



FRUITION SEEDS

ORGANIC SEEDS & TREES *for* SHORT SEASONS



RISE & SHINE

starting seeds with ease

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 takes years to become a confident seed starter.

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

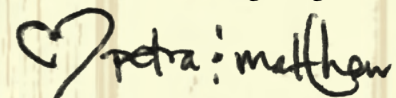
Many of us grow up starting seeds in cell trays, 6-packs and yogurt cups on our kitchen windowsill. I certainly did (hello, Petra here!) and though I loved starting seeds, it took years of experience on organic farms to finally start seeds better than anything I could find at a garden nursery.

And the abundance is epic.

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

We are so honored to dig in with you!

Sow Seeds & Sing Songs,



& the whole Fruition Crew



ps

If you haven't already, dive into *Starting Seeds with Ease*, our free online course sharing 100+ video tutorials to surround us all with abundance for generations to come! Over 10,000 gardeners have cultivated skills, confidence and community with us and we're so honored to share this joy with you, too. You'll find this and so much more at www.fruitionseeds.com, don't be shy and see you soon ~



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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 all who cultivate the next generation
of curious gardeners transforming the world*



WHY START YOUR OWN SEEDS?

Why prepare our Thanksgiving feast?

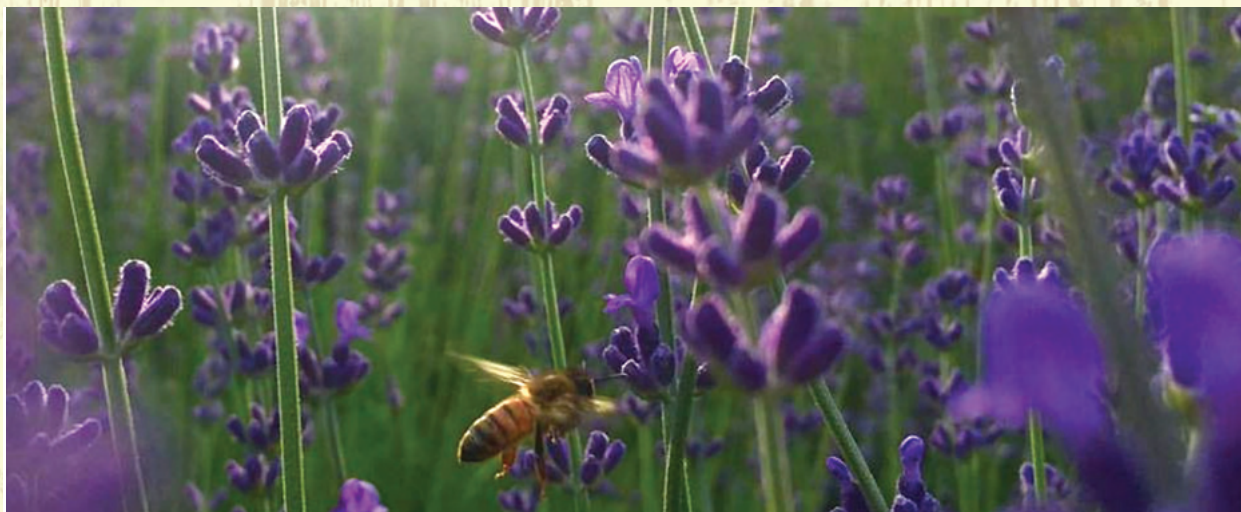
Why tuck our children in each night?

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

SEEDS 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.

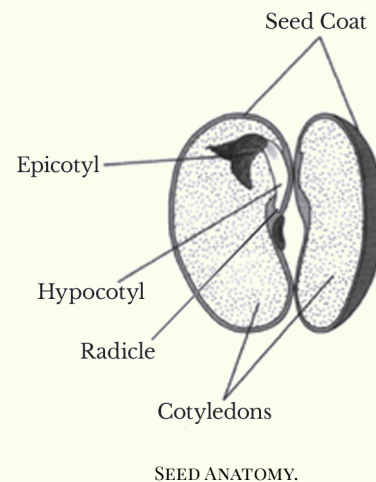
FRUITION FUN FACT:

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. Like humans losing our baby teeth, this is totally normal and no reason to worry.
 - 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.



2. THE ANATOMY OF A SEED PACKET

MOST 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.

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 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.

FRUITION FUN FACT:

MOST OF US SHARE A BLIND FAITH THAT OUR SEED IS PRODUCED BY THE COMPANIES SELLING THEM. THIS IS MOST OFTEN NOT THE CASE.

TODAY, MOST SEED IS GROWN WHERE THE CLIMATE FAVORS COMMERCIAL INDUSTRIAL SEED PRODUCTION, SUCH AS THE LONG, DRY SEASONS OF THE CENTRAL VALLEY OF CALIFORNIA. UNLESS YOU GROW IN THE CENTRAL VALLEY, THE SEEDS YOU SOW ARE NOT LIKELY TO BE WELL-ADAPTED TO YOUR CLIMATE! FRUITION GROWS ABOUT 60% OF OUR SEED ON OUR FARM IN THE FINGER LAKES OF NEW YORK. TO LEARN ABOUT THE OTHER SMALL SEED GROWERS OF THE NORTHEAST WE SOURCE SEED FROM, HOP ON OUR BLOG, *MEET THE GROWERS OF FRUITION'S SEED*.

FRUITION FUN FACT:

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



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.

We have (mostly!) separate annual and perennial beds. Since their care is so different this helps us maintain them with greater ease. We often augment establishing perennial beds with annuals to fill out their color in the first years and reduce weeding.

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.

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.

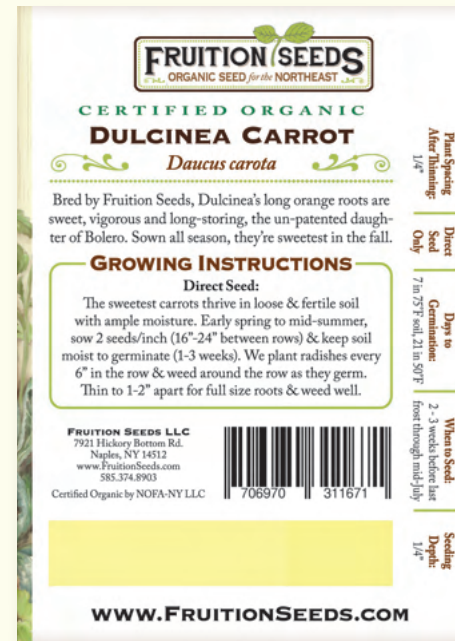
For more tips for thinning effectively (as well as joyfully!), enjoy our blog, *The Fine (and Essential) Art of Thinning*.

