Bona Terra Seed Growing Guide

Table of Contents

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Enhancing Genetic Diversity with Seeds: A Key to Thriving Habitats

Embrace genetic diversity right from the start, create a vibrant and resilient habitat in your yard with seeds. Think of it like this: you wouldn't start a dairy operation with just one cow and one bull, or create a new dog breed from a tiny gene pool of a few dogs, right? The same concept applies to your garden.

Why Genetic Diversity Matters

The more genetic diversity you have within a species in your plant community, the hardier your habitat becomes. Here's why it's crucial:

1. **Resilience:** Genetic diversity equips your plants to handle a variety of challenges – from diseases to droughts and wet years.

2. **Unique Traits**: Over time, unique beneficial traits encoded in your plant's DNA emerge. These might include thriving in local soils, resistance to salt, adaptability to urban heat islands, and other local variations. These traits increase a plant's chances of reproducing seeds and thriving in your ecosystem.

3. **Supporting Local Wildlife**: Local wildlife has evolved alongside their local plant life, and therefore recognize and depend upon these plants for food, shelter, and to complete their life cycles. Many insects in particular do not recognize cultivars within the species of plant due to the alterations made by man.

4. **Increased Planting Success**: Plant species adapt to their local conditions in varying degrees, some more specific to their location than others. The more closely you match the environmental conditions to the source of your plant material, the more likely your plantings will succeed in that location.

Seeds vs. Mature Plants

Starting from seed or young plugs grown from seed offers significant advantages. Here's why:

- **Cost-Effective:** You can grow hundreds of unique seeds or tens of unique plugs for the price of just a few gallon-sized plants.

- **Decreasing Your Environmental Footprint**: With far less fossil fuel required to grow your own plants from seed, you can double your benefits by adding diversity to your garden without the carbon footprint associated with traditional plant sources.

By embracing genetic diversity right from the beginning, you're not only improving the quality and longevity of your habitat but also fostering a thriving and dynamic ecosystem in your own backyard.

Getting Started With Seeds

Storing and Stratifying Seeds

Seed Storage

Seeds should be stored clean, in a cool, dry, dark space with light aeration. Cleanliness will keep fungus from spreading from the plant material to the seed. Lower temperatures will help keep the seeds from drying out. They should be stored dry to prevent them from beginning the germination process too early. Darkness prevents the seeds from being damaged by UV rays from the sun and light and aerated to prevent fungal attack.

Loosely store them in a labeled and dated paper bag (you can put the paper bag in a plastic bag for added durability) in the refrigerator. Be careful not to stack too much on them, do not compress the air out of them. Check on them every month or two to be sure they are not being compacted and to give them fresh air.

Stratification Start Times

Most native seeds have evolved to lay dormant in the soil over winter as a survival mechanism to prevent premature germination of the delicate plant material that can be damaged by frost. Because of this, the majority of these seeds need to have a cold moist period mimicked in order for them to germinate. Plants tend to produce copious numbers of seed to beat the numbers game they play in the wild where they are subject to forage, fungal attacks, UV-ray damage, being buried too deep in soil and all kinds of other factors that make each individual seed's chance of survival fairly low.

The amount of time a seed needs to be stratified can vary by region, but is generally close enough that a simple google search with the “species/latin name” followed by “cold stratification” will give you a number of days that is close enough. If you are unable to find a recommended amount of time to stratify the seed, you can look to similar species or plants growing in similar condition. For example, plants that typically grow near water tend to require longer cold wet stratification than say a dry meadow plant. This is by no means universal but could give you a good starting point.

Once you know how long a seed should be stratified, the next factor to determine is when to start the process. This information is more regionally specific and harder to find so it's been included for each species below. Generally if a plant does most of its growth in cool seasons, such as a spring ephemeral, you should plan on stratification to finish at the beginning of the cool season in March to mid-April. If a plant does most of its growth in the warm season, you should plan for stratification to finish at the end of the cool season in late April to early-June.

