cloth so no chunks
    - mix all ingredients together
    - add water and stir until material is damp but not wet, let sit for 30 minutes before making blocks

- **Recipe for SMALL ¾" micro Ladbrooke soil blocks:**

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

- 4 parts sustainable peat
- 1 part compost
- screen ingredients through 1/4” screen or hardware cloth so no chunks
- mix all ingredients together.
- add water and stir until material is damp but not wet, let sit for 30 minutes before making blocks

The above ingredients need to be passed through a sieve (we use a 1/4” hardware cloth nailed to a frame) in order to make sure they’re broken up and free of any “chunks.” Once sifted, thoroughly mix all dry ingredients together in a large bucket or wheelbarrow. Some people also like to mix in about 9 oz of all-purpose organic mineral fertilizer at this point to reduce/eliminate the need to apply liquid fertilizer as the seedlings grow.

Once your dry ingredients are mixed, stir in water, then let sit for 30 minutes before putting into cells or using in cells. You want the consistency of the mix to be like a wrung-out sponge, not too wet, not too dry.

Filling your seed starting containers

OK, you have your seeds and you have your seed starting mix, so now it’s time to get your seeds started!



Photo: Don’t fill your seed trays too full or it will make a mess when you water and fertilize; don’t fill them too shallow or you’ll limit the amount of space your seedling roots can grow in.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Two tricks that will help speed up your seed germination:

1. (Must do) wet your seed starting mix BEFORE you put the mix into your containers. It's really hard to get the mix evenly wet after it's already in the cells.

2. (Optional) you can soak the seeds you plan to start for 6-12 hours before you put them in their cells. This tip might not be possible if you're starting a lot of different types of seeds (it will be hard to keep them separated and labeled) OR if for varieties that have really small seeds. Only try this with large seeds, not small seeds.

If you're using biodegradable pots or seed cells, you'll want to fill each seed with your pre-wetted starting mix to just below the surface of the cell or biodegradable pot. *(see picture above for example)*

Seed Trays

You'll also want to keep your cells or soil blocks in seed trays, not loose. Why? Because you're going to have to water and fertilize your seedlings, and you don't want that spilling all over your floor. The trays also catch that extra water and let the cells or plant roots soak it back up.



Photo: Keep your seed cells inside seed trays!

Labeling Your Seeds/Seedlings

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Now that you have your trays full of biodegradable pots or plastic cells, you're ready to start labeling and adding your seeds!

You can cut up old solo cups or use popsicle sticks for this, but make sure you use a permanent marker or a silver sharpie when you write down your seed variety. The reason you want to label them is because you'll want to know what species or variety of plant you've got as you're planning out your garden or transplanting them out. Otherwise, you might end up with a dwarf tumbling tomato where you wanted to put in a tall indeterminate tomato.



Photo: What's growing in these plastic cells? Pasilla Peppers (forgive the typo). If we didn't label the cells, we wouldn't know what we were growing. Imagine eating something you love out of your garden, wanting to grow it again next year, and having no idea what it is. The horror! Keep your plants labelled throughout their life cycle to be sure this doesn't happen to you.

Sowing Depth

If you have a sharpie, it also makes a useful tool for making seed divots on the soil surface. Look at your seed packets for "sowing depth" before making a divot for your seed. Some seeds like to be buried deeply, some like to be buried shallow, and some like to be placed right on the soil surface because they actually require light to germinate.

Now start adding seeds and labels until you've got all the seed varieties you want started.

Ladbrooke Blocks

Ladbrooke blocks are a little different. We start with small ¾" microblocks, get our seeds germinated, and then pot them up to larger 2" blocks a couple weeks after they've germinated, after they have their first set of "true leaves" (we'll explain what that means momentarily).

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

We'll put a strip of paint tape on the sides of our trays to label the rows, then use a spreadsheet to keep track of what seeds were planted in each row (example: Peacevine tomatoes are growing from A1 - B6). This works great if you're starting hundreds of seeds at the same time. If you have a smaller growing space, you can also start your seeds in larger Ladbrooke blocks so you don't have to pot them up as they grow.

How Long Will My Unplanted Seeds Last?

