Bona Terra General Seedling Division Guide

Welcome to Our Seedling Division Guide

We're excited to have you join us on our mission to make native plants more accessible and to maximize the benefits of native plants in our community. To that end we're offering community quart pots filled to the brim with various plant species. Through our Plant Grant Initiatives, such as the Group Plant Grant, Individual Plant Grants, Native Seedling Giveaway Events and Bona Terra Sponsored Community-led Giveaway Events, we aim to bring native plants to anyone who is willing to spare some time for the environment.

While these initiatives give you more plants and help the environment, it does require a bit of effort and simple know-how on your part. This guide is your go-to resource for dividing our densely packed quart sized community pots. Whether you're a seasoned gardener or just getting started, these instructions will boost your success with any of our community pots. We understand that dividing these pots may seem a tad challenging, but don't worry – it's easier than generally assumed! This guide will walk you through the entire process, equipping you with the knowledge needed to make the most out of your seeded quarts. With dozens to hundreds of seedlings in a single quart container, a little planning will go a long way toward ensuring successful transplantation into pots or into the ground efficiently. So let's get started, and by the end of this guide, you'll have the knowledge and confidence to make the most out of your seeded quarts!

Tools Needed:

- Workbench: a large enough space for you to be able to spread out while separating seedlings
- Stool: seedling separation takes some time (1-4 hours per seedling quart), so make sure you're comfortable
- Broom
- Dustpan
- Small containers: for holding seedlings while dividing
- Pots to plant seedlings
- Soil mixes*
- Non-chlorinated water*
- Mister or hose with mister setting

- Aquaculture tweezers: for carefully putting seedling roots in soil (these are available for purchase at the nursery
- ½-inch sifting pan: to sift out large particles and ensure your soils are loose
- Shade for plants*: to protect the plants from heat and to slow photosynthesis
- Irrigation*: this is not essential but it's worth the minor investment for the time saved and peace of mind.
- Rain barrel (preferred): for collecting rainwater for irrigation
- Soil*
- Fertilizer: use organic fertilizer at 10% of what the bag recommends
- Water buckets for washing roots

*indicates that there are further notes in sections below.

Soil Recipes:

Dry Soil Mix

65%	5-year aged wood chips sifted through ½-inch screen or sifted peat-based potting soil
10%	Compost
15%	Pine fines or sand or a combination of the two
10%	Biochar or perlite or coarse vermiculite or a combination of the three

Organic Soil Mix

75%	5-year aged wood chips sifted through ½-inch screen or sifted peat-based potting soil
15%	Compost
10%	Biochar or perlite or sand or a combination of the 3 totaling 10%

Important Factors to Consider

Direct-to-Ground Planting vs. Planting in a Pot

When deciding between planting in the ground or in pots, there are several key considerations to keep in mind.

Planting in the ground, or **direct-to-ground planting** offers the advantage of requiring less overall time and reduces environmental resource usage. It's an efficient choice, especially if you have limited time for gardening. However, it does demand more knowledge, particularly in terms of seedling care, timing, and soil preparation tailored to specific species. It's recommended to consult our species notes for beginner-friendly options for direct-to-ground planting.

On the other hand, **planting in a pot** is a more forgiving approach that requires less specialized knowledge. It offers flexibility in timing and ensures seedlings reach a size where they are less likely to be weeded during maintenance. However, it comes with higher costs for soil and fertilizers, increased time spent on plant care, and may involve more physical labor, such as digging larger holes.

Consider your available resources, expertise, and project goals when making the choice between these two methods. Each approach has its merits, and the decision should align with your specific circumstances and preferences. This will likely be your first big decision, so let’s break down the pros and cons of each

Direct-to-Ground Planting

Pros	Cons
Less Work and Time: Planting directly in the ground typically requires less overall time so that you are able to get more done with the time you have.	**Requires More Knowledge**: It necessitates knowledge and skills for tasks like dividing seedlings without damaging roots.
Lower Environmental Resource Usage: It reduces the need for resources like water, fertilizer, and soil.	**Timing Expertise**: You need to know the best timing for planting in the ground and the ability to identify each seedling to avoid accidental weeding.

