“How can enhancing research on the collection of native seeds and the methods for cultivating plants indigenous to the Ohio region contribute to urban biodiversity initiatives in Ohio?”

Brianna Brown

Trillium undulatum seed pod. (Native Plant Trust: Go Botany.)

Optimizing Urban Biodiversity: Native Seed Collection and Cultivation Practices for Ohio's Native Plants

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"Don't take life so seriously, you won't get out of it alive." – Brian Brown

Relevant Experience

2024 — 2021

Spring 2024, Horticulture Final Project, HORT 4092, Professor Stevie Famulari

Spring 2024, Plant Propagation, HORT 4012, Professor Brian Grubb

Summer 2023, Herbaceous Ornamentals II, HORT 2033, Professor James Hansel

Spring 2023, Herbaceous Ornamentals I, HORT 2032, Professor Brian Grubb

Spring 2023, Woody Ornamentals II, HORT2031, Professor Steve Foltz

Fall 2022, Woody Ornamentals I, HORT2030, Professor Steve Foltz

Fall 2022, Native Plants II, HORT2034, Professor Donna McCollum

Spring 2022, Horticulture Science II, HORT 1011, Professor James Hansel

Fall 2021, Horticulture Technologies, HORT 1010L, Professor Sue Trusty

Fall 2021, Horticultural Entomology, HORT 3020, Professor Gene Kritsky

Spring 2021, Native Plants I, HORT1030, Professor Donna McCollum

Spring 2021, Horticulture Science I, HORT 1010, Professor Sue Trusty

Abstract

This research project investigates and improves the processes of native seed collection and native plant cultivation specific to the Ohio region. The overarching goal is advancing urban biodiversity initiatives, focused on flora indigenous to the Cincinnati area. The project delves into current research gaps and challenges associated with native seed collection and cultivation methodologies. Additionally, this research explores the potential ecological benefits and challenges associated with integrating native plant species into urban landscapes. This project researches 13 plant species in this context. The target outcomes of this research include a refined understanding of native plant adaptation to urban settings, improved conservation strategies, and actionable guidelines for urban planners and horticulturalists. This research contributes knowledge to the ongoing efforts of promoting biodiversity within urban landscapes, fostering a more sustainable coexistence between human developments and Ohio's native flora. The final result of this project is a field guide with sections on plant identification, seed harvesting, seed storage, cultivation needs, and common ecoregions for each plant.

Key Words

Biodiversity- encompasses all the plants that grow in a region, the differences within each species and the genetic diversity within a species

Cultivation- the process of growing plants, namely the planting, tending, improving, or harvesting of plants

Ecosystem- geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life

Germination- the process by which a seed grows into an organism, also refers to the sprouting of a seed into a seedling

Host plant- provides shelter, habitat, breeding sites, or serve as a food source as part of the life cycle of another organism

Native plant- a plant that has naturally occurred and existed in a region for many years without human intervention

Scarification- the process of altering a seed's coat via scratching or cutting to improve germination rates and allow for quicker water absorption

Cold stratification- method of preparing seed that involves storing the seed in or out of soil in cold temperatures (below 40F). Mimics the natural process that happens to seeds during winter, also called “overwintering”

Sphagnum- moss that is highly absorbent and sponge-like, which is good for seeds that require moist storage

Full sun- a plant with a “full sun” requirement needs more than 6 hours of direct sun per day

Part shade- a plant with “part shade” requirement needs four to six hours of direct sun per day, but most of that should come in the morning hours when the sun's rays are less intense

Project Statement

This project addresses the question: how can enhancing research on the collection of native seeds and the methods for cultivating plants indigenous to the Ohio region contribute to urban biodiversity initiatives in Ohio? Such research is vital for the proliferation of native species in urban areas, as collection of native plant seed can be arduous, due to these plants' typically remote location. This is confounded with a lack of knowledge among would-be growers on when, how, and where to harvest native plant seed, and even horticulturalists can struggle to successfully grow these plants from seed.

