



# FRUITION SEEDS

ORGANIC SEED *for the* NORTHEAST



# RISE & SHINE

*starting seeds with ease*

PETRA PAGE-MANN



# WELCOME!

Starting your own seeds can be intimidating.

But here's the thing: Seeds are in the world to transform the world.

They begin by transforming themselves.

A seed germinating is such magic.

Cultivating seedlings that thrive *after germination* is both an art and science.

It took me years to become a confident seed starter.

My hope for *Rise & Shine* is to save you time, money and heartache by sharing what I've learned in both failure and success.

I grew up starting seeds in cell trays, 6-packs and yogurt cups on our kitchen windowsill. Though I loved starting seeds, it took years of experience on organic farms to finally start seeds better than anything I could find at a garden nursery.

And the abundance is epic.

With the right tools and timing, seed starting is remarkably fun and easy.

I can't wait to dig in with you!

Sow Seeds & Sing Songs,



ps

If you haven't already, dive into our *free Seed Starting Academy*! Our 100+ video tutorials have helped over 10,000 gardeners quickly cultivate the knowledge and confidence and we're so honored to share this joy with you, too. You'll find this and so many more resources to surround you with abundance at [www.fruitionseeds.com](http://www.fruitionseeds.com), don't be shy!



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## IN THE LIGHT OF ANOTHER

Like sunshine  
to a  
seed

Attention liberates  
the seer  
from their shell,

Slowly  
breaking  
open

In the  
light  
of another.

*~ digger ~*

*dedicated to my father  
and all who cultivate the next generation  
of curious gardeners transforming the world*





## **WHY START YOUR OWN SEEDS?**

Why prepare our Thanksgiving feast?

Why tuck our children in each night?

Growing our own food and starting our seeds  
grows our capacity to grow into our deepest, richest selves.

And suddenly, thousands of varieties you'd never find at a nursery  
are now at your fingertips.

With a little passion and the right tools you'll have healthier,  
less stressed transplants than you'll ever find at a nursery.  
Healthy transplants are the foundation of your future abundance.  
Also, when you're not waiting for nursery stock to plant your garden,  
you can be planting out both earlier and later in the season,  
increasing your harvest by many weeks in both spring and fall.

Whether you've gardened for years or dreamed for years, Rise & Shine  
shares everything you need to start the garden of your dreams  
and keep sowing throughout the seasons.



## 1. THE ANATOMY OF A SEED

**S**EEDS are absolute magic. Their tininess contains everything an embryonic plant needs to grow into a head of lettuce, abundant arnica or giant sequoia. With a bit of Latin and a brush up in biology, I'll introduce you to the most magic you can experience without a wand: the seed.

### FRUITION FUN FACT:

THE FIRST SEEDS EVOLVED ~350 MILLION YEARS AGO IN THE LATE DEVONIAN PERIOD AS THE FIRST ANIMALS (WINGLESS INSECTS!) WERE EXPLORING LIFE ON LAND.

### FRUITION FUN FACT:

SEED ENDOSPERM PROVIDES HUMANS WITH TWO-THIRDS OF THE CALORIES WE CONSUME EVERYDAY, FROM RICE TO BREAD TO BEANS TO COCONUT TO CASHEWS. POPCORN IS POPPED ENDOSPERM! PASS THE HUMMUS, PLEASE.

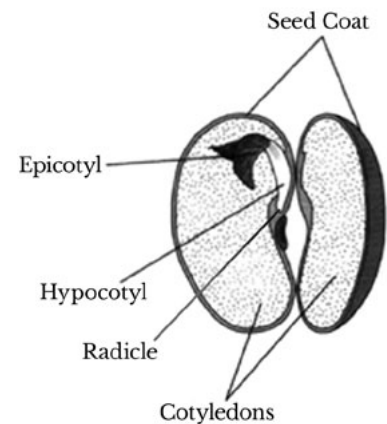
- ◆ Protecting the embryo from the surrounding environment, the **seed coat** (*testa* in Latin, meaning shell) imbibes water and falls away once conditions are favorable to germinate.

- ◆ The **endosperm** (*inside the seed* in Latin) is the nutritive starch, oil and protein that feeds both the unsprouted **embryo** and growing seedling before it can photosynthesize its own food. The endosperm is made up of these embryonic plant parts:

- The **cotyledon** (*seed leaf* in Latin) is the first “leaf” of a seedling that will photosynthesize (produce) sugars from sunshine to feed the seedling. Cotyledons are not “true” leaves. They shrivel and fall off once true leaves have established.

- The **hypocotyl** (*beneath the leaf*) is the primordial stem, found directly beside the cotyledon. The **epicotyl** (*above the leaf*), or plumule, is the primordial first “true” leaf.

- The **radicle** (*root*) is the first primordial root of the seedling. Intriguingly, the radicle always grows down before the hypocotyl grows upward.



SEED ANATOMY.

## 2. THE ANATOMY OF A SEED PACKET

**M**OST SEED PACKETS have an impressive amount of information to set you up for success. Let's dive into the details of Fruition's packets::



*Fruition Seed Packets  
are a treasure trove of information.*

**greens | 40 days for braising greens.** In our short seasons, early maturity dates are critical.

**28-32" TALL** Height is important whether you're planning flower beds or considering which pea (dwarf or full size or both?) will best fit your trellising ambitions. Tomatoes are classified as **Determinate** (varieties that only grow 4-5 feet tall and fruit in a concentrated 4-5 week period) or **Indeterminate** (varieties that continue to grow and fruit all season) to help you plan your garden, as well.

**SOWS 25'** This approximates the row feet your packet will sow, which will help you plan your garden. For example, if there are ~100 seeds in a packet, the plant spacing is 4 inches and you transplant seedlings in a single row, you'll have ~25 feet of that variety. Alternatively, if there are 400 mesclun mix seeds in a packet and you direct sow them 3-4 seeds per inch (~40 seeds per foot), you'll sow ~10 feet of greens from a single packet. If you know that between your family and guests you'd love ~30 feet of greens to enjoy throughout the season, three packets will meet your needs.

**80 DAYS TO MATURITY** Whether harvesting your first bouquet or savoring your first tomato, "days to maturity" gives you a sense of when you can expect to enjoy your abundance. Maturity dates for transplanted crops (like tomatoes) refer to days to maturity after transplant. Crops like mesclun mix may be harvested at several life stages, so we clarify **7 days for microgreens | 21 days for baby**

### **FRUITION FUN FACT:**

DID YOU KNOW MOST PEPPERS ARE ADAPTED FOR CALIFORNIA RATHER THAN THE NORTHEAST? I GREW UP IN THE FINGER LAKES OF NEW YORK, WONDERING WHY MY PEPPERS TOOK FOREVER TO TURN RED. WHEN YOU'RE SOWING SEEDS SUITED TO YOUR GROWING CONDITIONS, YOU WILL INSTANTLY BECOME A BETTER GARDNER.



*Fruition Seed Packets are a treasure trove of information.*

**DEADHEAD. FULL SUN. PERENNIAL.** Many seed packets will share these quick notations to help you map out your garden. **Deadhead** means this variety will produce more flowers when you remove blooms past their prime. (Which is true of most flowers, some more than others.) **Full Sun** indicates this variety desires the sunniest place in your garden, preferably with eight or more hours of glorious sunlight, to fully thrive. **Perennial** plants have adapted to survive our harsh Zone 5 winters, sharing their abundance for many seasons. **Annual** plants only grow one season, typically not surviving our harsh winters.

**PLANT SPACING AFTER THINNING** If you're transplanting, plant your seedlings out at this spacing. In the case of Chim Chiminee Rudbeckia, transplant your seedlings out with 12-18 inches between plants.

If you're direct sowing, follow the planting instructions on the packet and then thin the seedlings 2-3 weeks later to the spacing recommended. For example, on the beet seed packet "Plant Spacing After Thinning" says 4 to 5 inches. Beets are sown one seed every 2 inches, or 6 seeds per foot. After 2 to 3 weeks, once leaves are 1 to 2 inches tall, thin to 1 plant every 4 to 5 inches.

For more tips for thinning effectively (as well as joyfully!), enjoy our blog, *The Fine (and Essential) Art of Thinning*.

**TRANSPLANT ONLY** Many flowers and herbs, as well as tomato, eggplant, pepper and ground cherry, are only worth growing when started as transplants. Some seeds, like carrot, are only successful sown directly in the ground. Such varieties will say **Direct Sow Only** on packets. If a variety can be transplanted or direct sown equally well, like lettuce, packets will say **Direct Sow or Transplant**.

For more transplanting tips, hop over to our blog. You'll find *5 Tips for Gorgeous Transplants* plus *7 Steps to Transplant Tomatoes Perfectly* (#2 May Surprise You).

### *Grow Like A Pro*



Most "Full Sun" plants will grow in partial sun but will be more vegetative, producing more foliage than flower. You'll likely be disappointed if you grow fruiting crops like tomatoes or zucchini in partial sun. Your kale, chard, lettuce, basil, parsley and sage, in contrast, will thrive.



I have (mostly!) separate annual and perennial beds. Since their care is so different this helps me maintain them with ease. I often augment establishing perennial beds with annuals to fill out their color in the first years and reduce weeding. Each season, I plant rainbow chard and kale in both our annual and perennial cut flower beds.