Less space required: You don't need a nursery space while plants are growing out	**Expert Soil Preparation**: Tailoring soil preparation to individual species is best done by someone with experience. (See our species notes for information about what species are easy for beginners to use for direct to ground planting.

Planting in a Pot

Pros	Cons
Less Skill Required: This method is generally more forgiving and requires no specialized knowledge. (Milkweeds are a notable exception to this and often perform better with direct to ground planting)	**Higher Costs**: There are additional expenses for items like soil and fertilizers.
Increased Timing Flexibility: You have greater flexibility in choosing the timing of planting.	**More Time Spent**: It demands more time spent on watering and growing plants in pots.
Easily Identifiable Size: Seedlings can be grown to a size where they are less likely to be weeded during maintenance.	**Physical Labor**: Installing plants in pots may require more physical labor, including digging larger holes.
	Needs more space: More nursery space is required as plants are growing out

Consider these factors when deciding whether to plant in the ground or in pots, and choose the approach that aligns best with your resources, expertise, and goals.

Water

The water you use can have a big impact on how well your plants will grow in a container. Our atmosphere is filled with microscopic nutrients, microbes, spores, and other key nutrients plants need to survive. When grown in a container, plants are

isolated from the nutrients in the ground, so providing these nutrients with your water will increase the viability of your plants.

- **Rainwater** is best to use for watering your plants. It contains beneficial microbes and micronutrients that water accumulates in the atmosphere before or during rain. If you are using rain barrel water, be sure that your rain barrel is well-maintained and relatively fresh. Don't use rainwater that's been sitting in a rain barrel untouched for months .
- **Well water** will work nearly as well as rainwater (it comes in a close second). Well water will not have the same benefits as rain but it does not contain chlorine so it also will not have a negative effect.
- **Municipal water** is typically treated with chlorine to prevent microorganisms from growing in it. If you use this water, it will kill many other microorganisms in your soil. Municipal water and well water are also missing all the beneficial microbes and micronutrients that water accumulates from the atmosphere before and during rain.
- Never use **distilled water** because it is not an environmentally friendly way to provide your plants water.
- Don't use water on your plants that contains chlorine. The chlorine in **tap water** is expressly there to kill microorganisms. If you use this water, it will kill the microorganisms in the water and soil that your plants rely on for disease resistance and nutrient density.

Shade

Providing shade for your plants after they have been divided will be a key factor of having a high success rate. Shade is most important during division and for the following two weeks. Even if your plant naturally prefers full sun conditions, they will benefit from having some shade for a couple weeks after they've had the roots disturbed by the division process. When seedlings are removed from their trays, it is inevitable that some roots will be damaged. For those that are transplanting directly into the ground that means taking extra time and care with the plants you plan on putting in the ground.

With the use of shade, you can protect your plant from drying out faster by keeping the temperature lower and reducing the amount of photosynthesis than can occur while the plant restores the balance between its roots and leaf systems. After about 3 to 10 days your plants will have healed over their damaged portions and will have begun to bring themselves into equilibrium by growing new roots.

Once they have reached equilibrium you can put them back into their natural lighting conditions. If you're not sure if your plants are ready to be moved, just move one or two out into the light. It may be a bit wilted on the first day, but should bounce back that night and look good in the morning. If your plant does not bounce back and rehydrate itself overnight, your plants will need some more time in the shade.

Your plants will do best if you put them in the lighting conditions described for the species, but if there's a particularly hot week or you are unable to water for a few days, you can buy yourself some time by putting it in the shade for up to two weeks. You can use shade cloth, trees, or even old window screens to provide shade. If you are using the shade of a tree, remember that light rain is often entirely blocked by the canopy. If your tree has gone to seed, it can create a lot of work for you down the line if your plants have tree seeds in them. When using a tree for shade, it is ideal for your plants to get 1 to 2 hours of sun in the morning or evening.