It's also important to note that most garden seeds will last for many years, although others, like corn, will lose viability within 1-2 years. **So you don't have to plant all your seeds immediately or even within the same year you get them.**

At GrowJourney, we don't make you dig for that information (no pun intended). That's why GrowJourney's gives you the seed viability and the "use by" year on the front of our seed packets.

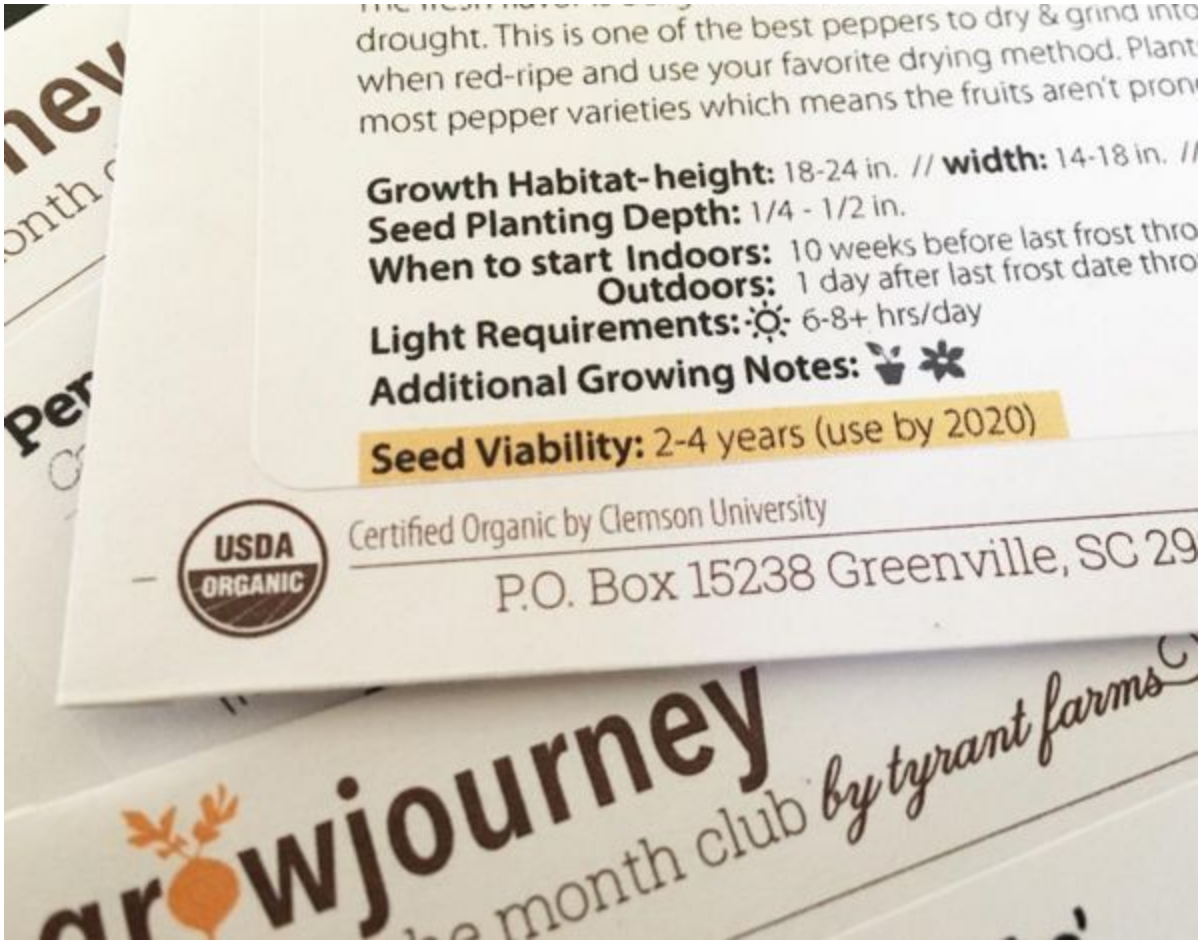


Photo: GrowJourney seed packets. We make it easy for you to know how long your seeds last.