This project researches where 13 different species (including white oak, painted trillium, prairie dropseed, and other wildflower species) of native plants are commonly found in the wild surrounding Hamilton County, looking for both preferred site conditions of the plant, and citing areas where these plants have been confirmed growing previously. This research will result in a field guide for use when attempting to harvest these native species. The field guide contains images of all plants for user confirmation, and descriptions of when these plants are ready for seed harvest are listed, found from existing data. Then, possible growth areas for these plants are explained based on each plant's preferred site conditions. Next are descriptions of how to harvest seed from natural areas without overly disturbing the mother plant, from data collection. A separate section follows containing best practices for seed storage, germination, and growth conditions of all plants, as well as the challenges and possible strategies for integrating native plants into urban environments, also compiled from existing data and experiences.

The result of this project is a field guide with plant identification, seed harvest methodology, seed storage best practices, and seed germination and plant growth necessary conditions.

Project Justification

Quercus rubra, the Northern Red Oak tree, is known as a keystone species, meaning that many facets of ecosystems depend on it for survival and habitat. This tree alone supports over 500 species of butterfly and moth caterpillars, as well as a variety of birds and mammals, some of which are solely supported by the red oak. The presence of native plant species (such as *Quercus rubra*) in an ecosystem is integral to that ecosystem's functioning, due to the specialized evolutionary relationships between native plants and insects, including pollinators. Even insects that can use non-native species as host plants will choose a native plant for their life cycle, given the opportunity (Tallamy).

This implies a need for reintroduction or enlargement in quantity of native plant specimens into urban green spaces, to attract more beneficial insects to the area, and to supply specialized insects with their host plant species in the area.

This research allows horticulturalists and other interested parties to utilize native species as parts of their urban greenspaces by making these plants' seed more readily available.

User Description

The final result of this project, the field guide, is targeted for use by the general public in the Cincinnati community and horticulturalists in the Cincinnati area who are curious about identifying these plants or harvesting their seeds. It is also intended for use by educators who want to give lessons on these native plants.

The field guide is organized alphabetically by common name, to allow the general public in Cincinnati to readily find descriptions and images of all plants, so they can identify them in their natural habitats. It will also contain a section describing the conditions in which the plants commonly grow, to allow people to search applicable sites for each plant.

For horticulturalists, the field guide contains methodology for seed storage practices, to ensure any seed harvested stays viable and is able to be grown efficiently.

For educators wishing to give lessons on native plants, this book contains site conditions necessary for healthy plant specimens, and give detailed descriptions and images of all plants, to allow students to learn to describe these plants, and remember what they look like.

For these listed parties, this book is intended for use year-round, although with different purposes, as plants bloom, seeds are ready for harvest, and plants are ready to be grown at different times of the year. For educators, plants can be studied at different points in the year.

Plant (Listed Alphabetically)	Cultivation Needs	Seed Storage Needs	Seed Harvesting Conditions	Struggles Integrating into Urban Environment	Natural Habitat Conditions
Baptisia australis 	Well-drained, loamy soil. Likes gravelly or sandy soil. Full sun, tolerates partial shade. Does not tolerate acidic soil.	Store in a cool, dry, sealed, refrigerated container.	Collect when pods are black and beginning to open. Remove pods from stalks and pull seeds out.	Heavy seed pods can cause stems to flop over, and look messy in a garden area. Parasitic weevils can eat the seeds and affect perennialism.	Prairies, meadows, pastures, or woodland edge. These areas differ in soil composition, but commonly have full to part shade.
Platanthera leucophaea 	Moist, humus soil with some sand, with organic matter Full sun, intolerant of shade for flowering.	Store in a cool, dry, sealed, refrigerated container.	Collect when pods are swollen and are lighter in color than the surrounding plant. Split the pod open on a clean surface and remove any debris from pod. Seeds are very small.	White-tailed deer, which are abundant in our area, eat this plant.	Prairies, meadows, pastures, or woodland edge. These areas differ in soil composition, but commonly have full to part shade.
Liatris aspera 	Likes dry soil. Tolerates drought, loamy, clay, sandy, or rocky soil. Full sun, semi-tolerant of partial shade. Likes acidic soil.	Store in an envelope in a cool, dark place- not in a refrigerator, as seeds may not last as long. 1-day moist cold stratification in sterile growing mix.	After flowers wilt and turn brown, cut off stalks and allow flowers to dry upside down in a dry, warm place for 3 weeks. Seeds are inside flower bodies.	Flower spikes are heavy and will droop. Plants will rot in moist soil and can fall over in moist soil upon flowering.	Prairie and Savanna. These areas have full sun and dry, commonly rocky or less nutrient-rich soil.