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).



Fruition Seed Packets are a treasure trove of information.



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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 30) charts and enjoy our planting calendar on page 35.

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 2023 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.

Grow Like A Pro

Resist sowing your transplants too early! We've planted countless seedlings before conditions were ideal, simply because the seedlings were less healthy every day we 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).

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



Perhaps you've witnessed a great, vining mystery grow out of your 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 and if you don't do your Latin homework, you may not grow the pumpkin you were anticipating! Dive into our free *Seeds for Seasons to Come* online course to join us saving seeds for generations to come.

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 Coccozelle 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 Seed Packets are a treasure trove of information.



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

SOWING SEEDS directly into the earth is so satisfying. As a child, peas and beans are often the first seeds we sow: They are large enough for fingers learning to be dexterous and they are not persnickety 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 *Starting Seeds with Ease* online course also shares a deeper dive into how to start seeds with the greatest success, join us at www.fruitionseeds.com.

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.



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 :)



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 ½ 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 (Petra here!) remember 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, we must tell you: The single greatest limiting factor in countless gardens we'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 at 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

WE'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 we 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 cow/peat pots. Soil blocks made by soil blockers are our favorite by far, requiring the fewest inputs and growing the healthiest seedlings. Cow and 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, we 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

THERE 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 we 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 our 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.

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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.'

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

YOU 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 tray that drains as well as a 'bottom tray' to catch excess water from the tray above. Cookie sheets and plastic trays are remarkably effective bottom trays in addition to what are often sold at garden stores. Be creative and have fun, Friends!

For the full story, hop over to our *All Containers Considered* blog, as well as our free *Starting Seeds with Ease* online course 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 31 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 20), 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 desiccating 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 25 and 28 with much more info as well as step-by-step demos on our blog as well as in our free *Starting Seeds with Ease* at 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

IT'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 we do, we 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.

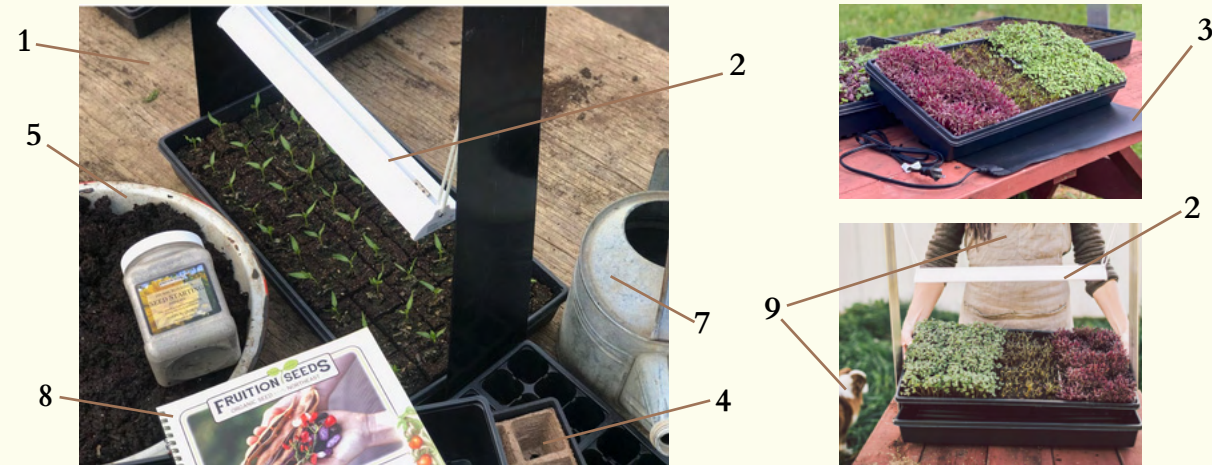
OUR GO-TO: We love Vermont Compost and their organic 'Fort Vee' potting mix is the best we've found. Its texture and nutrient capacity is ideal for seed starting as well as potting up transplants. We share this potting mix on our website and hopefully you can find it at your local garden center too, 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. ANATOMY OF A GREAT SEED-STARTING SETUP

EACH OF US ARE UNIQUE and everyone's seed starting setup will be unique, as well. Here are the core elements to attend to and Happy Sowing, Friends!



1. Flat surface with plenty of working room in a cozy space ideally above 60°F, 16°C. Ideally, this is a place you often are: seedlings don't thrive out of site, out of mind.

2. Great light! Seedlings thrive with 16+ hours of direct light with appropriate photosynthesizing wavelengths. Unless you have a heated greenhouse space, your seedlings will struggle to thrive without high quality supplemental light. Sunny south-facing windows are lovely and often not enough light for plants to grow straight, stout and stress-free. Three to four-week-old seedlings like lettuce, basil and zinnias can survive less than ideal conditions much better than 6+ week old seedlings like tomato and onion.

3. Heat Mats make all the difference! Keeping your soil consistently 10–12 degrees warmer than the ambient air temperature, most plants germinate quickest and grow most vigorously between 75 and 80°F (24 to 26°C), warmer than most homes, so heat mats make the best of both worlds.

4. Let's talk containers! Unless you're growing kelp (!), **drainage is essential** so be sure the container holding the seedlings, your 'top tray' has holes. Equally important is to have a '**bottom tray**' **without holes** to catch the draining water, conveniently nested below the top tray.

5. Potting Mix! The more nutrients the better, so investing in high quality potting mix is the foundation of the abundance to come.

6. Labels! Whether they're new or upcycled yogurt containers (we love you!), labeling your freshly planted seeds with both variety and date sown helps avoid much heartache.

7. Water is life! Be sure watering your seedlings is convenient and be sure to dive into our *Bottom Watering* blog, if you haven't already.

8. Take Notes! Whether they're on memos, spreadsheets or our *Across the Seasons Calendar*, a few notes go a long way to help improve your process in the future.

9. Friends! It's one of the best feelings in the world: celebrating successes and trouble-shooting with community who cares deeply about you and your seedlings, too.

10. 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.

GROWING YOUR OWN transplants is immensely satisfying, though before it becomes second nature it can be vastly disappointing. Sowing seed is easy; cultivating truly thriving seedlings for weeks is quite a challenge, indeed. Good tools, technique and timing as well as curiosity and community go far. We're here to share it all with you!