Two factors to consider as you plan and plant your vegetable and cut flower gardens: How dense do you envision your planting and what else you may be planting alongside?



Temperature is easy to control on indoor heat mats, and plants respond with vigorous growth. Without a doubt, the one thing you should invest in this season to up your seed-starting game is a heat mat. Paired with a full-spectrum LED grow light, your transplants will be healthier than anything you'll find at a nursery.



## Grow Like A Pro



Resist sowing your transplants too early! I've planted countless seedlings before conditions were ideal, simply because the seedlings were less healthy every day I didn't plant them out. These plants will suffer either way, if planted out too early or made to survive in a cell too long. If anything, plant a little later than you think.



Some crops, like Asian spinach and kale, are happy to grow at any point in your growing season. Others, like Habanada pepper, are extremely particular about the conditions they require for germination. Most varieties are somewhere in between.



Most crops can be sown throughout the season, surrounding you with abundance all season long. Check out **succession sowing** hints on each packet's **Growing Instructions**. With beets, for example: "sow every 2-3 weeks for continual harvest."



What do stressed transplants look like? They are tall ("leggy") and often leaning toward the window or light. Usually they're pale as well, instead of a deep, rich green. For more transplanting tips and video tutorials, hop over to our blog. You'll find *5 Tips for Gorgeous Transplants* plus *7 Steps to Transplant Tomatoes Perfectly* (#2 May Surprise You).

## DAYS TO GERMINATION

Germination is that magical moment your seed sprouts. When sown in optimum conditions, how long must you wait for that moment? For carrots, expect seed to sprout after 7 days in summer's warm soil and 21 days in the cool soil of spring. If actual temperatures are more than 10°F lower or higher than the optimal temperature range listed, germination may take longer or may not happen at all.

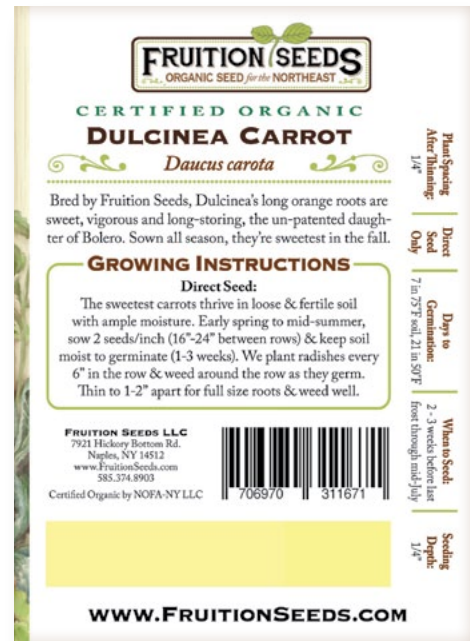
## WHEN TO SEED

Timing is everything. This indicates the earliest ideal time in a growing season to sow that variety. Carrots may be sown 2 to 3 weeks before your last frost. Take a look in the adjacent **Growing Instructions** for exact details, which often includes succession sowing tips. Most crops you can sow later than this date with great success, but don't be tempted to sow earlier. Most seeds quickly rot in moist, cool soil.

For more on when to seed, explore our direct seeding (page 14) and transplant (page 29) charts and enjoy our planting calendar on page 34.

**SEEDING DEPTH** As a general rule, sow seeds twice their depth. For example, if a seed is 1/8 inch in diameter, sow it 1/4 inch deep. If your seed is not a sphere (cosmos, rice, lettuce, calendula), sow twice its depth and lay its length parallel to the top of your soil. Many flowers need full or partial light to germinate, so rather than covering them, press them gently into the soil. Check our **Growing Instructions** for additional variety-specific tips.

**PACKED FOR 2021** All seed packed for a given year must pass or exceed Federal germination standards. If a seed packet shares its exact germination rate, that can help you decide how to seed that variety. If a germination rate is 70%, for example, you might choose to seed slightly more than if the germination rate was 97%. If you have leftover seed at the end of season, most of your seeds will last 3 to 5 years without losing significant germination, when stored in a consistently cool and dry location. The only exceptions are alliums (including onion, scallion, leek) as well as parsnip and many herbs, which are best purchased every season.



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## GROWING INSTRUCTIONS

Each variety is unique, and the pages to come will illuminate many details with easy-to-follow instructions. Many crops are successfully direct sown as well as transplanted, so we share steps for both. If you don't have a great seed starting space in your home, direct sowing is best. If our instructions say 'Transplant Only' or 'Direct Seed Only,' trust us. :)

**LATIN NAME** *Cucurbita pepo* is the taxonomical Latin genus and species of Cocozelle zucchini. (Latin is the language of love for your inner plant nerd.) If you save seed, knowing the latin name is the essential first step ensuring

your seed will grow true-to-type and not cross with something else in its species. For example, zucchini, pumpkin, acorn, delicata, spaghetti squash, patty pan and summer squash are all *Cucurbita pepo*, meaning they all will likely cross up to one mile. If you're not saving seed and don't need fun facts to impress your friends, pay no mind.

## FRUITION FUN FACT:

ALLIUM AND PARSNIP SEEDS HAVE FRAGILE SEED COATS AND READILY OXIDIZE, USING UP ALL THEIR ENERGY STORES IN THEIR ENDOSPERM AND THUS LOSING GERMINATION CAPABILITY QUICKLY.

*Grow Like A Pro*



I remember as a child watching a "pumpkin" grow out of our compost, watching in awe as its flowers ultimately became fruits that looked like zucchini/pumpkin/UFO. Saving seeds is one of the best ways to learn about biology. But if you don't do your Latin homework, don't get attached to saving pumpkin (and only pumpkin) seeds.



*Knowing the Latin name of plants is particularly helpful when saving seeds. All Cucurbita pepo species can cross up to one mile, for example. Just as all dogs can 'cross,' so will your zucchini, spaghetti squash, acorn squash and pumpkins, as well as your delicata and patty pan squashes! If you let them :)*



*Cosmos are some of the easiest seeds to direct sow, practically thriving on neglect! Equally easy are sunflowers and calendula.*

### 3. SOWING SEEDS DIRECTLY IN YOUR GARDEN

#### *Grow Like A Pro*



If you really want spinach over the summer, sow Asian spinach, which germinates March to October and is a glorious substitute for spinach in any dish in any season.



If you don't already get your soil tested, it's never too late. Gardening without a soil test is being on the Great Barrier Reef — on a boat. Put on your snorkel — get a soil test, check out our blog about it — and suddenly you'll know how to feed your soil and your crops in such a way that will surround you with more abundance than you ever thought possible.

**S**OWING SEEDS directly into the earth is so satisfying. As a child, peas and beans were the first seeds I sowed. They are large enough for fingers learning to be dexterous and they are not picky when it comes to being sown too shallow or too deep. Many thanks to all the people in our world sowing seeds with children!

#### **BEST OF BOTH WORLDS**

Many seeds (see Direct Seeding Chart on page 14) will thrive both sown directly in your garden or transplanted. Other factors such as the weather, weed pressure, mulch and companion planting will have greater influences on your ultimate harvest than these seeds' sowing preferences.

#### **DIRECT SOW THESE!**

Peas, beans, corn, any root vegetable and cilantro will be significantly more happy and healthy sown directly in the soil. Your harvests will leave you without doubt.

Hop over to our blog for way more detail, including *8 Seeds to Direct Sow in the Cold*, *6 Easy Seeds to Direct Sow in June* and *Sowing Autumn Abundance in August*. Fruition's free *Seed Starting Academy* also shares a deeper dive into how to seeds with the greatest success, join us at [www.fruitionseeds.com](http://www.fruitionseeds.com).



*Sowing seeds directly in your garden means a lot of variables to consider:*

**SOIL TEMPERATURE** In general, if a variety needs warm soil to germinate, you can sow the seed after your last frost confident that the soil has warmed sufficiently. If a variety prefers to germinate in cooler soil, sow it before last frost (April/early May) or in the fall September/early October). Many crops, like lettuce, kale and beets, germinate in a wide temperature range and may be sown throughout the season. Others, like spinach, are very particular and will only germinate in cool soils. Each packet and the chart below will give you a sense of what to plant when.

**SOIL PREPARATION** Preparing your garden soil is a complex equation of timing, tools and techniques. Your goal is to sow seeds into loose, open soil free of weeds, weed roots and large rocks. Every system has its advantages and disadvantages, from no-till lasagna-style to straw bale gardening to roto-tilling. This will be another book! And certainly dozens already exist on the subject. In the meantime, here is the key to keep in mind: less tillage is almost always better than more tillage. Also, don't skimp on fertility, especially compost-based nutrients that feed the soil and not just your crops. Our *Troubleshooting Common Compost Problems* and *Soil Testing Made Simple* blogs have a lot more to share!

**SOWING DEPTH** As a general rule, sow seeds about two times their depth. For example, if a zucchini seed is just less than  $\frac{1}{2}$  inch long, sow it no more than one inch deep. If your seed is not a perfect sphere, simply sow twice the depth of it's thinnest side and lay its length parallel to the top of your soil before you bury it.