Plant	Cultivation Needs	Seed Storage Needs	Seed Harvesting Conditions	Struggles Integrating into Urban Environment	Natural Habitat Conditions
Lupinus perennis 	Sandy, well-drained, dry soils. Full sun to part shade.	Store in cool (not cold, above 40F), dry, dark place in airtight container. Seeds need to be soaked overnight and scarification before germination.	Hairy pods can be collected when seed pods begin to pop, remove seed pods from flower stalk, dry the pods, and then extract the seeds.	If placed into an open area without competitors, this plant can be aggressive and take over the area.	Woodland edge, prairies, disturbed areas. These areas have full sun to part shade and vary in soil composition.
Mertensia virginica 	Moist, humus soil. Partial shade preferred, tolerates full shade.	After harvest, seeds should be mixed with sand. Store in a sealed, refrigerated container for 4-6 weeks before cold stratification.	After bloom, flowers produce shriveled seed pods. Pick whole pods and remove seeds from fruit body.	Can rapidly spread through an open garden area via self-seeding and rhizomatous root system. Will disappear by summer.	Moist woodlands and river floodplains. These areas have moist soil and at least part shade.
Phlox divaricata 	Moist, humus soil, well-drained soil. Partial shade. Tolerates dry and clay soils, and drought once established.	Store in paper bag to prevent mold. Keep seeds dry. Cold-moist stratification is required before germination. Seeds require complete darkness to germinate.	Harvest whole seed pods in late spring, when seed pods turn tan and will begin popping, releasing seeds.	Susceptible to fungal diseases, nutrient deficiencies, and are sensitive to pollution.	Woodland and woodland edges. These areas have moist, well-drained soils, and partial to full shade.

Plant	Cultivation Needs	Seed Storage Needs	Seed Harvesting Conditions	Struggles Integrating into Urban Environment	Natural Habitat Conditions
Quercus alba 	Full sun, tolerates part shade. Loamy, well- drained, dry to moist soil.	Cannot be stored more than 1 year. Store acorns in breathable container at room temperature in dark place, in moist, shaded saw dust or sand.	Collect acorns as soon as they fall or pick brown/tan acorns from the tree. Usually ready for harvest in late summer.	This is a large tree species, measuring 60-150 feet, so it needs enough space to not cause issues in the built environment.	Woodland, plains, coves. These areas vary, but White Oak likes places with well-drained, loamy soil.
Rudbeckia hirta 	Evenly moist, well-drained soil. Full sun, tolerates partial shade. Drought and heat tolerant once established.	Store seeds in a paper envelope inside sealed jar in a cool, dry place. Require 3 months cold stratification.	Collect when seed head is turning brown and drying out.	Very sensitive to cadmium contamination, and pollution from road salt. Can become aggressive in small gardens.	Prairies, Savannas, woodland edge, and disturbed areas. The conditions of these places vary, and this plant is highly adaptable.
Solidago canadensis 	Slightly acidic, dry to medium, well-drained soil. Full sun to light shade.	Store in metal or glass sealed container in a cool, dry, dark place.	Gather seeds as soon as possible, white fluff can blow seeds away quickly.	Known for aggressive rhizomatous growth, this plant will require vigilant maintenance to not overtake small spaces.	Tallgrass prairie and damp meadows. These areas have soil with high organic matter and full sun.