Indoor vs Outdoor Stratification

Seeds can be stratified outside in the landscape, but there are many more variables to consider. The rate of germination will likely be a fraction compared to that of indoor stratification due to the potential for foraging, fungal attack, erosion, UV damage and a number of other factors outside of your control. Fall seed planting can be less labor intensive, you'll play the same numbers game plants do every year, spend more money on seed and time on-site planning. If you stratify indoors and put seeds in the ground at optimal germination time, you will reduce the amount of time the seeds are exposed to hazards before they germinate and give your landscape seeding project a higher chance of success. The optimal time noted on each species' seeds is based on outdoor growing and is applicable to growing seed in the ground as well.

Choosing for Your Situation: Ground vs. Container Planting

Plants are capable of responding to their surroundings both above and below the ground. We often witness their above-ground responses, like a houseplant bending towards the light or a school science experiment with plants growing in a maze towards a light source. But it's important to know that plants exhibit similar adaptability below the surface, especially with their roots.

Here's a comprehensive guide to help you decide when it's best to plant in the ground or in containers, with a focus on factors that impact a plant's growth.

Container Planting

Pros	Cons
Portability: Containers are a practical choice when your plant's final destination isn't where it's initially grown. Perhaps you're nurturing seedlings indoors or in a greenhouse, but they'll ultimately find their home outdoors.	Slower Growth Rates: Containers come with their own set of dynamics that can impact plant growth. One significant factor is the physical boundaries of the container itself. When a plant's roots encounter impermeable surfaces, such as the sides of a container, they send signals to the plant to slow down growth, maintaining

Pros	Cons
	equilibrium. This results in the plant growing at a more moderate rate.
Controlled Situation: You have the ability to control the exact amount of water, nutrients, and sunlight available to your plants.	Needs Water monitoring: containers will dry out faster than the ground and will need weekly attention.
Monitoring: You can monitor the success rate of your efforts more accurately and improve your methods over time.	More Time: between filling containers, maintaining a grow space, watering and eventual planting this method will take more time to from the seed packet to mature plant.
Transplants and spacing: If you need to separate or disturb the roots, especially between June 15th and August 20th, containers can provide a controlled environment. By having the ability to move your plants, you can adjust light and temperature, aiding in root recovery. And you can be in direct control of the spacing of your plants when you move them to the ground.	Transplants and Spacing: It will be harder to separate plants and be in control of plant spacing if that is something your garden requires.

In-Ground Planting

Pros	Cons
Faster Growth Rate: with unlimited access to ground soil your roots can freely spread at their natural rate, allowing your plants to grow at a faster rate providing there are enough nutrients, void space and water available.	More Weeding: your seeds will not be able to germinate under a layer of mulch and therefore require open soil. Remember that whatever is in your soil seed bank will also start growing so it will be important to be able to tell the difference between weed seeds and the desirable natives you have planted. See our soil prep guide to help determine how best to start with a clean soil seed bank.
Less Work: You can save all the time involved in preparing, monitoring and transplanting from containers.	Reduced Ability to Monitor Success Rates:
Less Watering: Plants will have access to groundwater and will grow in a balanced way that will result in less or no watering needing to be done.	The Natural Numbers Game: There is an increased risk of loss to foraging, fungal attack, UV damage, being washed away, or buried too deep. You can mitigate this risk by doing your

Pros	Cons
	stratification in the refrigerator instead of the ground.

Timing Is Key

Choosing the right time for seeds to hit the soil can significantly impact a plant's success. Observe when your plants break dormancy or ask someone who knows; seeding 1 to 4 weeks before dormancy is broken will yield the best results. Seasons also play a role; during the spring, when temperatures are within the optimal range for photosynthesis and the tilt of the Earth reduces temperatures, planting in the ground can yield superior outcomes compared to containers. If you are starting from seed in the summer it may be more difficult for your seeds to compete with larger more mature plants that have had the spring to establish and doing a summer container grow and a fall planting could be a better option.