**SEED/SOIL CONTACT** Firm, direct soil contact is critical for most seeds to germinate, ensuring their emerging roots will have access to stable soil as well as abundant water and nutrients. Once you've sown and covered your seed with soil, press down firmly with your palm or hoe to ensure good soil/seed contact.

**WATER** Seeds need water to germinate, but too much will drown them. It's ideal to have the soil moist before you sow, since overhead watering as well as intense rainfall can easily displace seed. Covering seed with fabric row cover will maintain even moisture and increase temperature, hastening germination. This technique is especially important for slow-germing seeds like carrot and parsnip. Enjoy a step-by-step video tutorial and other tips to surround you with success in our *3 Keys to Great Carrot Germination* blog.



Some direct-seeded crops, like carrots, thrive with exceptionally fine seedbeds. Other crops, like zucchini, can thrive in much rougher seedbed.

**TWO DIRECT SOWING STRATEGIES** You've prepared an even, loose bed for your seeds and are ready to sow. What next?

First, there are plants that desire a lot of space, like zucchini, cucumbers and watermelon. Zucchini, for example, we ultimately want one plant every two feet. We'll sow two seeds every two feet, simply tucking them in the ground with our fingers, estimating their one-inch depth. About one week later, we'll return and pluck out the weaker, less straight and less vigorous of the two seedlings.

Other seeds like carrots, beets and radish grow much more closely and are direct sown much closer as a result. For those crops, we'll create a shallow furrow of a row with the side of a palm, tip of a trowel or corner of a hoe. It's not critical to have a perfectly level furrow, but a consistent furrow will allow consistent germination and growth, simplifying cultivation. One to two weeks later we return to thin our seedlings, ensuring vigor as well as health and abundance.

**THINNING** Is one of the most challenging aspects of growing a garden! I remember struggling to thin seedlings when I was a girl in my father's garden. We were growing a garden to cultivate life, right? When I started working full-time on a farm in Maine when I was 19, I saw for the first time how vividly plants thrived that had plenty of space, when properly thinned.

Indeed, death is life and life is death and Friends, I'd love to tell you: The single greatest limiting factor in hundreds of gardens I've seen across the years has simply been *thinning*. People hesitate or wait too long and then every single plant is stressed for both light and nutrients, airflow and water, becoming a sitting duck for every pest and disease to alight on the yellowing leaves.

Take a look on Fruition's packets (page 7), we share plant spacing before and after thinning to take the guess-work out of each variety. For more tips for thinning effectively (as well as joyfully!), enjoy our blog, *The Fine (and Essential) Art of Thinning*.

And if it's any consolation, many thinnings are delectable as microgreens and/or baby greens, so don't hold back. Let this be one of the most challenging — and most beautiful — ways your garden grows you this season.

## 4. DIRECT SEEDING CHART

Please note: Blue shading indicates varieties that may be transplanted with equal success.

<i>Crop</i>	Earliest Sowing Date	Sowing Depth	Seeding Spacing within Row	Spacing within Row after Thinning	Spacing between Rows	Days to Germination
BEAN	after last frost	1"	4-5 seeds/ft	4"	30"	8-10
BEEF	~4 weeks before last frost	1/2"	5-6 seeds/ft	3"	18"	5-8
CALENDULA	2-3 weeks before last frost	1/2"	3 seeds/ft	10-12"	12-18"	4-7
CARROT	2-3 weeks before last frost	1/4"	10-12 seeds/ft	2"	8-12"	7-21
CILANTRO	~4 weeks before last frost	1/2"	10-12 seeds/ft	1"	8"	6-10
CORN	~2 weeks before last frost	3/4"	2 seeds/ft	1'	30"	4-7
CUCUMBER	after last frost	1/4"	2-3 seeds every 2-3'	2-3'	2-3'	3-6
DILL	~4 weeks before last frost	1/8"	12-15 seeds/ft	3-4"	12"	7-21
GARLIC	Halloween - Thanksgiving	3-5"	6"	n/a	6-18"	n/a
KALE	4-6 weeks before last frost	1/4"	3 seeds/ft	1'	12-18"	3-8
KOHLRABI	~4 weeks before last frost	1/4"	5-6 seeds/ft	2-4"	12-18"	3-8
LETTUCE/MESCLUN MIX	~4 weeks before last frost	1/8"	12-15 seeds/ft	n/a	12"	3-7
LETTUCE HEADS	~4 weeks before last frost	1/8"	4-5 seeds/ft	12"	18"	3-7
MELON/WATERMELON	after last frost	1/2"	2-3 seeds every 3-4'	3-4'	3-4'	4-7
NASTURTIUM	after last frost	1/2"	2 seeds every 12"	12"	12-18"	7-14
PARSNIP	~4 weeks before last frost	1/2"	12 seeds/ft	3-4"	18"	12-20
PEA	as soon as snow melts	1/2"	10 seeds/ft	2"	30"	9-15
POTATO	1-3 weeks before last frost	>8" *	6-9"	n/a	30"	10-20 days (sprout)
PUMPKIN	after last frost	1/2"	2 seeds every 3-4'	3-4'	120"	5-7
RADISH	4-5 weeks before last frost	1/2"	12 seeds/ft	1-2"	4"	4-7
RUTABAGA	early August	1/4"	4-5 seeds/ft	5-8"	12-18"	3-8
SUNFLOWER	after last frost	1/2"	2 seeds every 18-24"	18-24"	18-24"	7-10
SPINACH	as soon as snow melts, in September as soil cools	1/2"	12 seeds/ft	6"	12"	5-11
SWISS CHARD	~4 weeks before last frost	1/2"	5-6 seeds/ft	12"	18"	5-8
SUMMER SQUASH	after last frost	1/2"	2-3 seeds every 2'	24"	24"	5-7
WINTER SQUASH	after last frost	1/2"	2 seeds every 3-4'	3-4'	120"	5-7

\*the deeper the better

- THINNINGS: TO EAT OR NOT TO EAT?** *These ones are delicious:*
- ◆ Flowers: Nasturtium, sunflower
  - ◆ Greens (kale, chard, lettuce, spinach)
  - ◆ Herbs (dill, cilantro)
  - ◆ Pea
  - ◆ Roots: Beets, radish, turnip

Hop on over to our blog for lots more direct sowing detail, including *10 Easy Seeds to Direct Sow in May*.



*Honeynut is one of our favorite squash! Like all cucurbits, we direct sow them in early June on our farm in the Finger Lakes in Zone 5, once the soil is warm and past frost.*

## 5. IF CUCURBITS COULD TALK

I 'VE EXPERIMENTED for years, disbelieving that a seed sown directly in the garden would produce harvestable fruit at the same time as a 2 week-old seedling or month-old seedling transplanted simultaneously. Here is what I learned: More often than not, the direct-sown seeds fruit first. If cucurbits could talk, they would sing when you direct sow them.

### FRUITION FUN FACT:

THE CUCURBIT FAMILY INCLUDES WATERMELON, CANTALOUPE, SUMMER SQUASH AND WINTER SQUASH, AS WELL AS CUCUMBERS.

If you feel you must transplant them, sow them in soil blocks (see page 30) or in peat pots. Soil blocks made by soil blockers are our favorite by far, requiring the fewest inputs and growing the healthiest seedlings. Peat pots are second-best. Readily decomposing, peat pots can be planted in the ground along with your transplant. Just be sure the peat pot is fully buried or else it will likely dry out and trap your seedling. If you want to maximize the space you're starting seeds in, use two-inch soil blocks or one and a half-inch peat pots, being sure to transplant them within 10 to 14 days of sowing them.

Though they take up more space, I recommend using 2- or even 3-inch peat pots because the plants won't need to be transplanted as quickly. Don't wait any longer than two weeks before transplanting your delicate and easily moved to moody cucurbit seedlings.

A word to the wise: Do not over-water your cucurbits! As a family, they are very sensitive to excess moisture. When you plant out, make sure the peat pot is soaking wet and take great care to bury none of the stem. Double-check that none of the peat pot is above the soil. An exposed peat pot will likely dry out and not break down quick enough, dehydrating and constraining your plant. Make sure the pot is soaking wet, ideally with dilute fish emulsion. For the full story and a video tutorial, hop on over to our *Fish Emulsion Demystified* blog.

*Grow Like A Pro*



Cucurbits and sunflowers have thin, fragile root systems that absolutely despise being transplanted.

## 6. 5 CONSIDERATIONS FOR THE 'THINK OUTSIDE THE ROW' GARDENER

**T**HERE IS NO ONE RULEBOOK to follow for plant spacing in your garden. Packets often suggest spacing both between plants and between rows and there are clever systems like 'Square Foot Gardening.' Here is how I think about it:

You're setting a table. You want to set out a supper plate, bowl, fork, spoon and knife, a water glass and a wine glass. If you've never 'set a table' before, it's hard to know where it will be best.

You're planting a garden. You want to harvest carrots, tomatoes, zinnias, basil and zucchini. If you've never 'planted a garden' before, it's pretty intimidating to know how to space everything just so.

Here's the thing: *Nothing can develop your plant spacing instinct better than personal experience and knowing what is best for you. So jump right in! Glad we're digging in together :)*

Here are five considerations to develop your garden spacing instinct.