Spending a fortune on fancy equipment is quite unnecessary, though investing in quality supplies makes starting your seeds much more straight-forward and rewarding. For step-by-step video tutorials of all these steps, join Fruition's free *Starting Seeds with Ease* online course at www.fruitionseeds.com.

MATERIALS

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

◆ Seed Starting (aka 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 (regionally adapted seeds are the most resilient)

◆ Soil Blockers (see page 31), Cell Trays and/or Peat Pots (yogurt cups with at least 4 holes drilled on bottom are acceptable, resist egg cartons, whatever you do...!)

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 (without holes)

◆ Labels

◆ Waterproof Marker

Optional yet optimal if you have:

◆ Full-Spectrum LED Light

◆ Heat Mat

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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 disheveled and disappointing flat of broccoli teaching me this lesson when I lived in Maine. The plants rarely recover, but the lesson is learned.

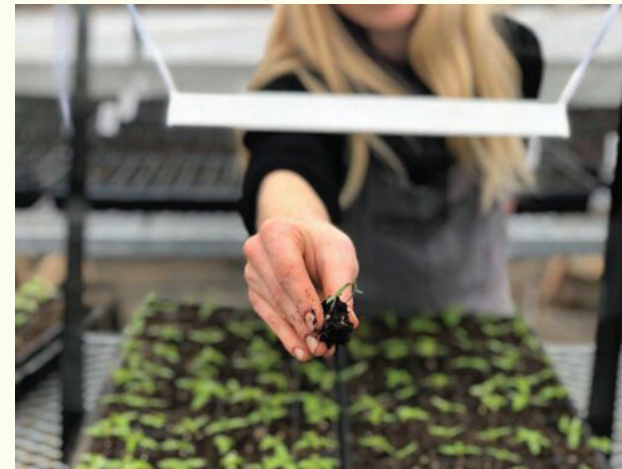
1. Before you begin, gather your materials from the list at left.
2. With lukewarm water, moisten your potting mix until it is thoroughly damp but not dripping wet. (Potting mix for soil blocks is ideally more moist than mix for cell trays: it should drip when squeezed.)
3. Create your soil blocks (for full instructions, see page 31) 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 we make a note in my perpetual calendar, spreadsheet or other garden journal so we can track our details to help us see patterns and make better decisions 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 its 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. We hold smaller seeds in one hand while our other (dominant) thumb and forefinger gently rolls, dropping one to two seeds into each soil block or cell. Another technique we love, especially for light seed like lettuce and lavender, is to wet the end of a toothpick with our tongues. Next, we 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.

your seedlings can be taken off your heat mat to make room for more seeds to germinate! If you don’t need to germinate more seeds and would like your seedlings to grow all the faster, leave them on your heat mat. Just keep an eye on their moisture levels, since they’ll dry out faster on the 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 our *How Bottom-Watering Changed Our Lives* blog for a video tutorial sharing 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, your seedlings may benefit from 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 with a timer. Your

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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 29 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.

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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.



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?!)

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 30.

Full-spectrum LED grow lights will transform the quality of your transplants, and are so worth the investment. Keep your light about 6 inches above your seedlings, ideally no less than 3 inches from your tallest plant. More than 6 inches away, your plants will become leggy and may turn pale. Some lights, like our full-spectrum LED grow lights, have drawstrings making adjustments easy.

Note! If you'd love to grow microgreens, you can actually grow more trays of microgreens under lights that are higher and the slightly extended, leggy stems make microgreens easier to harvest. Three 10" x 20" trays of microgreens can grow under our 17" LED lights; six trays can grow under our 33" light.

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 (Petra, here!) 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

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Thinning is brutal, 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. Bury the cotyledon leaves, they'll quickly feed their growing roots!

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).

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Resist letting 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. Like taking a snack with you on a long hike, this gives them a nutrient boost when they need it most!



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.

to harden off your transplants, making their sappy, succulent growth 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, we're 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 ours.



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 :)

11. 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.

12. TRANSPLANT CHART

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

Crop	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.

13. SOIL BLOCKING IN 5 EASY STEPS

PLANTING SEEDS into compressed cubes of soil was documented over 2,000 years ago in Central America. Indigenous brilliance! The Dutch have been making metal soil blockers for over a century.

We 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 today, soil blocking is our favorite way to grow seedlings.

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; we've had a large soil blocker for nearly two decades and it is 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.

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

Grow Like A Pro



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



We use warm water to moisten our potting mix, and though we can't speak for the seeds, we suspect this makes seed starting more comfortable for us all!



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.

A Friendly PSA! *Though large soil blockers are nearly indestructible (hooray!), mini soil blockers are not (sigh). Nonetheless, you and your mini-blocker will be great friends for years if you resist pressing really hard when there is significant resistance. Rather than forcing the release, dunk your mini-blocker in water to remove the potting mix without force. Take a peek: Most often the mini-blocks aren't releasing because a) the potting mix is too compressed or b) a small stick or stone in your potting mix has lodged between the plastic base and the metal that pops each block out. Remove any obstruction and block away!*

For step-by-step video demonstrations, hop on over to our blog as well as our free "Starting Seeds with Ease" online course at www.fruitionseeds.com!

SOIL BLOCKING IN 5 EASY STEPS (CONTINUED)

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 un-moistened 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. We 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. We 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!

14. 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.