Soil Volume Matters

Consider soil volume. Nursery soil is typically well-suited for plant growth, being loose, organic, aerated, and nutrient-rich. However, improving your existing garden soil with compost to mimic the characteristics of potting soil can be a more straightforward approach than utilizing containers. You'll enhance void space, water retention, soil biodiversity and nutrient availability, setting the stage for successful growth.

Conclusion

The decision between ground and container planting isn't about a one-size-fits-all rule. Instead, it's about understanding your specific plant's needs, timing, and the conditions that will best support its growth journey. By considering the above factors, you can create an environment where your plants thrive and flourish.

How Environmental Conditions Affect the Growth of Your Plants

Understanding Height Ranges Made Simple

The height ranges for plants in this guide are based on typical growth conditions in the Washington DC metro area. These conditions include average to above-average organic horizon characteristics, average nutrient levels, median light tolerance, and median moisture tolerance.

When estimating your plant's growth, four main factors come into play:

1. **Soil Void Space:** More space in the soil encourages larger growth, while compacted soil can restrict it.

2. **Organic Material:** Increased organic material in the soil promotes larger plants by increasing water, nutrients and void space and insulating roots from high temperatures that can slow photosynthesis. Less organic material will have an inverse result and can restrict plants to the smaller end of their potential range.

3. **Light:** More light encourages plants to reach the higher end of the height range, while reduced light may keep them on the lower side. There is a notable exception to this, shade plants can react to excess light by growing smaller to help prevent loss from transpiration and keep leaf size in balance with the amount of energy they need to grow.

4. **Water:** Adequate water levels push plants toward the taller end of the range, while limited water can keep them smaller.

In summary, if you want your plants to thrive on the higher and larger end of the range, provide more void space, organic material, light, and water. Conversely, if you prefer smaller plants, reduce these factors.

Soil Types within the O Horizon and Topsoil Layer

The organic horizon and topsoil layer (OHTS) is the accumulation of decomposed material (humus) that has built up over thousands of years, and can take many lifetimes to regenerate through natural means. Due to modern practices, humans have removed the OHTS just about everywhere there is human activity, particularly in areas with new construction, erosion due to agriculture, or lawns. A good OHTS is the most influential aspect of a healthy soil community: a healthy OHTS is the foundation on which they rest.

Determining Your O horizon and Topsoil Layer

To determine how much of an OHTS you already have in your garden, dig a hole down until you hit a layer of soil with no organic material. The organic material making up the OHTS tends to be dark brown to black and is filled with soil organisms. Inorganic material is made up of sand, clay, and rock, with significantly less life. The depth of an OHTS will vary from a few inches to many feet.