Knowing how long your seeds will last makes it much easier to plan your garden and save seeds for future years in your personal seed library.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Light & Temperature

Getting enough light on your seedlings is something that can be challenging.

It's very difficult to get enough light indoors to grow healthy seedlings. Unless you have a sunroom that gets lots of direct light or a large south-facing window that gets direct light throughout the day, you'll need to get indoor grow lights or just plan to start your seeds outdoors where getting enough light isn't a problem.

Also, it's important to note that high quality energy-efficient modern windows can block or filter out a lot of the light spectrum that your plants need to grow.

Another option is to pay careful attention to the temperatures and put your seedlings outdoors during the day any time the temperatures are warm or cool enough.

- **For spring and summer varieties** that you're starting in late winter or early spring, this means putting your seedlings outdoors in the day when the temps are **55 F or higher** and bring them indoors at night.
- **For fall & winter varieties** that you're starting in late summer or early fall, this means you'll want to put them outdoors when temperatures are in the **low 80s or below** and bring them indoors at night.

Light Before Sprouting?

As soon as your seeds are sown in their trays, we recommend getting them under grow lights or into the sunniest spot in your home. The UV from the light will help keep the soil from molding, and it will also add a bit of heat on the soil surface which will help with germination. Immediate light is also critical for seeds that are surface-sown "light-dependent germinators," e.g. they require sunlight to germinate (many of our favorite flower seeds are this way).

Soil Temperatures

Which brings us to another critical factor in starting seeds successfully: **temperature**.

In nature, soil temperatures "tell" seeds when it's time to germinate or remain dormant. Obviously, your indoor temps are pretty consistent year round at about 70 degrees F, even as the outdoor temps fluctuate. 70 degrees may be a perfect germination temperature for one seed variety while being too cold or too hot for other seed varieties.

Most summer seeds, like tomatoes, peppers, and eggplants, are going to **need an absolute minimum of 70 degrees to germinate**. The closer you can get them towards 80 degrees, the faster they're going to germinate and the more vigorous they'll be. That's why we like to use heat mats or soil cables (or place our seed trays on the tops of our warm, turned-on grow lights) to create optimal conditions for indoor seed germination on our summer varieties.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Electric seedling heat mat - ideal for summer varieties like peppers, tomatoes, eggplants that like high soil temps over 80 degrees F.

Spring and fall plants, like your lettuces and brassicas, don't need very warm temperatures. They'll germinate between 55-70 degrees F, which means you don't have to worry about getting extra warmth on them to germinate indoors.

If you're a GrowJourney member, be sure to use our online QuickGuides and GrowGuides to see the ideal temperature ranges you'll need to germinate every seed variety you've gotten from us.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

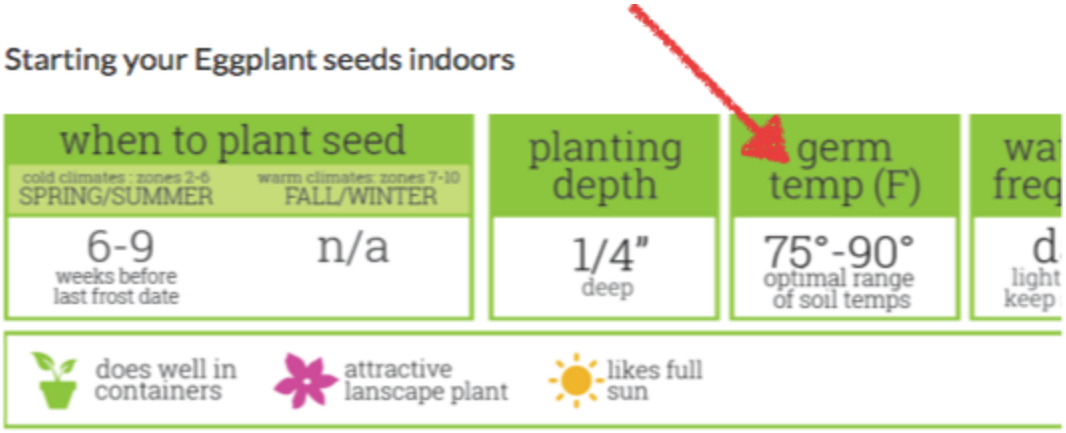


Image: A section from GrowJourney's members-only online Eggplant GrowGuide.