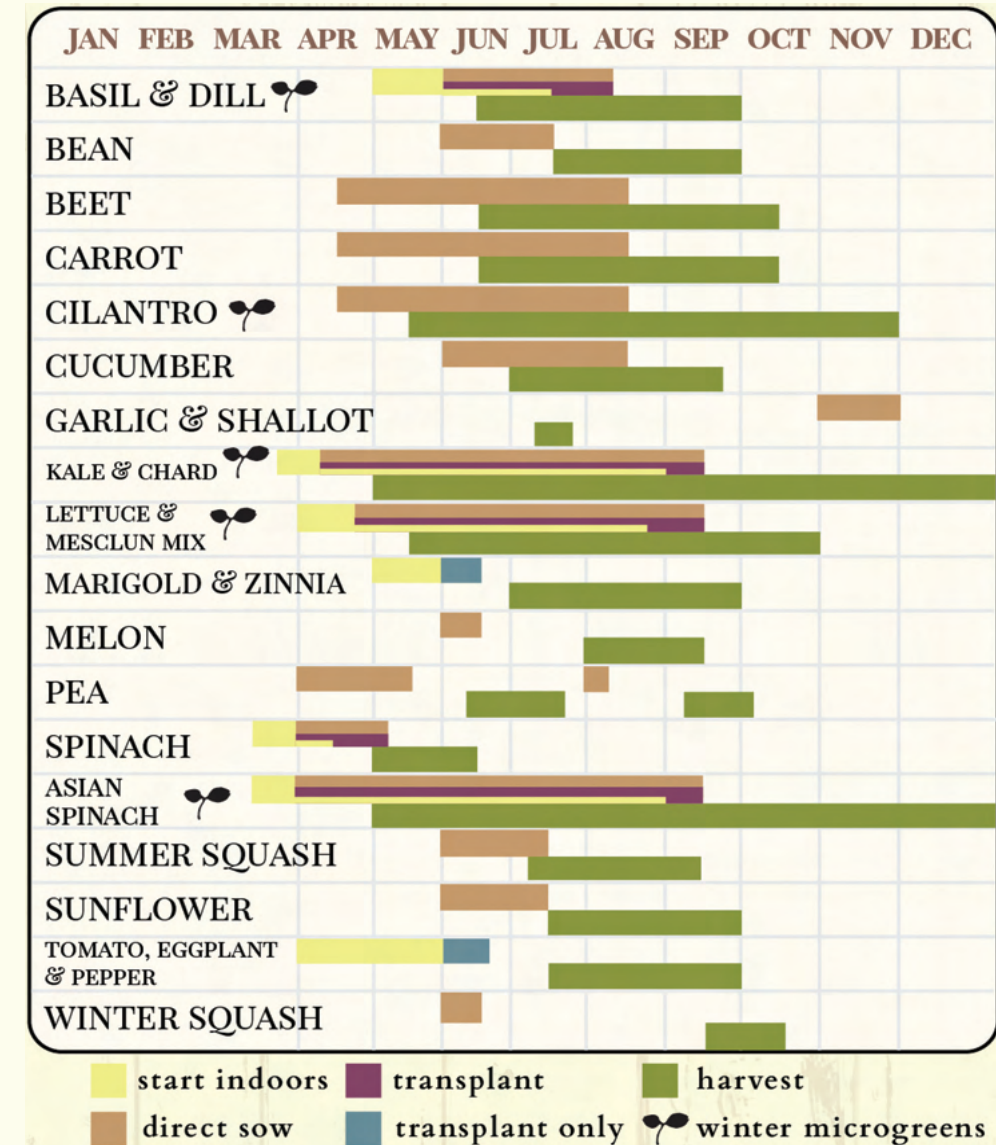


Numerous bacteria and fungi are responsible for "damping off," the most common cause of seedling death.

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. Resist using clear plastic domes. They are unnecessary and increase humidity, making your plants more susceptible to disease. If you do use them, remove them the moment the first seedling emerges.
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 our blog *How Bottom-Watering Changed Our Lives* for a video tutorial for 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.

15. 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](#)



We all come from a great lineage of seedkeepers. From ten thousand years to a century ago, to be a gardener was synonymous with being a seedkeeper. Keen observation, thoughtful selection and an appreciation for diversity across the millennia have surrounded us with all the agricultural crops we now know, love and depend on. As Joseph Lofthouse loves to remind, everything we think of as agricultural diversity is the genius vision of ten thousand years of indigenous farmers, patient and brilliant, illiterate only by modern standards. Let's step into this legacy together.

16. A BRIEF NOTE ON SEEDS & SAVING THEM

THE LONGER WE GROW GARDENS, the more we're convinced they grow us more than we grow them.

Similarly, when we hear the phrase 'seed saving,' we often think, 'who's saving who?'

Resisting savior complexes, we lean into the notion of mutual plant and humxn co-adaptation, acknowledging and honoring that we all are being transformed as we accompany each other.

Some seeds are easy to save while others are truly a challenge.

At Fruition, we're profoundly inspired by the Chinese proverb reminding us that 'giving people fish' feeds them for a day while teaching them to fish feeds them for a lifetime. Believing all flourishing is mutual, we share seeds as well as extensive 'how to grow' information as well as seedkeeping insight, as well. You'll find all this alongside every seed on the 'shop' side of our website as well deeper detail on our 'learn' side. The most extensive information you'll find in our Growing Guides (see our *Tomato Growing Guide*, page 41) and dive into our free online seedkeeping course, *Generosity Across Generations: Seeds for Seasons to Come*.

17. SEEDKEEPING CHART

<i>Plant (Latin Name)</i>	Easy to Save	Life Cycle	Wet or Dry-Seeded	Self or Cross-Pollinating	Isolation Distance*	Optimum Pop Size**	Seeds Easy to Clean?
BEAN (<i>Phaseolus vulgaris</i>)	easy	annual	dry	self	5' ✨	5 ♣	yes
BEEF (<i>Beta vulgaris</i>)	advanced 🌱	biennial	dry	cross	1 mile	200	no
BROCCOLI (<i>Brassica oleracea</i>)	intermediate ♦	biennial	dry	cross	1 mile	60	yes
BRUSSELLS SPROUTS (<i>Brassica oleracea</i>)	advanced 🌱	biennial	dry	cross	1 mile	60	yes
CABBAGE (<i>Brassica oleracea</i>)	advanced 🌱	biennial	dry	cross	1 mile	60	yes
CARROT (<i>Daucus carota</i>)	advanced 🌱	biennial	dry	cross	1 mile	200	no
CORN (<i>Zea mays</i>)	intermediate ♦	annual	wet	cross	1 mile	200	yes
CUCUMBER (<i>Cucumis sativus</i>)	intermediate ♦	annual	wet	cross	1 mile	25	yes 🌱
EGGPLANT (<i>Solanum melongena</i>)	easy	annual	wet	self	80'	25	yes
FLOWERS (<i>diverse species</i>)	intermediate ♦	annual	dry	cross	1 mile	25	depends!
HERBS (<i>diverse species</i>)	intermediate ♦♥	annual	dry	cross	1 mile	25	depends!
GARLIC (<i>Allium sativum</i>)	easy	biennial	n/a	n/a	n/a	n/a	n/a
KALE (<i>Brassica napus</i>)	intermediate ♦	biennial	dry	cross	1 mile	60	yes
KOHLRABI (<i>Brassica oleracea</i>)	advanced 🌱	biennial	dry	cross	1 mile	60	yes
LETTUCE (<i>Lactuca sativa</i>)	easy ♥	annual	dry	self	5' ✨	5 ♣	yes ‡
MELON (<i>Cucumis melo, Citrullus lanatus</i>)	intermediate ♦	annual	wet	cross	1 mile	200	yes
ONION/LEEK (<i>Allium cepa, Allium porrum</i>)	advanced 🌱	biennial	dry	cross	1 mile	200	yes
PARSNIP (<i>Pastinaca sativa</i>)	advanced 🌱	biennial	dry	cross	1 mile	200	yes
PEA (<i>Pisum sativum</i>)	easy	annual	dry	self	5' ✨	5 ♣	yes
PEPPER (<i>Capsicum annuum</i>)	intermediate ♦	annual	wet	self	‡ see note below	5 ♣	yes
POTATO (<i>Solanum tuberosum</i>)	easy	annual	wet	‡ see note below	‡ see note below	‡ see below	yes
PUMPKIN (<i>Curcubita pepo</i>)	easy ♦	annual	wet	cross	1 mile	25	yes
RADISH (<i>Raphanus sativus</i>)	easy ♥	weak biennial	dry	cross	1 mile	60	yes
RUTABAGA (<i>Brassica napust</i>)	advanced 🌱	biennial	dry	cross	1 mile	60	yes
SPINACH (<i>Spinacea oleracea</i>)	easy ♥	weak biennial	dry	cross	1 mile	60	no
SQUASH (<i>Curcubita pepo</i>)	intermediate ♦	annual	wet	cross	1 mile	25	yes
TOMATO (<i>Lycopersicon lycopersicum</i>)	intermediate ♦	annual	wet	self	1 mile	5 ♣	yes 🌱