**1. HOW MUCH SPACE WILL THIS PLANT NEED WHEN FULL-GROWN?** Being able to imagine your plants' approximate size at maturity will allow you to think outside the box and outside the row. For example, a minimum of two feet between tomato plants is critical. When you plant them out, it's hard to believe you're not wasting precious garden space. By August, when your tomatoes are crowded on top of each other and oozing black with late blight, you'll likely wish you had planted them with 30 inches between plants. Check out our blog on *Preventing Tomato Diseases*, by the way! And if you look at Fruition's packets, our 'plant spacing after thinning' on the back tells you exactly how much space each variety would love.

**2. THINK OUTSIDE THE ROW** As classic as they are, rows may or may not be efficient for you. If a row of carrots, beets and basil feels organized and efficient, by all means, plant in rows! Many seed packets will give you information based on this premise. A row may be a single line of radishes or it could be a six-inch wide wall of radishes. In container gardens particularly, we don't bother planting in rows at all: We simply fill the entire 5-gallon container with beets, lettuce greens or radish, for example. Less to weed, more to harvest. Keep experimenting and above all else, know there are many other ways to organize your garden beyond the row.

**3. MONOCULTURE OF THE MIND** This is one of my favorite cautionary phrases of Vandana Shiva. She is referring to the inherent perils of the paradigm that leads to hundreds and often thousands of acres being planted in a single crop of corn. Of wheat. Of soy. Even in a garden it can be tempting to have this bed be your greens bed, here are your tomatoes. Over here is the squash and over here is the herb garden. Certainly we have to respect that some things really don't grow well together (zucchini really won't thrive under tomatoes) but once you have some fundamentals down, experiment. Trial. Mix it up. Enjoy *Fruition's Guide to Companion Planting* on our blog! Most plants can be planted out in polyculture to some degree, to the advantage of all. The indigenous strategy of planting the 'Three Sisters' of corn, beans and squash together is a perfect example.

*Grow Like A Pro*



A short list of great companion plants that compliment just about everything else:

Dwarf marigolds like  
Queen Sophia  
Calendula

Upright romaine lettuce  
Upright, aromatic herbs like  
parsley, dill, basil, thyme  
and oregano. Enjoy the full  
story in *Fruition's Guide to  
Companion Planting* blog.





*The genius indigenous polyculture of planting corn, beans, and squash together as 'Three Sisters' is one of my favorite ways to 'think outside the row.' Enjoy our blog on Three Sisters gardens, if you haven't already! We share so much more in our blog, Lessons Learned from our Three Sisters Garden.*

#### **4. HOW MUCH FERTILITY DOES THIS PLANT NEED, HOW MUCH IS IN MY SOIL?**

In general, more fertility allows plants to be planted closer together. That being said, it is critical to still give everything enough space so air can flow, minimizing the spread of disease. Also, roots can grow down as well as out. All plants have their preferences (carrots go down, lettuce goes out) but if you have rich, deep soil you can tighten your plant spacing. Double dug beds, deep raised beds and soil building through sheet mulching are all great approaches to giving roots greater access to deeper nutrients.

We love to mulch or 'top-dress' with compost, allowing the freeze and thaw of fall and spring to slowly work the nutrients and organic matter deeper into the soil.

Fish emulsion, found on our website, can always be applied throughout the season, boosting health as well as nutrient density. Made from the by-catch of fisheries, it is a phenomenal resource reducing waste, though it feeds your crops but not your soil. For the full story, hop over to our *Fish Emulsion Demystified* blog.

**5. HOW DO YOU PLAN TO WEED?** How you weed will dramatically impact how your garden is laid out. Weeding by hand, with a standing or hand hoe and applying mulch are the most common approaches (which can be combined) in an organic garden. Just make sure you have the space you need to weed between plants with your chosen method. There is a sweet (and often elusive) scenario where you weed diligently for the first month after seeding; once your plants are large enough, they'll shade out weeds below while not competing with each other.

## 7. ALL CONTAINERS CONSIDERED

**Y**OU CAN START SEEDS in virtually anything that a) holds potting mix and b) drains excess water.

That being said, some containers are better than others! Keep in mind: If you're starting seeds in your home, you'll need a bottom tray to catch excess water from the containers that drain. When I was a girl, we used cookie sheets; plastic trays without holes are often available in garden centers, as well. Be creative and have fun!

For the full story, hop over to our *All Containers Considered* blog, as well as our *free Seed Starting Academy* with tips on using toilet paper rolls, takeout containers and more!

Here is a quick list of common containers people use for starting seeds, our general sentiments from decades of learning the hard way and easy solutions to common mistakes people have with them:

**Bravo!** *From best to less so...*

**SOIL BLOCKS** are the best! With the most nutrients and soil per volume and natural air-pruning, you won't grow healthier transplants any other way plus you don't have to use disposable plastic. See page 30 for the full story.

*Common mistake:* Blocks begin to crumble after a few days or weeks.

*Easy Solution:* Making solid blocks doesn't just happen! With the right potting mix (see page x), diligence, honesty and experience, your soil blocks will be dense and glorious. For more tips, join one of our seed starting classes on the farm each spring or enjoy our video tutorials on our website!

**PEAT/COW POTS** also prevent planting from becoming root-bound and don't engage disposable plastics. Cow pots are slightly more renewable than peat pots.

*Common mistake:* Plants become root-bound in the house or in the garden.

*Easy Solution:* If peat pots dry out, they wick moisture away from the soil around them, effectively dessicating the plant roots around them. In the house, always keep your peat pots moist, ideally with bottom-watering. (You'll find bottom-watering tips on pages 24 and 27 with much more info as well as step-by-step demos on our blog as well as in our *free Seed Starting Academy* at [www.fruitionseeds.com](http://www.fruitionseeds.com).) In the garden, be sure to plant your peat pot fully in the ground, so none of the peat pot is exposed to the air. Sometimes we'll even tear off the top half inch or so of the pot to ensure a delicate stem isn't buried in soil and the edges of the pot are well below the soil surface.

**CELL TRAYS** (larger cell sizes are better for small scales)

*Common mistake:* Not all seedlings grow evenly or transplant as well.

*Easy Solution:* It's really common for cell trays to have pockets of air among the potting mix. To ensure your cells are full of potting mix with no air pockets, fill your cell tray and then firmly — yet gently — tap your tray on the table. The potting mix will settle and add more potting mix to fill the trays fully. Voila!

## 6-PACKS

*Common mistake:* Same as cell trays, often not all seedlings grow evenly or transplant as well.  
*Easy Solution:* It's really common for cell trays and 6-packs to have pockets of air among the potting mix. To ensure your cells are full of potting mix with no air pockets, fill your cell tray and then firmly — yet gently — tap your tray on the table. The potting mix will settle and add more potting mix to fill the trays fully. Voila!

**YOGURT CUPS** (½ cup volume) with 4 to 6 1/8-inch holes drilled in the bottom

*Common mistake:* Not drilling enough holes for water to effectively drain from the cup.  
*Easy Solution:* When in doubt, drill a few more holes! It's better to have more small holes than less large holes. Also, if the holes are too small, they might be clogged by particles in the potting mix; if they're too large, your potting mix will simply fall through. Have fun finding the right balance for your potting mix!

**PAPER POTS** made from newspaper pot makers (a sweet little British trick)

*Common mistake:* Growing tomatoes or other 6+ week transplants in them... they just don't hold up.  
*Easy Solution:* Only use paper pots for quick transplants less than four weeks old, like kale, zinnias and lettuce.



*Pay attention to Pinterest at your own risk! Despite what quaint images you'll find there, resist all temptation to sow seeds in egg cartons: They're too small to nourish plants of any size well and their curves transplant roots poorly.*

**Oh no!** *These are all the worst...*

**EGG CARTONS** (Just never do it; defy Pinterest for your best interest! There is too little soil for healthy seedlings of any size and they transplant poorly, damaging roots as you try.)

**YOGURT CUPS** without holes. (Without drainage, your seedlings will drown/dampen off quickly.)

**'PEAT PELLETS'** or other little containers of 'potting mix' in thin mesh expanding with water. (The potting mix they generally use is low quality and your seedlings will be hungry right away.)



*Resist the urge to purchase cheap seed and cheap potting mix! Once you experience the abundance of quality seeds grown in quality soil, the abundance will speak for itself.*

## 8. STRAIGHT TALK ON POTTING MIX

**I**T'S TRUE. Low quality seeds won't thrive in the world's best potting mix. Also true: the highest quality seeds won't thrive in poor-quality potting mix. Dialing in your potting mix will alleviate so many common seed starting problems! Here are two keys to keep in mind, plus our go-to potting mix and DIY recipe:

**POTTING/SEED STARTING MIX IS DIFFERENT THAN GARDEN SOIL** Garden soil is much too dense for starting seeds indoors, alas. Potting mix, also called seed starting mix, is a combination of common materials providing a growing medium for roots to establish along with nutrients to nourish your burgeoning seedlings. Most often potting mix is a combination of peat moss, coconut coir, compost, vermiculite and/or perlite and other micronutrients. Generally you get what you pay for: Higher quality potting mix is generally more expensive.

If you're pinching pennies (as I do, I love you!), use less expensive potting mix on quick-growing transplants like lettuce, broccoli and zinnias, which will only be growing indoors about three weeks or so. Save your high quality, more expensive and nutrient dense potting mix for potting up your older seedlings, like your 4- and 6-week old tomato transplants, because they need quality nutrition to not become stunted.