Seed Germination

How long does it take your seeds to germinate? Again, it depends on the seed variety. Some varieties, if you soak them overnight, can germinate in as little as 24 hours - peas come to mind here, especially if you soak them overnight before planting them.

Other seed varieties like parsley and celery **can sometimes take 2-3 weeks to germinate**. This info is also in our QuickGuides and GrowGuides.

So you shouldn't necessarily get anxious if one seed variety has sprouted and another variety hasn't shown any signs of life yet. You might just need to give it more time or make sure you have the seed in its ideal temperature range for germination.

As you're waiting for your seeds to germinate, you don't need to fertilize them. All you need to worry about is making sure they stay in their ideal temperature range and that you make sure they don't dry out.

On the flip side, you CAN overwater them and cause the seeds to rot. You don't want to have them sitting in water. The general rule is you want your seed starting medium to be damp, but not wet, **which means it needs to have the general consistency of a wrung-out sponge**.

Light, Water, Nutrition AFTER Germination

Your seeds have germinated - woohoo! Go ahead and give yourself a high five!

There are two stages here:

- BEFORE True Leaves
- AFTER True Leaves

What are "true leaves"?

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Most common garden plants are angiosperms that are generally divided into two classifications: **monocots and dicots**, which is an abbreviation of monocotyledons and dicotyledons.

After germination monocots will form a single leaf. These are things like corn and onions. Dicots will have two cotyledons when they sprout, and then they'll form their first "true leaves," that are basically tiny versions of the leaves they'll have when they're mature plants. A few common dicots are tomatoes, peas, and peppers.



Photo: Cotyledons of a recently sprouted kale seedling. The next set of leaves will be true leaves and those leaves will resemble actual kale leaves.

So when your seedlings first germinate, they won't have their "true leaves." Depending on the plant variety, it may take 1-3 weeks for the first true leaves to form. During that period,

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

you just need to make sure the plants are getting adequate light and water, but you do NOT need to start feeding them yet.

After True Leaves

After your seedlings form their first true leaves, **you'll want to start feeding them**.

Now it's important to note here that **we're specifically talking about indoor seedlings**. If you're direct sowing seeds outdoors, and you've been using organic methods like cover crops, mulching, hot composting, or using actively aerated compost teas to build your soil biology and innate fertility, you won't need to add any fertilizer as your plants grow.

But indoors in small cells, there is only a small amount of growth medium, limited parent material, and very few soil microorganisms available to feed your plants.

Seedling Fertilizer

Organic gardeners use different things to feed their indoor seedlings.



Photo: A good organic liquid fertilizer we use on our seedlings.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Some products we recommend are OMRI certified fish, squid, or kelp emulsions. Some gardeners also use homemade products, like "liquid gold," but we'll let you look that one up for yourself. :)

Regardless of the fertilizer you use, **you'll want to dilute it with water, otherwise you risk over-fertilizing and killing your plants**.

If you've ever seen a brown spot on a grass lawn after a dog pees or poops there, what you're seeing is the same things as "fertilizer burn."

Each fertilizer product is a little different as far as its concentration goes, so pay attention to the dilution instructions on the package. If the instructions are ONLY for mature plants, you'll want to dilute the fertilizer to half strength of the recommended ratios for your seedlings.

For instance, if the instructions say 3 parts water: 1 parts fertilizer for MATURE plants, you'll want to go 6 parts water: 1 part fertilizer for your seedlings.

How Often Do You Fertilize Your Seedlings?

Use your diluted fertilizer mixture daily when you water your seedling, but make sure not to overwater your seedlings making the soil soggy and anaerobic, which will kill your seedlings.

Remember: the soil needs to be damp, but not wet, or roughly the same moisture level as a wrung-out sponge.

- **Under-fertilizing** - If you notice your seedlings' leaves yellowing and your seedlings looking weak, this could be due to lack of nutrition, in which case you'll want to increase the amount of fertilizer you're giving them.