Often the easiest seeds to save are self-pollinating annuals that have easy seeds to clean.

- ♦ easy when isolated from other varieties sharing the same species
- ♥ resist saving seeds from the plants that bolt (go to seed) first, so you're selecting for longer vegetative windows. (Select in the opposite way for fruiting crops like tomatoes: save seeds from the first fruit(s)!
- 🌱 overwintering can be a challenge, especially in short seasons (with rodent pressure)!
- ‡ profoundly self-pollinating, these plants can bloom closer and not cross, so 5' is simply to make it easier to not physically cross them when harvesting. fun fact: beans & pea flowers are pollinated before they even open.
- ♣ technically only 1 seed/plant can grow seeds and resist inbreeding depression, but the more the merrier!

- *Isolation Distance: Physical barriers (barns, forest, a field of other blossoms) reduce this number. Also, if you're not concerned with plants crossing, let them cross!
- **Optimum Pop Size: Though larger populations are less susceptible to inbreeding depression, seed can be saved from smaller population sizes. If you're growing less total plants in a given generation, aim to have this # of plants crossing within 5 plant generations.
- 🌱 ferment seeds before drying
- ‡ LETTUCE when seedheads are individually harvested to minimize chaff
- ‡ PEPPER 60' between sweet, 300' to isolate from hot with absolute confidence
- ‡ POTATO Pollinating: tubers n/a, flowers self— Isolation Distance: for tubers, n/a flowers cross within 50' — Optimum Pop Size: tubers n/a; flowers 25'

18. 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>	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>	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:				

FRUITION SEEDS

guide to organically growing

TOMATOES

ENJOY DOZENS
MORE GROWING
GUIDES ONLINE
IN FRUITION'S
FREE
GROWING
LIBRARY!

Native to what we now call South and Central America, wild tomatoes are often the size of peas. We have the Aztecs and other indigenous peoples of Mesoamerica to thank for co-adapting the delectable diversity of colors, shapes and sizes of the fruit we now celebrate. Named 'tomatl' in Nahuatl Aztec, Spanish colonization swept the 'tomato' across oceans and continents; by the 16th century tomatoes were mentioned in a Nepalese cookbook. Though many of us think of tomatoes as quintessentially Italian, much of Europe feared tomatoes even in the late 1700s, believing them as poisonous as so many other members of the nightshade family. In 1889, 'pizza' was created in Naples to present the colors of the Italian flag to the visiting Queen; the rest is history.

AT A GLANCE

Latin Name: *Solanum lycopersicum* (though there are others, like *S. pimpinellifolium*)
Sun: Full **Life Cycle:** Annual

Direct sow or transplant: Transplant only **Ease of care:** Moderate-difficult

Height: Compact varieties 2.5 to 3 feet, 75 to 90 centimeters;
determinate varieties ~4 to 5 feet, 120 to 150 centimeters; indeterminate varieties 5+ feet, 150+ centimeters

Container Friendly: Yes, especially compact & cherry varieties

TYPES OF TOMATO

FRUIT SIZE

Slicing tomatoes grow in a delicious rainbow of colors, beloved for their large fruits perfect for sandwiches and so much more! 'Slicers' may grow 5 ounce to 2+ pound fruits, depending on variety. 'Gold Medal' is a quintessential slicing tomato.



Cherry tomatoes also grow in a delicious rainbow of colors, their abundant fruits easy to pop right in your mouth as they cascade off laden trusses. Cherries are often spherical though they fruit in a fabulous diversity of shapes, including hearts and grape-size 'plum' tomatoes. Some have higher water content than others; those with low-water content are ideal for drying. 'Chiapas' is a quintessential cherry tomato.

Paste or Roma tomatoes have lower water content than slicers as well as fewer seeds, making them ideal for making tomato sauce and paste. Often more cylindrical in shape, 'Ten Fingers of Naples' is a quintessential paste tomato, though they can truly fruit in any shape. For example, 'Italian Heirloom' is an ox-heart style paste, aptly named and often over 18 ounces of sweet, dense fruit with surprisingly few seeds.

Saladette Often called 'two-bite cherries,' saladette tomatoes are often 2 to 3 ounces, more or less the size of a golf ball. We love to slice them in half for salads! Summer Sweetheart is a quintessential saladette tomato.

And Beyond! There are literally thousands of tomato varieties that don't fit into any of these categories and we hope you meet many of them along your journey.

PLANT SIZE

Compact or 'dwarf' tomatoes only grow between 2.5 to 3.5 feet tall, depending on variety and fertility, making them perfect for containers and small spaces. 'Lemon Ice' is a quintessential compact tomato.