**MAKE IT ORGANIC.** Real nutrients make all the difference. The difference between organic, compost-based nutrients and chemically soluble nutrition (like Miracle-Gro) is the difference between a head of broccoli and a bottle of vitamins. Vitamins can offer supplemental nutrition (sometimes and at best) but they simply won't sustain you. The same is true for your plants. Organic nutrients are the only real nutrients for plants that confer robust health as well as optimal growth.

**OUR GO-TO:** We love Vermont Compost and their organic 'Fort Vee' potting mix is the best we've found. It's texture and nutrient capacity is ideal for seed starting as well as potting up transplants. We share this potting mix on our website and hopefully you can find it at your local garden center too, though it's highly unlikely you'll find it or anything comparable, sigh.

Since sourcing high quality potting mix is such a challenge, we've developed a mix of nutrients so that you can turn even poor potting mix into high-quality potting mix. It's basically finely ground minerals that can be mixed with potting mix or other raw ingredients to make your own potting mix. We share it on our website and each 2.5 cup container makes eighty quarts of potting mix for a fraction of the cost. Here's the recipe that comes on the back of our container and definitely enjoy our blog with the full story and video tutorial on our website:



*Fruition's DIY Seed Starting Mix*

## RECIPE

*first, combine:*

- 10 quarts well broken-down peat
- 10 quarts fine compost

*separately, combine:*

- 7 quarts perlite
- 1 cup DIY seed starting mix

*mix all ingredients thoroughly*

*for full instructions & a video tutorial, enjoy our blog:*

**Make Your Own Seed Starting Mix**

**WWW.FRUTIONSEEDS.COM**

## 9. 15 STEPS FOR SPECTACULAR SEEDLINGS



*Cucumbers and all cucurbits love to be direct-sown. If you must transplant them, sow in soil blocks and plant them out no more than two weeks later, once true leaves have just emerged, as the plant on the left.*

**G**ROWING YOUR OWN transplants is immensely satisfying, though it can be vastly disappointing if not done well. I'll always be grateful to have grown up in a family who started their garden from seed. Even today, the journey of starting seeds indoors in early spring, often as the snow melts, makes me feel I too am coming back to life.

Spending a fortune on fancy equipment is quite unnecessary, but investing in quality supplies will make starting your seeds much more straight-forward, foolproof and rewarding. For step-by-step video tutorials of all these steps, join Fruition's free *Seed Starting Academy* at [www.fruitionseeds.com](http://www.fruitionseeds.com).

### MATERIALS

(You'll find many of these on our website)

- ◆ **Seed Starting Mix**

(organic, compost-based mix grows the healthiest, most abundant seedlings; enjoy more soil ruminations on page 20)

- ◆ **Tub to easily contain potting mix**

- ◆ **Warm Water** (tap is perfect)

- ◆ **Seeds** (organic seeds grow the most abundance)

- ◆ **Soil Blockers** (see page 30), **Cell Trays and/or Peat Pots**

(yogurt cups with at least 4 holes drilled on bottom acceptable, egg cartons are acceptable never!) For the full story, hop over to *All Containers Considered* on page 18. For a gallery of healthy transplants, stressed seedlings and the common mistakes to avoid, enjoy our *5 Tips for Gorgeous Transplants* blog.

- ◆ **Small pan of water** (to rinse your blockers in)

- ◆ **Bottom Trays**

- ◆ **Labels**

- ◆ **Waterproof Marker**

Optional but much more successful if you have:

- ◆ **Full-Spectrum LED Light**

- ◆ **Heat Mat**

## Grow Like A Pro



We have cringed for years as people sent us photographs of leggy, pale transplants grown under their expensive fluorescent “grow lights.” Unfortunately, these grow lights don’t have the UV spectrum plants require, and the plants in the photographs were obviously suffering. Yikes. Finally, after years of searching and researching, we’ve found lights we trust as fully as our seeds. Check out our full-spectrum LED grow lights on our website. You’ll have them for years and your plants will dance about the difference.



Use warm water to moisten your potting mix, making seed starting more comfortable for both you and your seeds.



Eliminating the air pockets in your seedling containers is important for several reasons. First, roots grow in soil (true, epiphytes exist and are the exception!) and your seedlings will be happier with more soil, more nutrients and more roots. There is plenty of air in the micropores of your mix. Second, transplanting cells with air pockets is messy for both the human and the plant. The cells fall apart and tender roots are jostled and exposed. I remember a very dishevelled and disappointing flat of broccoli teaching me this lesson when I lived in Maine. The plants rarely recover, but the lesson is learned.

1. Before you begin, gather your materials from the list at left.
2. With lukewarm water, moisten your potting mix until it is thoroughly damp but not dripping wet. (Potting mix for soil blocks should be wetter than for cell trays.)
3. Create your soil blocks (for full instructions, see page 30) or fill cell trays with soil. As you fill your cells or other containers, tap each one against the table several times. This allows the soil to settle, eliminating any air pockets in your cell. Start by filling the soil up to the top of each cell; it will inevitably settle a bit. Be sure each cell tray has a nesting bottom tray for stability and maintaining root humidity.
4. Label your tray with the variety name and sowing date. Labeling “Salmon Rose Zinnia 4/15” before you sow helps keep you and your seedling trays organized. This is also where I make a note in my perpetual calendar, spreadsheet or other garden journal so I can track our data and see emergent patterns across the years.
5. If you’re not soil blocking, you’ll need to indent each cell in your tray before you sow your seeds. I love to use my fingers. The eraser-end of a pencil won’t mind the dirty work, either. As a general rule, sow seeds twice their depth. For example, if a seed has 1/8-inch diameter, sow it 1/4-inch deep. If your seed is not a sphere (cosmos, rice, lettuce, calendula), sow twice it’s depth and lay its length parallel to the top of your soil.
6. The moment has arrived! Drop two or three seeds into each soil block or cell. If your seed is more than two years old, consider sowing three to four seeds per soil block or cell. Your goal is to have one vigorous plant in each soil block while thinning only minimally. Large seeds make this easy. I hold smaller seeds in my left hand while my right (dominant) thumb and forefinger gently rolls, dropping one to two seeds into each soil block or cell. Another technique I love, especially for light seed like lettuce and lavender, is to wet the end of a toothpick with my tongue. Next, I pick up one seed with this wet tip and deliver it (easily, you’ll be amazed!) to your soil block or cell.
7. Most seeds need full contact with the surrounding soil to germinate. Once you’ve sown your seeds, cover your soil blocks or cells with just enough potting mix to cover your seeds. Many flowers need full or partial light to germinate so, rather than cover them, press them gently into the soil. Check our **Growing Instructions** on the back of your packet for variety-specific tips.



*If you're growing tomatoes and any other transplants indoors more than 5 weeks, good grow lights are essential. Unfortunately, not all grow lights are great and price isn't always an indicator. Our Full-Spectrum LEDs are one of the few we recommend.*

germinating seeds. Once germinated, your seedlings can be taken off your heat mat.

**9.** It is critical to keep soil moist for your germinating seeds. Always sow seeds into a moist potting mix! Check your trays daily and water when soil appears almost dry. Heat mats cause soil to dry out significantly faster and require more supervision. Bottom-water your soil blocks and cell trays until your first true leaves have emerged by simply adding a little water to the bottom tray rather than adding water from above. This allows water to wick up from the bottom, keeping water at the roots where you need it most. Be sure the water you add doesn't come up to the bottom of the top tray, so your top tray will still drain effectively. Enjoy my blog *How Bottom-Watering Changed My Life* for a video tutorial more details. Misting also works, though it rarely reaches the deepest roots where it is needed most. Overhead watering can easily displace tiny seeds as they germinate. Once true leaves have emerged, it benefits for your seedlings to experience overhead watering, strengthening their stems for the wind and rain to come, before being transplanted so these elements won't surprise them.

**10.** Once your seeds have germinated, they need as much light as possible. If you have a greenhouse, you are so fortunate! If you are using lights, know most lights do not have the full light spectrum plants need to photosynthesize. Once you have the right lights, suspend them 6-12 inches above your seedlings, depending on the light and its strength. Fruition's full-spectrum LED grow lights come

**8.** Set your seed trays on a heat mat or in the warmest nook of your home. Heat mats will raise the soil temperature 10 to 15 degrees above ambient room temperature. Heat mats are one of the easiest ways to up your seed starting game! Temperatures consistently above 65°F are best for your

*Grow Like A Pro*



A waterproof marker ensures you'll read your labels even after weeks of being watered.



As a general rule, sow seeds twice their depth.



You can easily test most seed's germination rate easily! Enjoy our blog on *Easy Germination Testing at Home*.



Use the 'days to germination' in our Direct Seeding Chart on page 14 to help guide what you plant when so your seedling's growth rates accommodate rather than antagonize each other.



Though all vegetables will germinate best covered in soil, many flowers need light to germinate. Check out *9 Flowers That Need Light to Germinate* (and the ones that desire darkness) on page 28 before you sow your flowers this season.



Heat mats are magical. With a heat mat's constant warmth, seeds germinate faster and grow more vigorously. Once you invest in a heat mat, you will wonder why you didn't invest years ago.