- **"Leggy" Plants** - Notice how close our grow lights are to our seedlings here. If your grow lights aren't close enough to your seedlings, or if your seedlings aren't getting enough natural sunlight through your windows, they'll think that something is blocking their light and start to quickly grow as tall as they can in an attempt to reach more sunlight. This will lead to what's called "leggy" plants that will soon stretch too tall and too thin to support the weight of their leaves. If it's not quickly remedied, the seedlings will flop over and the stems will collapse, killing the plants. So, you want to see good, stocky-stemmed seedlings, not tall, thin-stemmed seedlings.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Yikes! Because these seedlings aren't getting enough light they're getting "leggy". They're growing as tall and as fast as they can upwards to try to get to light, and soon their stems won't be able to support their leaves, causing the plants to crumple and die. Thanks MC for the photo - we love ya!

Indoor Pests & Diseases

Yes, pest insects can be a problem when you're starting seeds indoors, especially since there are no predatory insects to keep them under control.

We're going to cover the most common indoor pests that can kill or weaken your seedlings and tell you exactly how to control them organically:

1. **Aphids**
   Aphids are small, sap-sucking insects. Some of them have wings and some don't. Aphids can be green, red, or even a white-yellow color. They're basically the plant-equivalent of fleas, but they can reproduce at an insane rate and kill your seedlings if left unchecked. You'll see them on the stems and undersides of your plant leaves, where they congregate to suck the sap out of you plants.

   Treating Aphids - If you see aphids on your seedlings, the easiest thing to do is simply squish them with your hands without damaging the leaves or stems of your plants. Wear latex gloves if you'd like. If that sounds gross to you, option B is to bring the seed tray to your kitchen sink and shower them off with a kitchen sprayer. Just be careful not to spray so hard that you damage the plants. Option C is to purchase ladybugs and set them loose on your seedlings. When we see aphids on our outdoors plants, we'll usually leave them alone because within a few days, we'll find the same plant will now have ladybugs, ladybug larvae, lacewing larvae, or some other predatory insect that has come along and done pest control for us.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Ladybug larvae (the black and red insects) eating aphids on the underside of Rosa Rugosa leaves.

2. **Fungus Gnats**
   Fungus gnats look just like fruit flies. You'll see them flying around the surface of your seed trays. The adult gnats are harmless to your seedlings. However, their larvae burrow into the soil eating fungus and the roots of your seedlings. If enough of them are present, they can do enough damage to the root systems of your seedlings to kill them.

   Treating Fungus Gnats - Any time we're doing a big round of seed starting, we make sure to have a packet of predatory nematodes around. You make this into a root drench and within about one week, the nematodes will have eaten the fungus gnat larvae.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

3. **Damping Off**
   Damping off is a disease caused by a few different types of soil borne fungi. Otherwise healthy seedlings' stems will suddenly wither and the seedling will collapse and die.

   Treating Damping Off - Damping off is usually not a problem for outdoor seedlings; it's more of a problem with indoor-started seedlings, made worse when air circulation is low and plants are being overwatered. Don't overwater your seedlings, and try to keep good air circulation where seedlings are growing. Put seed trays outdoors whenever weather permits.



Photo: Dead seedling in the foreground and dying purple kohlrabi seedling in the middle caused by damping off. You can see a few spots of white mold on the soil surface indicating some combination of the following: soil too damp, not enough air circulation, not enough UV solar radiation.

When Possible: Put Your Seedlings Outdoors!

Another great way to control both aphids and fungus gnats is to **put your seed trays outdoors as often as the weather permits**.

- For our **summer seedlings** that we're growing in late winter, we'll put the seed trays outdoors any time the weather is sunny and **over 60 degrees** (unless the seeds haven't germinated yet).
- For our **fall/winter seedlings** that we're growing in late summer, we'll put them outdoors, even if it's in the shade, any time the temps are **below 80 degrees**. Wind, sun, and predatory insects found outdoors will help keep these pests under control.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Chapter 3: The Do's and Don'ts of Transplanting Your Seedlings Outdoors

Now it's time to transplant your indoor-grown seedlings outdoors into your garden!



Photo: Fall seedlings started indoors in late summer.

Transplanting Your Seedlings

"Transplanting" simply means taking your indoor seedlings and putting them in the ground in their final position outdoors in your garden.