Determinate varieties have a 'determined' fate, only growing between 4 and 5 feet, depending on variety and fertility, producing all of their fruit within four weeks.

Semi-Determinate Though only growing between 4 and 5 feet like determinate varieties, semi-determinates continue flowering and fruiting throughout the season like indeterminate varieties. 'Seiger' is a quintessential semi-determinate tomato.

Indeterminate tomatoes often grow well over 5 feet tall, continuing to flower and fruit all season long. 'Rose de Berne' is a quintessential indeterminate tomato.

SOW

Tomatoes are challenging to grow from seed and stressed seedlings resist abundance, so we recommend starting your own tomatoes when you have a heat mat, grow light (or great south-facing sunroom or greenhouse) as well as ample energy to devote to potting them up.

Enjoy our 40-page book *Rise & Shine: Starting Seeds with Ease* for step-by-step instructions! You'll find paper copies at www.fruitionseeds.com as well as our free download of the ebook.

Goal: Healthy, vigorous seedlings that are relatively short and stout (not 'leggy'), deep green and potted up before showing signs of stress. Plan to transplant your tomato seedlings after final frost once nights are above 50°F, 10°C.

Common Mistakes: Starting tomato seeds **without a heat mat** leads to low germination rates since 77°F, 25°C is their optimum germination temperature. **Starting tomato seeds too early**, especially if you don't have a grow light, grows stressed seedlings that will struggle to fruit abundantly. **If you don't have a grow light or greenhouse**, it's often more rewarding to purchase gorgeous tomato transplants instead. Also, tomatoes struggle if they experience nights below 50°F, 10°C, so sowing seeds even later than you think & not rushing to transplant them will often surround you with the most abundance.

Days to germ: 7 to 10 at 77°F, 25°C (heat mats make all the difference)

When: 6 to 8 weeks before last frost (We start our tomatoes in early April here in Zone 5)

Direct sow/transplant: Transplant only

Spacing in row: 24 to 30 inches, 60 to 75 centimeters

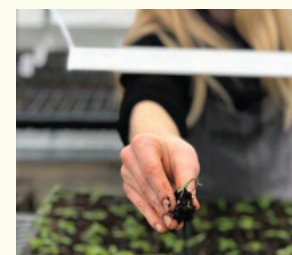
Spacing between rows: minimum 36 inches, 90 centimeters

Seed depth: 1/8 inch, .3 centimeters

Seeds per soil block/cell: 1 per mini soil block, 2 to 3 in larger soil blocks/cells thinned to the most vigorous 1

Preferred seed starting method: We love to sow 1 tomato seed per mini-block in a tray on a heat mat for the quickest and highest germination. Once the first cotyledon leaves emerge, we 'pot them up' (see below) into large soil blocks. When the second set of true leaves emerge, we pot them up into 4 inch (10 centimeter) containers, burying the stem up to the first set of true leaves.

If you're sowing into a cell tray on a heat mat, sow 2 to 3 seeds per cell, thinning to the strongest 1 and potting up into a 4-inch container one the second set of true leaves emerge. Resist using egg cartons & jiffy pots to start seeds, Friends! Enjoy our blog, *Egg Cartons are for Eggs: Six Effective Containers for Seed Starting*.



Mini soil block:
Once 1 seed sprouts 1st set of cotyledon leaves, pot up to...



Large soil block: When 2nd set of true leaves emerge, pot up to...



Cell tray: Sow 2 to 3 seeds & thin to strongest 1; once 2nd set of true leaves emerge, pot up to...

When to Pot Up
Pot up peppers, tomato, eggplant early & often!
~ note: images are not only of tomatoes ~



4 inch (10 centimeter) container:
If you have more than 4 sets of true leaves, pot up to minimum 6" container

Potting Up: Potting up tomatoes is essential, allowing your seedlings to continue vigorous growth, experiencing the least stress possible. Pot up early and often! Water just prior to potting up to minimize root disturbance. Nutrient-dense potting mix makes all the difference, reducing the need to pot up as often. Unlike peppers, eggplant and most other seedlings, tomato stems turn into roots when buried rather than rot. Burying half to 2/3rds of your tomato seedlings' stems as you pot them up encourages greater rooting and nutrient uptake, ultimately growing a more healthy and resilient plant. This is also a great opportunity to make a 'leggy' seedling less so, though if this is the case, focus on providing more quality light so your seedlings will be that much healthier and more abundant. Also, if your plants are outgrowing their 4-inch (10 centimeter) pot, pot them up again into 6-inch (15 centimeter) pots or larger. Keep in mind, especially as you're planning when to sow your seeds, that younger, unstressed plants are more healthy and thus more abundant than older, more stressed plants.

Watering Seedlings: Bottom-watering makes all the difference (see our blog, *Bottom Watering is Your New Best Friend*, for full details) and only overhead water after letting the top millimeter of your potting mix dry out, preventing algae growth on the surface as well as damping off.

Feeding Seedlings: We feed our tomato seedlings once they have 2 sets of true leaves, spraying their foliage with dilute fish emulsion every 10-14 days.

Succession sowing: Since tomatoes require a long growing season, continuing to fruit more abundantly with time, care and fertility, we do not succession sow tomatoes.

Companion planting: We love to tuck quick-growing greens and herbs between our tomatoes when we transplant them to harvest within 6 weeks when the tomato canopy fills in. Try baby leaf lettuce and mesclun mix, radish, dill and cilantro, even baby basil! Your goal is to fill empty space while not shading or crowding your tomatoes.

Fertility Considerations: Tomatoes are hungry! There is a direct relationship with quantity & quality of nutrients available and the quality and quantity of abundance you'll harvest. Also, tomatoes require abundant phosphorus and calcium for proper flower and fruit growth. Too much nitrogen produces abundant foliage rather than fruit. Fruition's Fish & Kelp Emulsion is optimally balanced for fruiting plants like tomatoes, which we foliar feed every 2 to 3 weeks until just before frost.

CULTIVATE

Soil & Sun: Tomatoes prefer well drained fertile soils with a pH of 6.3 to 6.6 in full sun.

Spacing in row: 24 to 30 inches, 60 to 75 centimeters

Spacing between rows: minimum 36 inches, 90 centimeters

Transplanting: Tomatoes are most healthy and happy when transplanted after final frost, ideally night temps are above 50°F, 10°C. It's critical to 'harden off' your seedlings, acclimating them to life outdoors for 4 to 7 days before planting them. Plants can get sunburned, too! Slowly increase their sun exposure during this time. Just before transplanting, shower your seedlings with water or dilute fish emulsion to loosen and feed their roots, mitigating transplant shock.