Types of Soil According to Depth within the OHTS

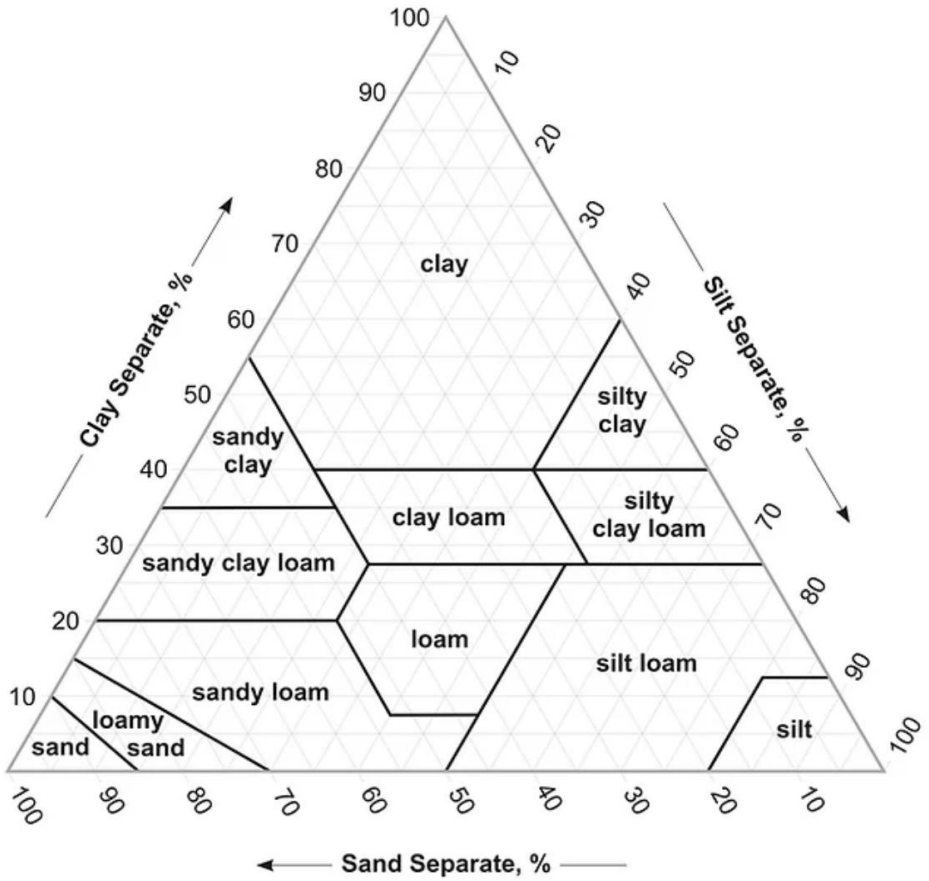
Soil Type	OHTS Depth

Very Poor	No organic horizon
Poor	Less than 1 inch organic horizon
Below Average	1-3 inch organic horizon
Average	3-5 inch organic horizon
Rich	5+ inches organic horizon

Moisture and Soil Content

To determine the proportions of different particle types in the soil, you can follow this method: Place a soil sample in a jar with water, shake it well, and allow it to settle (this may take up to 24 hours). After settling, you'll notice distinct layers. The largest particles, which are sand, settle at the bottom. Silt forms the middle layer, and clay, the finest particle, is found at the top. This approach can yield twelve different soil texture designations.

Soil Textural Triangle



Moisture Types According Soil Content

Moisture Type	Soil Content
Dry	Soil with little to no organic horizon, low levels of void space, may contain large rocks and is exposed to wind and sun.
Below Average	Soil with less than 1 inch-2 inches of organic horizon, some void space, may contain some medium rocks and is lightly exposed to wind and sun.
Average	Soils with 2-3 inches of organic horizon, workable void space that can easily be shoveled,

	has few rocks and some wind and light protection.
Moist	Usually has 1-4” organic horizon, near a water source or drainage area.
Wet	Directly adjacent to a water source and typically can only be found dry in the heat of the summer.
Saturated	Directly adjacent to water or in shallow water and does not dry out even in the heat of summer.

Jeremy’s Soil Recipes

Dry Potting Soil Mix

% of Mix	Content
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
<1%	Forest or prairie O-Horizon inoculant (based on species natural habitat)
<1%	Organic granular fertilizer

Organic Potting Soil Mix

% of Mix	Content
75%	5-year aged wood chips sifted through ½ inch screen or sifted peat-based potting soil
15%	Compost

10%	Biochar or perlite or coarse vermiculite or a combination of the three
<1%	Forest or prairie O-Horizon inoculant (based on species natural habitat)
<1%	Organic granular fertilizer

Dry Native Soil Mix

% of Mix	Content
75%	Sandy Loam
10%	Biochar
10%	Pine fines of sand or a combination of the two
5%	Compost
<1%	Forest or prairie O-Horizon inoculant (based on species natural habitat)
<1%	Organic granular fertilizer

Average Native Soil Mix

% of Mix	Content
75%	Loam, clay loam, or sandy clay loam
10%	Biochar
10%	Compost
5%	Pine fines of sand or a combination of the two
<1%	Forest or prairie O-Horizon inoculant (based on species natural habitat)
<1%	Organic granular fertilizer