How Long Before Transplanting?

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

For most seedlings, you'll want to get them transplanted in about 6-8 weeks after they've germinated. Otherwise you risk stunting the plants due to them becoming "root bound," e.g. not having enough space to grow in.

We're going to go over some tips and tricks to make sure you have great results when transplanting your seedlings, because this is actually a step where a lot of new gardeners lose their plants, and that's a lot of work down the drain.

"Hardening Off"

Natural sunlight is much more intense and has a broader spectrum than indoor grow lights or light filtered through a window. If you were to put your seedlings outdoors in direct sunlight for a day without transitioning them, they'd get sunburned and likely die.

This is sort of like if you've been inside all winter and suddenly went on vacation to a beach in Florida - your skin is going to burn pretty fast.

That's why you need to "harden off" your seedlings BEFORE transplanting them.

Here's a good 1 week hardening off schedule to follow:

- **Days 1 - 3:** Place your seedlings outdoors in a shady spot that will only get 3-5 hours of direct sunlight throughout the day. Or if it's going to be overcast all day, you can put them right out in the open.
- **Days 4 - 5:** Place your seedlings in a slightly sunnier spot that will get about 5-6 hours of direct sunlight.
- **Days 6 - 7:** Place your seedlings in a full sun spot.

Note: If you've been periodically taking your indoor seedlings outside several days per week when the weather permits, you might not need to harden them off at all.

Watch the Weather

You'll need to pay close attention to your weather once it's time to transplant your seedlings outdoors.

We highly recommend getting a Weather App of some sort on your phone. If your 10 day weather forecast calls for heavy rain or really strong winds over 20 mph or other inclement weather, you probably don't want to leave them outdoors during that day.

One of our first years growing from seed, we left our seedlings out during a day when bad thunderstorms were forecast, and we lost over half our plants to a hail storm. It was a painful learning experience.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Plant Placement & Light Needs

When planning out the spots in your garden for your seedlings, consider whether your plants are full sun, part sun, or shade-tolerant varieties. This information is on our seed packets and our online guides. Make sure you put your seedlings into the optimal light conditions. A plant that needs shade is going to die in a full-sun spot, and vice versa.

Companion Plants and Plant Guilds

Also, instead of putting everything into straight rows of the same plant, consider doing companion planting or plant guilds. As it turns out, plants are like people, they grow best in diverse communities and ecosystems. Research has shown that the more plant diversity you have in your growing system, the more productive the individual plants will be in that system, and those benefits increase over time.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: A nice edible landscape right outside of Aaron & Susan's front door (the cofounders of GrowJourney). Strawberries, chard, kale, lettuce, wheat, sage, and other edible are all growing together.

Allelopathic Plants

However, not all plants grow well together and some can actually be allelopathic with each other. For instance, a chemical compound called juglone in walnut, hickory, and related trees will stunt or kill certain species of plants that try to grow near them.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

If you're a GrowJourney member, you can easily find what plants do and do not grow well together with the plant species you're trying to grow in the Plant Guilds section of your online GrowGuides.

Items You Need For Transplanting

Here are the items we recommend you have on-hand as you transplant your seedlings:

- gardening gloves
- a spade
- a bucket of worm castings or fresh, pleasant-smelling compost
- your seed markers (you want to put them in the ground next to your seedlings to remember what variety you're growing where)

7 Tips & Tricks When Transplanting

There are a lot of different tricks you can use to give your seedlings a leg-up during transplanting. Here are 7 Important Ones to Remember:

1. **Check Your 10 Day Weather Forecast**
   Weird weather is the new normal, so be prepared to experience unusual weather patterns and extreme temperatures. Even if your last frost date has passed, be sure to look at your 10 day weather forecast before planting your seedlings outdoors. If you see freezing temps in the forecast, don't transplant your seedlings outdoors yet.

2. **Tomato Trick**
   Who doesn't love homegrown, sun-ripened organic heirloom tomatoes? Weirdos, that's who! Tomatoes are one of a few plant species that have **"adventitious roots"** along their stems, so you want to bury their stems when transplanting them so they'll develop larger, deeper root systems. (Here's a good article over on the GrowJourney blog if you want to learn more tomato growing tricks.)