## Grow Like A Pro



By nesting your tray of soil blocks or cells in a second “bottom” tray, you add stability, as well as the capability for the brilliance of bottom-watering. Instead of watering from above, add water to the bottom tray or gently along the edges of your top tray. This allows the soil to wick up the moisture while the stem and leaves stay dry, preventing disease and damping off. It also keeps moisture at the roots, where seedlings need it most.



Let’s pause for a moment of truth: If you garden in short seasons, even the dreamiest south-facing window likely won’t have enough light for 4+ week old transplants like tomatoes, eggplant and pepper to thrive. To have truly healthy, vibrant seedlings, you’ll need great grow lights. If you’d rather not invest in grow lights, you can still grow seedlings of plants that will only be inside up to four weeks, like lettuce, broccoli and zinnias. Plan your seed starting with our Direct Sowing Chart on page 14 and our Transplant Chart on page 29.



Full-spectrum LED grow lights will transform the quality of your transplants, and are so worth the investment. Keep your light within 6 inches of your seedlings, ideally 3 inches from your tallest plant. More than 6 inches away, your plants will become leggy and pale. (Our full-spectrum LED grow lights make adjustments easy.)



*Thinning is daunting scrutiny for many gardeners but don't be daunted, Friends. Space is essential for healthy seedlings to grow and surround you with their abundance. Plus, so many seedlings are delicious! (You'll eat so many of them eventually, right?!)*

with a timer. Your seedlings will thrive with 16 hours of light each day. Plants need darkness to release the byproducts of photosynthesis, so don’t be tempted to reduce their time in the dark. As your seedlings grow, raise your lights so they’re three to five inches above the tallest plant. Experiment! If your seedlings are too leggy, they’re too far from the light. If the seedlings farthest from the light are beginning to get leggy, raise the light so it will shine more evenly on the entire tray. (Leggy plants rarely recover, so remain vigilant!) If you’re relying on natural light coming through a window, make sure it’s south facing and still warm enough. If your seedlings start to lean toward the window, invest in lights.

**11.** Thinning is essential! If you’ve sown more than one seed in a soil block or cell, it’s critical you thin them as young as possible by using scissors to snip the stem of the less vigorous, leaving only the tallest, straightest, single most healthy plant. Don’t pull the less vigorous seedling by pulling them up by their roots, because the pulling will disturb the roots of the plant you’re favoring. For more tips for thinning effectively (as well as joyfully!), enjoy our blog, *The Fine (and Essential) Art of Thinning*.

**12.** As seedlings outgrow their blocks or cells, it’s time to “pot up” into larger containers or begin to transition them outside (step 13). Potting up is critical because vigorous early growth is the foundation of future health and summer abundance. It is better to pot up younger rather than older seedlings, encouraging seamless growth. Seedlings constrained in their block or cell will quickly stop growing and become stressed, reducing your future abundance significantly. As you pot up, be sure to disturb your seedlings’ roots as little as possible and bury each stem no more than before. Tomato is the only exception, which thrives when 75 percent of its stem is buried both when potted up and again when transplanted into your garden.



*Your goal is to foster even, vigorous growth for the entire indoor life of every seedling. Transplants that will be in your home more than 3 or 4 weeks will need to be 'potted up' as they grow, offering fresh soil, nutrients, and space from their jungle of sisters and brothers. As you pot up, take care to not bury the stem which may quickly rot. Tomatoes are the only exception: They love to have three-quarters of their stems buried, immediately turning stem into roots that skyrocket their above-ground growth.*

**13.** If you have seedlings in blocks or cells longer than three weeks, they will stop growing well unless they are fed. We offer our seedlings a spray of diluted fish plus seaweed emulsion, which we also share on our website. Follow the label instructions and know your seedlings will smell like a fish market for 20 minutes. Then watch them turn deep blue green with gratitude. We feed our seedlings once per week once they're four weeks old.

**14.** Little things make all the difference and you'll become a much more successful gardener when you "harden off" your seedlings before transplanting them into your garden.

I grew up transplanting seedlings straight into the garden from our kitchen window, watching many of them struggle to adjust to life outside. Buffeted by wind, many stems would crack rather than bend. Having so much more light, many got sunburned. The sudden shock of temperature drops at night can stunt their growth and promote bitterness, and certainly, you'll harvest less than you would if they were transitioned gently to their life outside. I grew up thinking a rough transition was inevitable. However, after experiencing the timing and techniques of many organic farms across the country, I learned how to 'harden off' seedlings before transplanting them across diverse styles and scales.

### Why harden off your transplants?

Just imagine: You've been coddled and cozy inside your temperature-controlled home for weeks. How stressful would it be to be thrown out into the cold ground while the sun beats down all day, the wind is blowing, and all of a sudden it's cold at night? It's critical to harden off your transplants, making their sappy, succulent growth

### Grow Like A Pro



Thinning is brutal I know, but here's the thing: Extra seedlings are just like unwanted weeds. They compete for light, water and nutrients, as well as slowing air circulation, making even your healthiest seedlings less healthy. Plus, thinnings of greens and sunflower you can eat as microgreens. :)



Pot up transplants before they beg for it! Stressed seedlings will surround you with much less abundance than healthy seedlings. Here is the stage we pot up our tomatoes. (Note true leaves have not yet emerged!)



Tomatoes adapted to their ancestral Central American rainforest by growing roots out of their stems and branches within 6 or so inches of the forest floor. You are actually making your tomato healthier and more productive by planting 75 percent of its stem both when you pot up and again when you transplant it into your garden.



For more transplanting tips, hop over to our blog. You'll find *5 Tips for Gorgeous Transplants* plus *7 Steps to Transplant Tomatoes Perfectly* (#2 May Surprise You).

## Grow Like A Pro



Never let leaves of separate seedlings overlap one another. Once leaves overlap they are competing for light, increasing humidity and more prone to stress. The less stress seedlings experience (especially pepper, eggplant and tomato), the healthier and more abundant the plants will be.



If some of the fine roots are disturbed as you're transplanting, know your plant will grow a new, bushier network of feeder roots immediately. As long as their root system is mostly intact, a little jostling is actually beneficial. (Cucurbits and sunflowers are the only exceptions.)



Add fish and seaweed fertilizer to the final watering of your seedlings before transplanting them into your garden. This gives them all the nutrients they need to transition quickly and never stop growing.



*Before true leaves emerge, it's essential to 'bottom-water' your seedlings by simply adding water to the bottom 'catch' tray rather than the top tray which drains. Bottom-watering prevents the seed and soil displacement almost inevitable in overhead watering. Just be sure to fill the catch tray below the drainage holes of the top tray! Once your seedlings have true leaves, overhead watering helps them grow strong stems that will welcome the rain. /// Hardening off your seedlings for five to seven days before transplanting them into your garden helps reduce seedling stress and thus amplifies abundance. Gradually exposing them to increasing light, sporadic watering (ie, rain) and fluctuating temps is critical for their smooth transition. Floating row cover over hoops is one of the simplest approaches.*

harder so they won't be damaged by the wind, sun and fluctuating temperatures in your garden.

Harden off your seedlings by setting your seedling trays on an outside table in a sheltered place where they receive 6 to 10 hours of light for at least 3 but ideally 5 to 7 days. For cold-hardy transplants like kale and onion, cover them with floating row cover to protect them if it frosts overnight. For frost-sensitive transplants like basil and eggplant, bring them back inside if the night temperatures may dip below 50. As your transplants are hardening off, make sure they don't dry out. Water them only if they're nearly dry and don't feed them as they adjust to life in an ever-changing environment. The more you ease your seedlings' transitions, the more abundance you'll harvest! It's often hard to slow down; when it comes to hardening off, you'll be so rewarded.

**15.** Water your seedlings thoroughly just before you transplant them into your garden. This keeps their root systems intact as they transition. It also encourages immediate exploration of the surrounding soil once they've been planted. Bonus: Watering them with dilute fish emulsion sets them up for that much more success!

**MOST IMPORTANTLY** Don't get down on yourself when you make mistakes. Even after starting seeds for decades, I'm still making mistakes and learning constantly. How many times did you fall off your bicycle? You're going to make far fewer mistakes by learning from mine.



*Before you sow, check the growing instructions on your packet. It's so frustrating to wonder why no snapdragons have emerged after two weeks to then realized you simply sowed them as you did your marigolds :)*

## 10. 9 FLOWERS THAT NEED LIGHT TO GERMINATE (AND THE ONES THAT DESIRE DARKNESS)

Press these  
into the soil,  
not covering at all

1. STRAWFLOWER
2. SNAPDRAGON
3. SKULLCAP

Cover these  
very lightly,  
if at all,  
with soil

3. COSMOS
4. TITHONIA  
(Mexican Sunflower)
5. ARNICA
6. CELOSIA
7. NICOTIANA
8. STOCK
9. CLEOME

### SOME LIKE IT DARK!

Cover other flower seeds with a firm 1/8 to 1/4 inch of soil, depending on the size of the seed.

## 11. TRANSPLANT CHART

Please note: Blue shading indicates varieties that can be transplanted before last frost.