Plant	Cultivation Needs	Seed Storage Needs	Seed Harvesting Conditions	Struggles Integrating into Urban Environment	Natural Habitat Conditions
Sporobolus heterolepis 	Adaptive to different soil, but prefers dry, rocky soil. Full sun.	Store in a cool, dry place at around 40 degrees. Cold stratify seeds in dry soil for 10 weeks before planting.	Harvest when seeds turn brown. Remove seed pods from stems and remove stems from pods after drying.	This species can have poor establishment when direct seeded.	Tallgrass and mixed grass prairie. Most common around great plains. These areas have full sun, and sandy or clay soil.
Tradescantia ohioensis 	Dry to medium, well-drained soil. Adaptive to different soil types. Full sun or part shade.	Mix seed with sterile, slightly moist soil, store in refrigerator for 1 day. Combine with moist sand and store in refrigerator for 4 months before planting.	Collect when seed pods turn from green to yellow. Mature seeds are gray color.	White-tailed deer eat this plant. It can also become aggressive and outcompete other plants in fertile soils.	Woodland edge, moist prairie, and disturbed areas. The conditions of these places vary, and this plant is highly adaptable.
Trillium cuneatum 	Deep, humus, well-drained soil. Acid to neutral soil preferred. Part shade or full shade.	Store berry body in mixed, moist spaghnum, sealed in a container in refrigerator. No dry storage. Cold stratify for 4-6 weeks.	Ready to collect when seed pod darkens. Pod should lose its firm feeling and be ready for harvest.	Sensitive to pollution. Sensitive to compacted or waterlogged soils.	Woodlands. These areas have partial shade, and moist, well-drained soil year-round.

Plant	Cultivation Needs	Seed Storage Needs	Seed Harvesting Conditions	Struggles Integrating into Urban Environment	Natural Habitat Conditions
Trillium undulatum 	Deep, humus, well-drained soil. Acid to neutral soil preferred. Part shade to full shade.	Store berry body in mixed, moist spaghnum, sealed in a container in refrigerator. No dry storage. Cold stratify for 4-6 weeks.	Ready to collect as soon as the pod has turned from white to brown. Pod should lose its firm feeling and be ready for harvest.	These showy flowers are commonly picked, and picking the flower too close to the leaves can kill it. Also sensitive to pollution or compacted or waterlogged soils.	Woodlands. These areas have partial shade, and moist, well-drained soil year-round.

Plant Analysis

The addition of native plant species into Cincinnati's urban green spaces is beneficial, as it will make our landscapes more biodiverse, and therefore more resilient against stressors in a time when our green spaces are threatened by climate change. The more diverse an ecosystem's gene pool is, the more resilience the ecosystem has against diseases, pests, and environmental changes. This is due to the impact of diseases, pests, or other stressors not being the same across species of organisms. Different organisms also have different adaptive capacities. Humans adopting and protecting those species which cannot adapt quickly enough to withstand today's changing ecosystems helps to preserve biodiversity. This seed collection process is one of the first steps toward integrating native plants into landscapes. Other methods of producing new native plant specimens include tissue culture and vegetative propagation. Seed collection is more accessible than tissue culture, which is costly, time-consuming, and cannot be done by the public. Vegetative propagation is not an option for many native wildflower species, as it has very low success rates among vegetative propagation efforts.

Plants are chosen for this project based on their current status of being threatened or endangered in the Ohio region, or their propensity for endangerment in the near future based on current habitat loss or human activities. Plants are also chosen for their ornamental qualities, whether that is bloom color or soil nitrogen fixation, and each one's suitability for implementation into an urban setting. The chosen plants are perennial plants, meaning that once they are established properly, they will come back every growing season in the Cincinnati area.

Major Project Elements

This project culminates in a field guide style book that shows images of plants during bloom and when seeds are ready for harvest, and that explains when, generally where, and how to harvest native seeds of the 13 plants listed.

"Field Guide" Elements

A. "Mission Statement" and Goal Setting Section
Includes:

1) Explanation of why native plants and seed collecting is important.
2) List of things to consider when setting goals for collecting native seeds.
3) Explanation of the importance of researching legal regulations in target seed collection area before collecting seeds.

B. Plant Identification Section
Includes:

1) An image of the plant in bloom.
2) An image of the plant ready for seed harvesting.
3) A written description of the plant's growth conditions and growth habit, leaf and bloom colors, and seed locations on plant.