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: Nom-nom-nom! Homegrown, organic, heirloom tomato still warm from the sun.

Be sure to note that if you bury the stems of other seedlings that do NOT have adventitious roots, you can cause the plant to rot and die, so **only use this method on plants that you are certain have adventitious roots on their stems**, the tomato being the most common one.

3. The Stick Trick

A lot of gardeners have trouble with **cutworms** eating their seedlings in the spring. These are caterpillars that crawl along either below or above the soil surface, and when they find a young seedling, they'll chew the stem in half. For your stemmed plants, you can easily keep cutworms from damaging your seedlings by inserting a small stick or toothpick right next to the stem of your seedling when you transplant the seedling. This tricks the cutworm into thinking the plant is tougher than it can chew through so it moves on in search of another victim.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: A newly transplanted tomato seedling - notice the stick inserted into the ground immediately parallel to the stem to stop cutworms.

4. **Toilet Paper Rolls**
   Another way you can keep cutworms and other ground-crawling pest insects away from your young seedlings is to use the cardboard section of an old toilet paper or paper towel roll. Cut the roll into 4" sections or smaller to make sure the roll isn't keeping the seedling's leaves from getting sunlight. Push down on the roll to bury it slightly so it doesn't blow away in a brisk wind.

5. **Add Good Microbes**
   When digging a hole for your seedlings, add a small scoop of worm castings or good, sweet-smelling compost, and mix it around in the hole a bit. This inoculates the root system with a host of beneficial microorganisms that will help your plants remain healthy, fed, and watered throughout their lifetime. Remember, anywhere between

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

50-70% of a plant's energy is put into feeding soil microorganisms that in turn feed, water, and nurture your plants. It's "survival of the most collaborative."

6. **No Till Organic Gardening**

   As we've discussed this on our blog, as an organic gardener, you need to understand that soil health is key to plant health and to human health. **Soil is a living system, it is quite literally the skin of the earth.**

   The reason forests and other mature ecosystems can thrive without any fertilizer or pesticide or water from humans is because of the biology in the soil food web. **That's why we recommend no-till organic gardening**. Tilling your soil is like hitting a city with an earthquake. It kills or disrupts many of the beneficial microorganisms and ecosystems inherent in your soil, and you'll have to replace those organisms' function with human inputs.

   Instead, use brown or green mulches which will:
   - protect your soil from UV radiation,
   - eliminate weeds,
   - feed and promote beneficial soil microbes
   - moderate soil temperatures,
   - increase water penetration and retention,
   - and pretty much give you more and more amazing growing results the longer you do it.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.



Photo: A nice harvest from GrowJourney's cofounders' summer garden. They've been using no-till organic methods for over 5 years, and the results speak for themselves.

***Transplanting seedlings into a mulched, no-till garden bed** is simple. Simply push aside the mulch in the spot where the seedling is going, cut in your hole, add a small scoop of compost or worm castings, put in your plant, make sure that the soil is firmly packed back in around the plant. Don't bury the stem of your plants in mulch as this will cause them to rot; leave the mulch pulled back from immediately around your plants as shown in the tomato seedling above in tip #3.

7. **Water Deeply**
   Once you've transplanted your seedling, water deeply around the base of the plant, roughly the equivalent of 1" of rainfall. Any time you water, try to use drip irrigation. Overhead watering systems aren't as water-efficient, and they can also lead to higher incidents of leaf-born diseases.

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.

Transplant shock - For the first week or so, your plants' energy will go into getting their roots established, so you won't see much above-ground growth. Don't worry! After 7-10 days, you'll start seeding your newly transplanted seedlings take off!

That's It! Now Go Forth And Grow A Better, Tastier World!

If your soil is healthy, living, and mulched, you shouldn't have to do any weeding or fertilizing, and your watering needs will be greatly reduced (read more about that here).

At that point, the hardest part of gardening is keeping up with all the fresh, delicious organic food!

Got questions or feedback? Post them in the comments section of our blog!

This ebook is licensed under Creative Commons (Attribution-NonCommercial-ShareAlike 3.0) by GrowJourney, LLC.