<i>Crop</i>	Transplant Level	Earliest Sowing Date	Sowing Depth	Days to Germination	Spacing within Row	Spacing between Rows	Best in peat pot/ soil block
BASIL	easy	3 weeks before last frost	1/4"	5-7	12"	12"	no
BROCCOLI	easy	4-6 weeks before last frost	1/4"	4-7	24"	24"	no
CABBAGE	easy	4-6 weeks before last frost	1/4"	4-8	24"	24"	no
COSMOS	easy	3 weeks prior to last frost	1/4"	7-10	12"	24"	no
CUCUMBER	difficult	2 weeks before last frost	1/2"	3-5	36"	36"	yes
EGGPLANT	difficult	6-8 weeks before last frost	1/4"	7-10	18"	18"	no
KALE	easy	4-6 weeks before last frost	1/4"	3-5	18"	18"	no
KOHLRABI	easy	4-6 weeks before last frost	1/4"	3-5	4"	12"	no
LAVENDER	difficult	6-8 weeks before last frost	1/8"	15-22	12"	12"	no
LEEK	intermediate	early March	1/4"	5-10	3-4"	18"	no
MARIGOLD	intermediate	4-6 weeks before last frost	1/8"	5-8	12"	12-24"	no
NASTURTIUM	easy	after last frost	1/2"	5-7	12"	12-18"	no
ONION/SHALLOT	intermediate	8-10 weeks before last frost	1/8"	6-9	3-4"	8-12"	no
OREGANO	intermediate	4-6 weeks before last frost	1/8"	10-14	12"	12"	no
PARSLEY	intermediate	4-6 weeks before last frost	1/8"	8-12	12"	12"	no
PEPPER	difficult	6-8 weeks before last frost	1/4"	7-10	24-30"	24-30"	no
PUMPKIN	difficult	2 weeks before last frost	1/2"	3-5	3-4'	3-4'	yes
SPINACH	easy	6-8 weeks before last frost	1/2"	4-6	6-9"	9-18"	no
SUMMER SQUASH	difficult	2 weeks before last frost	1/2"	3-5	24"	24"	yes
SUNFLOWER	intermediate	2 weeks before last frost	1/2"	3-5	24-36"	24-36"	yes
SWISS CHARD	easy	4-6 weeks before last frost	1/4"	4-7	12"	12"	no
THYME	intermediate	4-6 weeks before last frost	1/8"	10-14	12"	12"	no
TOMATO	difficult	6-8 weeks before last frost	1/4"	5-7	30-40"	40-50"	no
WINTER SQUASH	difficult	2 weeks before last frost	1/2"	3-5	3-4'	3-4'	yes
ZINNIA	easy	4-6 weeks before last frost	1/4"	5-8	12"	12"	no

For more transplanting tips, hop over to our blog. You'll find *5 Tips for Gorgeous Transplants* plus *7 Steps to Transplant Tomatoes Perfectly (#2 May Surprise You)*.



*Soil blocks have the greatest soil and nutrients per soil volume. They also allow roots to naturally air-prune, never becoming root-bound, growing the healthiest seedlings we've ever seen. Soil blocking is ideal for most seeds. Though they prefer to be direct-sown, you can still transplant seeds like corn and beans in large soil blocks.*

## 12. SOIL BLOCKING IN 5 EASY STEPS

**T**HE DUTCH have been developing modern soil blocking for nearly a century. Planting seeds into cubes of soil was documented 2,000 years ago in Central America, as well.

I love soil blocks for the remarkable health of transplants compared to their cousins grown in cell trays. And they're fun to make! Plus, if you take care of your soil blockers, they will last decades if not generations.

Brilliantly, potting mix is both the container and the growing medium of a soil block. Since (most) roots evolved to grow into dark soil rather than bright air, seedlings will naturally air-prune themselves in soil blocks. This maximizes their soil volume (which is much more than a cell in a tray could offer) and prevents seedlings from becoming root-bound. For decades and without question, soil blocking is my favorite way to grow seedlings.

**There are two main sizes of soil blockers that are ideal for home gardeners.** There are two main sizes of soil blockers that are ideal for home gardeners. Mini-blockers create half-inch blocks ideal for tiny seeds that need time and/or warmth to germinate. Standard soil blockers make two-inch blocks accommodating almost everything else under the sun! They compliment each other marvelously, especially with simple plugs ('mini-inserts') that allow the mini-blocks to be 'potted up' directly into the large soil blocks, keeping life simple. You'll find them both on our website; I've had my large soil blocker for nearly two decades and she's still making soil blocks with us each season.



**MINI-BLOCKERS** create twenty half-inch soil blocks. This size is perfect for germinating tiny seeds (like oregano), slow to germinate seeds (like lavender) and/or heat-loving seeds (like peppers). Mini-blockers brilliantly maximize the limited and precious space on your heat mat, since they are so much smaller than large blocks or cell trays. When seeds are that much closer to the heat mat, their germination rate is both higher and faster. Also, mini-blocks pot up into large blocks with simple plugs ('mini-inserts') that attach to the large soil blocker, making perfect indentations for your mini-blocks to pot-up or nest into.

*Grow Like A Pro*



Once seeds in your minis have germinated, pot them up pronto.



I use warm water to moisten my potting mix. It makes seed starting more comfortable and fun. :)

### Best Seeds to Start in Your Mini-Blocker

- ◆ Any solanaceous crops:  
tomato, eggplant, pepper, tomatillo, ground cherry
- ◆ Tiny-seeded herbs with moderate to long days to germination:  
oregano, thyme, parsley, shiso, basil, chamomile, hyssop, flax, natives (like skullcap), sage, lemon balm, sorrel
- ◆ Tiny-seeded flowers with long days to germination:  
lavender, nigella, rudbeckia, coreopsis, natives (like yarrow), strawflower, phacelia



Our **LARGE BLOCKERS** make four-inch soil blocks. Other sizes are available, though we find this size is ideal for most seeds and home-scale. Many seeds we sow directly into these large blocks. Fast transplants (zinnias, lettuce) we harden off as soil blocks and plant directly in the garden; Long transplants (peppers, ground cherries) pot up with ease into four-inch containers, continuing to grow before being transplanted.

If you're going to only have one soil blocker, the large soil blocker is the way to go. It's the most versatile and widely applicable. If you grow a lot of flowers, tomatoes, peppers, eggplants or herbs, having both the mini and large blocker will dramatically increase your abundance.

*For step-by-step video demonstrations, hop on over to our blog as well as free Seed Starting Academy at [www.fruitionseeds.com](http://www.fruitionseeds.com)!*

## MATERIALS (You'll find many of these on our website)

### Potting Mix

*(organic, compost-based mix grows the healthiest, most abundant seedlings; enjoy more soil ruminations on page 20)*

### Tub to easily contain potting mix

### Warm Water *(tap is perfect)*

### Seeds *(organic seeds grow the most abundance)*

### Soil Blocker *(we use a mini and 2-inch blocker)*

### Mini inserts

*(so your mini soil blocks will perfectly nest in the large blocks)*

### Small pan of water *(to rinse your blockers in)*

### Bottom Trays

**1.** Before you begin, gather your materials from the list above.

**2.** In a sizable tub with a flat bottom, moisten your potting mix with warm water. Potting mix for soil blocks is wetter than for cell trays. A squeezed handful of mix should not drip, but nearly. Your sense of proportion will come with experience. If possible, keep unmoistened potting mix close by in case you over-wet your mix and need to even out the moisture.

**3.** Fill your soil blockers! Fill your soil blocker by pressing it into the potting mix, pushing down several times and twisting a bit, rocking from side to side. Your goal is to have solid blocks of soil. I often hand-pack the soil into each block to be sure there are no remaining air pockets. (This is especially important if your large soil blocker has the mini inserts attached, because the top of the block has a thinner, more fragile edge.) Once you're confident your blocks are packed tight, scrape any excess soil on the bottom off with the your hand, a butter knife or the edge of your container.

**4.** Place your blocker on your bottom tray. Release your blocks by pressing the spring-loaded handle and raising the blocker in a smooth, even motion. Voila! If your blocks are not solid, toss them back into your tub of potting mix and continue on. No one gets it right the first time and soil blocking has one of the most fun, most forgiving learning curves imaginable. I always learn best by watching people do things effectively, so hop on our website for video tutorials to help you make great soil blocks, as well.

**5.** Rinse your soil blocker between each set of blocks. To make consistently perfect soil blocks (and for the biggest payoff from your efforts), your potting mix needs clean contact with your soil blocker.

Enjoy more details, photos and a video tutorial on our *Soil Blocking in 5 Easy Steps* blog.

*Grow Like A Pro*



Pack your soil blocker as densely as possible. The upper corners of the block are the most prone to crumbling. Use your fingers to pack your potting mix deep into the soil blocker before the blocker is mostly full. This is especially critical when using the mini-inserts, whose edges are narrower and thus more fragile. If your block crumbles, even a little bit, simply try again!



Practice makes perfect. Soil blocks are no exception. Your first soil blocks will likely make you laugh. They'll slump, they'll crumble, they'll look like the grossest brownies you've ever seen! Throw them back in the mix and make more. You may learn the hard way that standing ability alone doesn't prove their density; blocks that aren't dense enough will slump and crumble in the following weeks. When in doubt, you want them firm and their edges crisp.



Use warm water to moisten your potting mix, making soil blocking more enjoyable for both you and your seeds!