Preparing for Seedling Division

Pot Sterilization

Pot sterilization is extremely important when growing in a greenhouse or for large-scale operations where diseases or pests can easily sweep through large monoculture stands of plants. Fortunately, you're not a large-scale operation and these plants are native so they can be kept outside. Plus, you're hopefully using a living soil mixture that provides a lot of resilience for your plants to fight off pathogens. A simple inspection of the pot for insects or old soil particles will do. If the pot is quite dirty just wash it off with water. If there is a lot of residue and it's difficult to get off then soak your pots in a bucket of water overnight. If you are still concerned about the sterility of your containers add 1 tablespoon of bleach to 5 gallons of water before soaking overnight.

Making Living Soil

Much of the focus of plants is placed on what you see above the ground, but all of the water, nutrients and most of the carbon dioxide that a plant needs come from within the soil. Your plants will only be as healthy as your soil: each native plant has its own network of thousands to hundreds of thousands of organisms in a symbiotic relationship that help it thrive. Healthy soil is paramount for healthy plants. Commercially available

potting soils (such as Miracle-Gro) are full of chemicals that may not do much to visibly harm your plant or show an immediate health impact, but they have immediate damaging effects to the microorganisms that these plants rely on to maintain the vitality they need to resist pathogens and insects.

The best soil mixes start with what you don't use. Don't use soil mixes laden with chemical-based fertilizers. These are one dimensional nutrients, which is much like feeding your own body nothing but sugar and white bread: plants can also be set up for many long-term health consequences if they consume a nitrogen-rich and nutrient-poor diet. This advice is based on plants growing in containers and doesn't necessarily apply to plants in the ground that have access to a broad spectrum of naturally occurring nutrients.

The other big killer of microorganisms is the sun. This really only applies to the smallest containers, such as plug-sized cells. During the hottest part of the year (July and August), the temperature of the soil in small containers can rise to levels that your plant can tolerate, but which soil microbes may not. There are two ways to combat this temperature issue. One is with a shade cloth or midday shade provided by a tree or some other canopy. The second way to combat this is by continually infusing your small containers with compost tea. See the section on how to make compost tea.

Once you have eliminated ways to kill microorganisms from your soil systems, creating a living soil is the job of the microbes, and all you have to do is feed them. When feeding your microbes you want organic matter in all stages of decomposition. The primary volume of your soil should be for the most part inert. Inert materials include sand, clay, perilight, vermiculite, fully decomposed wood chips/mulch, and (given the absence of a better option, the dreaded slayer of the tundra and other carbon-locking ecosystems) peat. For ratios of inert material to organic material, see the soil recipe section.

Ingredients for living soil are as varied as life on earth. The most common ingredients are compost, worm castings, organic fertilizer, leaf mulch, wood mulch, coffee grounds, and just about any organic material that can fit through a half inch screen. For the most part there is no need to introduce new microbes to your soil. Many of them will already be well established in compost, worm castings, and decomposing material in your mixtures. If you want to add microbes, I suggest waiting a week or two after you've potted up your plants before making compost tea. See the section on how to make compost tea.

How to Fill Pots with Soil

When filling your pots with soil, you should take freshly mixed and loose soil and fill it to the rim of the container. Never compress your soil by pushing down on it for this will reduce the amount of air and water that your container can hold, and plants will need that air and water to thrive. Once you have filled your container to the rim, lightly tap it on the ground once or twice to allow the soil particles to fall down and fill any gaps or cracks in the soil. After you've tapped the container there should be approximately ¼-inch gap between the rim and the soil for plugs, a ½-inch gap between the rim and soil for quarts, and a 1-inch gap between the rim and soil for gallon size containers. This is to make room in your container to hold enough water to hydrate the soil below when watering in the future.