Tomatoes can be transplanted either vertically or horizontally. Transplanted vertically, dig a hole about three-quarters as deep as the plant is high, adding a handful of compost or a dusting of our slow-release organic fertilizer to the bottom. Remove your seedling from their container, back-filling their roots & stem while burying about three-quarters of the stem. Gently tamp down the soil around each seedling base, reducing air gaps. Water with an extra dose of dilute fish emulsion, if you have any handy, and hooray!

Transplanting horizontally is brilliant, allowing your plant to establish only in the warmest, most nutrient-available top few inches of the soil, though it takes more effort and care since it's much easier to snap your tomato stem in the process. Ideally, harden off your tomato in a horizontal position, allowing your tomato's intrinsic phototropism to bend their top toward the light. When you're ready to

transplant, dig a trench as long as you need to bury three-quarters of your tomato stem only two inches deep, digging a deeper hole where your roots will be buried. Add a handful of compost or a dusting of our slow-release organic fertilizer in your hole and along your trench. Remove your seedling from their container, back-filling their roots & stem while burying about three-quarters of the stem, taking care to not snap the top of your tomato stem pointing skyward. Gently tamp down the soil around each seedling base, reducing air gaps. Water with an extra dose of dilute fish emulsion, if you have any handy, and hooray!



Tomatoes are hungry! There is a direct relationship with quantity & quality of nutrients available and the quality and quantity of abundance you'll harvest. Also, tomatoes require abundant phosphorus and calcium for proper flower and fruit growth. Too much nitrogen produces abundant foliage rather than fruit. Fruition's Fish & Kelp Emulsion is optimally balanced for fruiting plants like tomatoes, which we foliar feed every 2 to 3 weeks until just before frost.

Note! If your tomato (or pepper, eggplant, ground cherry or tomatillo) is flowering before or as you're transplanting, remove those flowers. So hard, right? It's counter-intuitive, true! Nonetheless: seedlings flowering prior to transplanting are stressed, fast-forwarding to the end-game of reproduction as a last-gasp hail mary. Removing these flowers allows your tomato to focus on vegetative and root production, becoming a strong, healthy tomato before flowering, which will ultimately surround you with significantly more abundance.

Weeding: Tomatoes are easily crowded by weeds. Mulch is marvelous! Darker mulches both suppress weeds and increase heat, which tomatoes love.

Feeding: Well-fed tomatoes are healthy tomatoes surrounding you with abundance! We share a handful of compost and a dusting of our granular slow release organic fertilizer in each hole as we transplant our tomatoes. We then feed our tomatoes with dilute fish emulsion, either as a root drench or foliar spray, every 2 to 3 weeks until 1 to 2 weeks before frost. Compost tea and worm castings tea are fabulous ways to nourish your tomatoes, as well.



Pruning tomato bonus branches make your tomatoes more manageable as well as fruitful. Pruning also increases light infiltration as well as airflow around your tomatoes, hastening ripening and decreasing disease susceptibility.

Pruning: Tomatoes produce abundant growth and fruiting branches often called 'suckers' and Friends, instead of pruning tomato 'suckers' we prune 'bonus branches' which is a Fruition community-sourced vocab shift which we just love!

Pruning tomato bonus branches make your tomatoes more manageable as well as fruitful. Pruning also increases light infiltration as well as airflow around your tomatoes, hastening ripening and decreasing disease susceptibility. Not all tomatoes need pruning, though the ones that need it really benefit from it (see below). 'Bonus branches' are side shoots emerging from your main stem just above each leaf which, left to their own devices, will fruit as well as grow yet more bonus branches.

Compact tomatoes need no pruning. Indeterminate cherries, semi-determinate and determinate varieties only need pruning in the first few weeks, ensuring that the bottom foot of each stem is a strong 'single leader.' Indeterminate slicers benefit from even more pruning, so there is more space, light and airflow in the canopy. The earlier you prune the better, so you're removing tiny little 'suckers' rather than large branches. Tiny 'suckers' can be snapped off by hand; larger than a pencil, snip your 'suckers' with scissors. Pruning your tomatoes is more about trial and error than precision, since each tomato plant is unique. Interestingly, some varieties need more pruning than others. Our 'Italian Heirloom,' for example, is naturally more sparse in foliage and branching than most. Also, it's easy to prune too much, especially when you're first learning to prune, so hold back and simply

observe the growth habits of your plants. You'll never look at tomatoes quite the same!

We also 'prune' our tomatoes about 4 weeks prior to frost, lopping off all the vegetative growth above the highest fruit set. Since tomatoes take about 28 days to ripen from flower to fruit, 'topping' tomatoes in this way helps your plants focus on ripening the fruit already forming while encouraging more light to infiltrate the canopy, additionally encouraging fruit ripening.

Pests: The beautiful Tomato Hornworm is the most common 'pest' insect affecting tomatoes, ravenously devouring both foliage and green fruit. Hand-squishing is the most 'organic' method to curb their populations, though we most often slice them in half with scissors or collect them in a bowl to toss to our neighbor's chickens. Braconid wasps naturally curb their populations, laying large white eggs on the caterpillar's back for larvae to emerge, quickly hatching to devour the hornworm alive. If you see such eggs, resist squishing that caterpillar! Brilliantly camouflaged in tomato foliage, hornworms can be tricky to find though their white spots can't hide from black lights in the dark.

Disease: In the Northeast, tomatoes suffer from many diseases, though the top three by far are late blight, early blight and septoria leaf spot. See our blog as well as ebook about *Identifying & Managing Tomato Disease Organically* as well as our blog sharing the *5 Keys to Preventing Tomato Disease (there is no silver bullet, but #1 is close)*. There is so much more to share! Blossom End Rot is also common, though it is a nutrient deficiency rather than a disease. An abysmal disappointment, Blossom End Rot is both manageable and preventable. Dive into the details in our blog, *Identifying & Managing Tomato Disease Organically*.

Trellising: All tomatoes benefit from trellising. Even compact varieties only 2.5 feet (75 centimeters) tall will ripen more fruit more quickly and be less susceptible to disease when trellised! Tomato 'cages' we rarely recommend except for compact varieties in containers; for all other tomatoes we recommend 'The Florida Weave,' brilliantly using just stakes and twine. Placing one 5-foot (150 centimeter) stake every three plants, weave twine (baling twine is much stronger than jute) between each plant, pulling as taught as possible between stakes. Circle each

stake twice to help hold the line taught, tying off once you reach the end. We aim to place twine every foot or so high, with lines pulled taught on both sides of your plants.