## 13. 6 KEYS TO BEAT DAMPING OFF

**Symptoms:** Stems turn soft and rot, often just above the soil.

**Bad news:** You won't get much warning. If you see one plant succumb, most of the time it is too late to save the rest.

**Good news:** It's quite preventable. Both bacterial and fungal pathogens thrive in humid conditions, so anything you can do to keep warm air moving around your plants will dramatically reduce your risk.

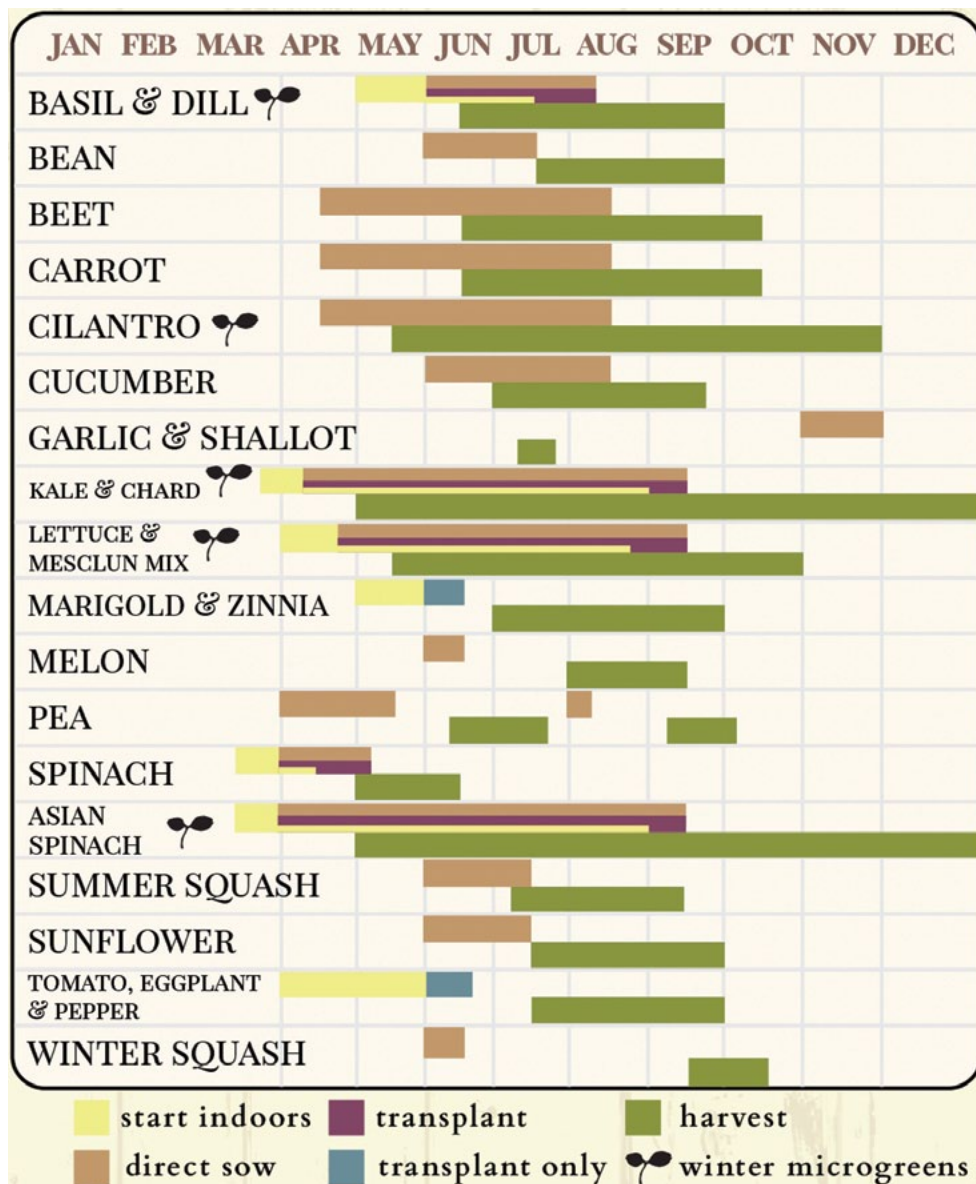


*Numerous bacteria and fungi are responsible for "damping off," the most common cause of seedling death.*

### SIX KEYS TO BEAT DAMPING OFF:

1. Moisten your potting mix well enough before you sow your seeds so you don't need to water them immediately.
2. Use a heat mat and full-spectrum LED grow light. Increased temperature and light encourage faster plant growth and decrease humidity, significantly reducing the chance of disease.
3. Don't use clear plastic domes. They are unnecessary and increase humidity, making your plants more susceptible to disease.
4. Resist the urge to water until you notice the tops of your blocks or cells are almost dry.
5. When your blocks or cells are truly dry, bottom-water only. This allows water to wick up from the bottom, keeping water at the roots where you need it most. Be sure the water you add doesn't come up to the bottom of the top tray, so your top tray will still drain effectively. Enjoy my blog *How Bottom-Watering Changed My Life* for a video tutorial more details.
6. Thin your seedlings early and pot up often to provide maximum airflow between plants. If leaves are overlapping, humidity will form between the leaves. Humidity causes many diseases to thrive.

## 14. PLANTING CALENDAR FOR ZONES 5 THROUGH 7



Our blog shares so much more detail! Here are a few to explore first:

[Sowing Allium Seed in Spring](#)  
[6 Seeds to Sow in Early April](#)  
[8 Seeds to Sow in Cold Soil](#)  
[5 Keys to Eating Greens Before Memorial Day](#)  
[Easy Flowers to Sow Before Final Frost](#)  
[How to Grow Peanuts in Short Seasons](#)  
[5 Tips for Gorgeous Transplants](#)  
[10 Easy Seeds to Sow in May](#)

[Lessons from our Three Sisters Garden](#)  
[7 Steps to Transplant Tomatoes Perfectly](#)  
[6 Easy Seeds to Direct Sow in June](#)  
[3 Keys for Great Carrot Germination](#)  
[5 Tips for Growing Great Beans](#)  
[Successful Succession Sowing in July](#)  
[Sowing Autumn Abundance in August](#)  
[Seeds to Sow in September](#)

# 15. CROP NOTES : LET'S DIG IN!

a planting & harvest record across the seasons by crop

As you take notes, watch for the patterns that emerge over time! If you like recording your observations and learning, you'll love *Across the Seasons*, our perpetual calendar for garden planning and celebrating life.

<i>Crop:</i>	YEAR : _____	YEAR : _____	YEAR : _____	YEAR : _____
variety name & seed source:				
date sown indoors/outdoors:				
date transplanted (if sown indoors)/thinned (if direct sown):				
plant spacing:				
# of plants/row feet planted:				
date soil worked/bed prepped:				
date harvested:				
yield notes:				
insect & diseases present:				
fertility notes:				
other observations:				
<i>Crop:</i>	YEAR : _____	YEAR : _____	YEAR : _____	YEAR : _____
variety name & seed source:				
date sown indoors/outdoors:				
date transplanted (if sown indoors)/thinned (if direct sown):				
plant spacing:				
# of plants/row feet planted:				
date soil worked/bed prepped:				
date harvested:				
yield notes:				
insect & diseases present:				
fertility notes:				
other observations:				

<i>Crop:</i> variety name & seed source:	YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
date sown indoors/outdoors:				
date transplanted (if sown indoors)/ thinned (if direct sown):				
plant spacing:				
# of plants/ row feet planted:				
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date harvested:				
yield notes:				
insect & diseases present:				
fertility notes:				
other observations:				
<i>Crop:</i> variety name & seed source:	YEAR: _____	YEAR: _____	YEAR: _____	YEAR: _____
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<i>Crop:</i>	YEAR : _____	YEAR : _____	YEAR : _____	YEAR : _____
variety name & seed source:				
date sown indoors/outdoors:				
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<i>Crop:</i>	YEAR : _____	YEAR : _____	YEAR : _____	YEAR : _____
variety name & seed source:				
date sown indoors/outdoors:				
date transplanted (if sown indoors)/ thinned (if direct sown):				
plant spacing:				
# of plants/ row feet planted:				
date soil worked/ bed prepped:				
date harvested:				
yield notes:				
insect & diseases present:				
fertility notes:				
other observations:				

## 16. WE'VE ONLY JUST BEGUN

Each seed is deceptively singular,  
bearing the blessing of countless beings before it.

Each seed is just waiting to grow.  
Friend, you are such a seed yourself.



### JOY-FULL

Like a sun-  
flower  
seed

We are here  
to more  
than just  
survive

But to be  
broken open,  
to grow

And transform this world  
in the joyful  
kind  
of way.

~ digger ~

Here's to the seeds, seasons & abundance to come!

Sow Seeds & Sing Songs,





# READY TO DIG DEEPER?

*Dive into our library of in-depth, step-by-step resources:*

ONLINE COURSES

WEBINARS

BLOGS

EBOOKS

PLANTING CALENDARS

[WWW.FRUITIONSEEDS.COM](http://WWW.FRUITIONSEEDS.COM)

*and hope to see you here on the farm one day!*



[WWW.FRUITIONSEEDS.COM](http://WWW.FRUITIONSEEDS.COM)

*sow what you love & love what you sow*

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