If you are using soil that still has weeds seeds from compost or other organic material you've added, you'll want to make a separate mixture of soil that is free of weed seeds, such as potting soil purchased from a store. When using a combination of soil that has weed seeds in it and clean soil, you should fill the bottom 3/4 of your container with the weedy soil mix and then put at least a 1 inch layer of weed-seed-free soil on top of it. For quart and gallon-sized containers, you can also put a layer of mulch on top of it. That mulch can be made of shredded paper, rice hulls, leaf mulch or regular mulch. If your mulching material has chunks in it larger than a half an inch you may want to run it through your half inch screen to sift out larger particles. When using mulch for your seedlings, it is usually faster to fill the container with soil and put the mulch in. Move the mulch aside only in the area you are putting the seedlings in rather than mulching after you've planted.

Keep Bare Root Plants Moist

To better understand how to handle your bare root plants after you've divided them you should understand a few of the mechanics of plant biology. Plants' vascular systems work much like a siphon. As water evaporates out of the leaves, it pulls water up through the roots into the stem and out through the leaves. Much like the physics of a siphon, if you get air in the system, its ability to expand and contract (unlike liquid) results in the siphon system failing. Similarly, if you let air get absorbed by the roots where water should be, you have doomed that portion of root to death. If this happens to enough roots, the whole plant will die. You can avoid this by always keeping a thin layer of water on the roots. Keep a mister handy and every few minutes as you're dividing the plants spray a little mist on them.

Whenever I'm dividing plants and collecting them before I pot them up, I usually keep them in an empty nursery pot to reduce the air flowing around the roots. I will keep a second pot of the same size so that I can put it over the plants and protect them from the wind and extend the time it takes for them to dry out. When plants are hot they transpire more water. Plants use water to regulate their temperature by radiating heat as well as to photosynthesize. You can slow this process down by choosing the coolest location you can for dividing and potting up plants. Never divide plants in the area with direct sunlight unless it is below 50°F outside. Use the mist setting on your hose to keep the roots hydrated and cool as the water evaporates off of them, taking some of the heat with it. Watch out for hot water in the hose if it lays out in the sun.

You can store bare root plants in the refrigerator for 3 to 10 days by loosely placing them in a container and covering them with a damp cloth or rag. If plants are left in the refrigerator for 3 days, you can still have a good retention rate of your seedlings (100%). Each subsequent day, you tend to lose about 5% of your seedlings that are refrigerated.

Irrigation

Hopefully you have decided to water your plants with rainwater. Unless you are able to hook up an in-line pressure system, you'll be relying on gravity to pressurize your system. For the most part, the easiest way to distribute this water is going to be with a handheld hose. I recommend trying lots of different attachments to find what works best with your rain barrel.

Fertilizer

Use organic fertilizer at 10% of what the bag recommends. Avoid fertilizer for 10 days after division if possible.

How to Divide Seedlings

This is a process that is easier to explain with a visual guide at our seedling division demonstrations. We hold these at our giveaway events and you can watch the seedling division video using the QR code below or this link:
https://www.instagram.com/p/CstvIXovLJ6/?hl=en

How to Separate Seedlings

Gently wash the soil off of the plants, particularly along the edges, and then gently coax plants out of the root ball. Water is a good lubricant for tough ones, and working in concentric rings from the outside-in is often the most effective approach. Place the separated seedlings in a small container with wet cloth before either gently placing in soil (in the ground or a pot), or storing in the refrigerator.

How to Pot Up Seedlings

Grab your tweezers in one hand and hold the crown of the plant in the other. Comb the roots down and position the tweezers approximately a quarter of the way up from the bottom of the length of the roots. While roots are in the tweezers use the tweezers to fluff up the soil to create a hole so that the roots are halfway down, and then push the roots down the rest of the way into the soil with the tweezers. You can fluff up the roots so they're evenly dispersed and tuck in the short stragglers. Smooth out the soil surface and check to make sure that the crown is exposed and all the roots are buried. Water within 5 to 10 minutes of the seedling being potted. Plants with 90% of their roots preserved can be put directly into well-prepared garden beds.

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