Containers: Tomatoes often thrive in large containers better than many other 'heavy feeding' crops like brussels sprouts and garlic. Compact or 'dwarf' varieties are best suited for containers; cherries can also thrive and indeterminate slicers are by far the least happy, healthy & thus abundant in containers. Though they survive with less, we recommend 10 gallon containers as a minimum or tomatoes, 15+ gallons all the better.

Be sure to fill your container with nutrient dense, slow-release fertility, Friends! Keep in mind that potting mix is perfect to start seeds but not to grow plants. Garden soil with plenty of compost is optimal, combined with an organic slow-release fertilizer (like our granular mix) incorporated into every square inch of the container, inspiring a vigorous and extensive root system throughout the container. Additionally, foliar feed or root drench with fish emulsion, compost tea and/or worm castings tea every two weeks to keep your plants healthy and abundant.

Grow just one tomato in the center of each container with quick-growing cut-and-come-again greens and herbs (basil is our favorite!) along the outer edge of the container. As the tomato overshadows the greens below, harvest them all and mulch for the greatest moisture retention and airflow. Enjoy our free *8 Keys of Container Gardening Mini-Course* for more tips like this!



All tomatoes ripen more fruit more quickly and are less susceptible to disease when trellised! Tomato 'cages' we rarely recommend except for compact varieties in containers; for all other tomatoes we recommend 'The Florida Weave,' brilliantly using just stakes and twine.

As tomato leaves yellow and abundance wanes, sigh: your plants are hungry. Foliar feed with fish emulsion or compost tea every two weeks all season long to stay ahead of the curve, keeping them healthy & prolific all through the season.

Season Extension: Tomatoes are most prolific with abundant heat, so anything you can do to increase the heat your tomato plants experience will amplify your abundance. Though hoops and floating row cover are an easy way to extend your harvest well past fall frost for many crops, the height of tomatoes makes this a difficult strategy. We find that there are often several weeks of frost-free nights after our first significant frost, so if you can throw sheets or heavy-weight floating row cover over your tomatoes to protect from those first frosts, you'll often ripen all the more fruit. Finally, some varieties like our Pianello del Vesuvio have been selected to have branches harvested and hung indoors to extend the harvest, well before the age of canning and freezing.

HARVEST

Though deceptively obvious, no matter our preconceived notions of color & shape, a tomato is ripe when it is soft to the touch. Many heirloom tomatoes will have greenish shoulders and this is actually a sign of deliciousness! For the full story, enjoy our blog, *The Secret (& Unexpected) Signs of a Ripe Tomato*.

At season's end, when the inevitable killing frost is imminent, we harvest the last of the tomatoes, including all large-ish green tomatoes, which we love as fried green tomatoes as well as chutney.

SEED KEEPING

Life cycle: Annual (in Zone 5, though perennial where it never freezes)

Self or Cross-Pollinated: Self-pollinated, tomatoes can still cross within ten feet. Varieties of 'potato leaf' (as opposed to more serrate 'modern' leaves) often have exerted stigmas, more prone to crossing. At Fruition, we separate all our tomatoes by at least 50 feet (15 meters) to be confident they will not cross.

Wet or dry-seeded: Wet

Qualities to select for: Above all else, deliciousness! Early vigor, early fruiting, abundant fruiting, stout and strong architecture as well as disease resistance are also important. Also, if you prefer tomatoes that don't crack, only save seeds from plants and fruit that are not cracking.

When to harvest: Mature seeds are harvested from mature fruits allowed to fully ripen on the vine. We love saving tomato seed because we get to 'have our cake (save our seed) and eat it, too!'

Seed Cleaning Notes: Saving tomato seed is deceptively simple, Friends. Yes, you can simply separate each seed from the fruit, rinsing and drying them before tucking them in an envelope to sow next season. But here's the thing: That clear membrane surrounding each seed is full of anti-germination compounds. Unless that membrane is removed, only about 30% or so of your seeds will germinate.

Which isn't the worst, but it's far from the best. For thousands of years our ancestors have fermented tomato seeds, effectively neutralizing those anti-germination compounds as well as removing some seed-borne diseases. It's a gloriously simple process. First, harvest your fruit. Once you squeeze out the seeds into a glass jar, enjoy the fruit and label the jar with variety name and ferment date. Next, add an equal measure of water to the pulp and seeds, covering with a napkin and rubber band. This keeps the fruit flies at bay as your tomato seeds ferment for a few days! Soon distinct layers will form: dense, mature seed at the bottom and light, immature seed with pulp at the top and a clear-ish layer of water in the middle. Next, pour off all but the mature seeds and rinse them well before drying on screens with fans wicking away moisture quickly. For a video tutorial and much more detail, dive into our blog, *Saving Tomato Seed in Seven Easy Steps*.

Seed storage & viability: Like all seeds, dry, cool and dark conditions increase the shelf-life of your tomato seeds. Expect 3 to 4 years of great germination when your tomato seeds are stored well. Enjoy our blog about seed storage, including freezing techniques, on our website.

Special Considerations: Though most tomatoes are *Solanum lycopersicum*, we are able to grow several other species here in the Northeast. Distinct species don't cross in the textbooks, though we recommend separating all your tomatoes by at least 10 feet (3 meters), regardless of species, if you're committed to them not crossing.

BEST OF THE BLOG

- Fruition's Guide to Growing Tomatoes
 - 5 Keys to Preventing Tomato Disease (there is no silver bullet, but #1 is close)
 - 7 Steps for Gorgeous Tomato, Pepper & Eggplant Seedlings Plus Common Mistakes to Avoid
 - 7 Steps to Transplant Tomatoes Perfectly (#2 May Surprise You)
 - Secret (& Unexpected) Signs of a Ripe Tomato
 - How to Ripen Green Tomatoes in September
 - Saving Tomato Seed in Seven Easy Steps
 - Ideal Varieties for Container Gardening & Raised Beds
 - How Long Do Seeds Last? Fruition's Secrets to Storing Seeds
- Enjoy the videos with each of our varieties online, as well!*



Insight & inspiration daily!

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20. 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,

petra: matthew

& the whole Fruition Crew



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sow what you love & love what you sow