C. Seed Harvesting "Best Practices" Section
Includes:

1) Images of all seeds after harvest.
2) Written step-by-step directions of harvesting responsibly (cutting into plant or cutting off seed capsules without killing mother plant).
3) List of tools needed for harvesting and storage.

D. "Best Practices" for Seed Storage and Germination Section
Includes:

1) Example images of the method being described for each plant.
2) Written, numbered, step-by-step directions of storing harvested seed.
3) Written, numbered, step by step directions of germination, formatted into a timeline.

E. Plant Cultivation Needs Section
Includes:

1) List of soil, water, and light quantities required by each plant for optimal growth, and specific nutrient requirements (if applicable) for plants.
2) Explanation of plant's natural ecotype region and natural characteristics of these areas.

3) Explanation of challenges each plant might have growing in an urban space, and a list of suggestions (at least 1 solution per problem) to optimize growth.

F. “Finding Native Plants” Section

Includes:

1) List of different ecoregions that these plants may inhabit, and an explanation of where such ecoregion conditions can arise around urban environments.

Native Plant Images and Descriptions Index

Wildflower species

Trillium undulatum, Painted Trillium

Description: Single white flower, 3 petals with ruffled edges, pink in center with yellow center and stamen, and three blue-green leaves surrounding it.

Trillium cuneatum, Toad Trillium

Description: Single maroon flower, with 3 upright and 3 prone petals shaped like daggers, with 3 mottled blue-green and light green leaves surrounding it.

Liatris aspera, Rough Blazing Star

Description: Tall, slender plant, about 1 foot tall. Flowers grow from the upright center stalk with a reddish color. Flowers are bright pink, with small petals around seed pods, and similar colored spider-leg tendrils growing around the flower's edge.

Baptisia australis, Blue False Indigo

Description: Bluish-purple, sometimes with white-purple petals, pea shaped flowers near the top of the stalk. Green, oval-shaped leaves appear farther down the stalk.

Platanthera leucophaea, Prairie Fringed Orchid

Description: Flowers white or creamy, deeply 3-lobed, margins fringed, column appears hooded. Flowers arranged in a cylindric spike. Lanceolate leaves several to many, scattered along stem.

Tradescantia ohioensis, Ohio Spiderwort

Description: Green stem with grass-like leaves, blue-purple flowers on top with 3 clover-shaped petals. Green stamens in center of flower, and green seed pods appear near flower clusters.

Solidago canadensis, Yellow Goldenrod

Description: Tall plant, 1-7 feet tall, smooth stem with fine hairs at top near flower clusters. Sharply toothed, dagger-shaped leaves, with fine hairs. Tiny, bright yellow flowerheads on arching branches, in a long or flat-topped cluster at stem's end.

Phlox divaricata, Blue Phlox

Description: Lavender purple-colored flowers with light blue rimmed hole in center of 5 heart-shaped leaves. Green stems with tapered leaf shape, short, fine hairs on leaf and stem.

Rudbeckia hirta, Yellow Coneflower

Description: Bright yellow flower with brown central spherical node. The number of petals vary, but are thin, oval shaped surrounding center of flower body. Bright green stem with dagger shaped leaves close to the ground.

Mertensia virginica, Virginia Bluebells

Description: Blue, bell-shaped flowers hanging down from small stems off green center stalk. Bright pink-purple flower pods just before bloom. Oval-shaped leaves close to the ground and up by flower stems.

Lupinus perennis, Wild Lupine

Description: Green, palmate (spiral from one point) dagger shaped leaves just below flower stems. Flower stems are more grey-green than leaves, and small, bud-shaped blooms surround stem, forming an upright flower appearance. Flower buds open from the base, opening to a purple blue color, and white-green buds on top are the last buds to open.

<u>Grass species</u>

Sporobolus heterolepis, Prairie Dropseed

Description: Fine-textured bunchgrass with thin individual stalks, bright green in color. Grows in a circular and upright form around a central area. Small seed stalks appear, with a lighter green color than grass leaves.

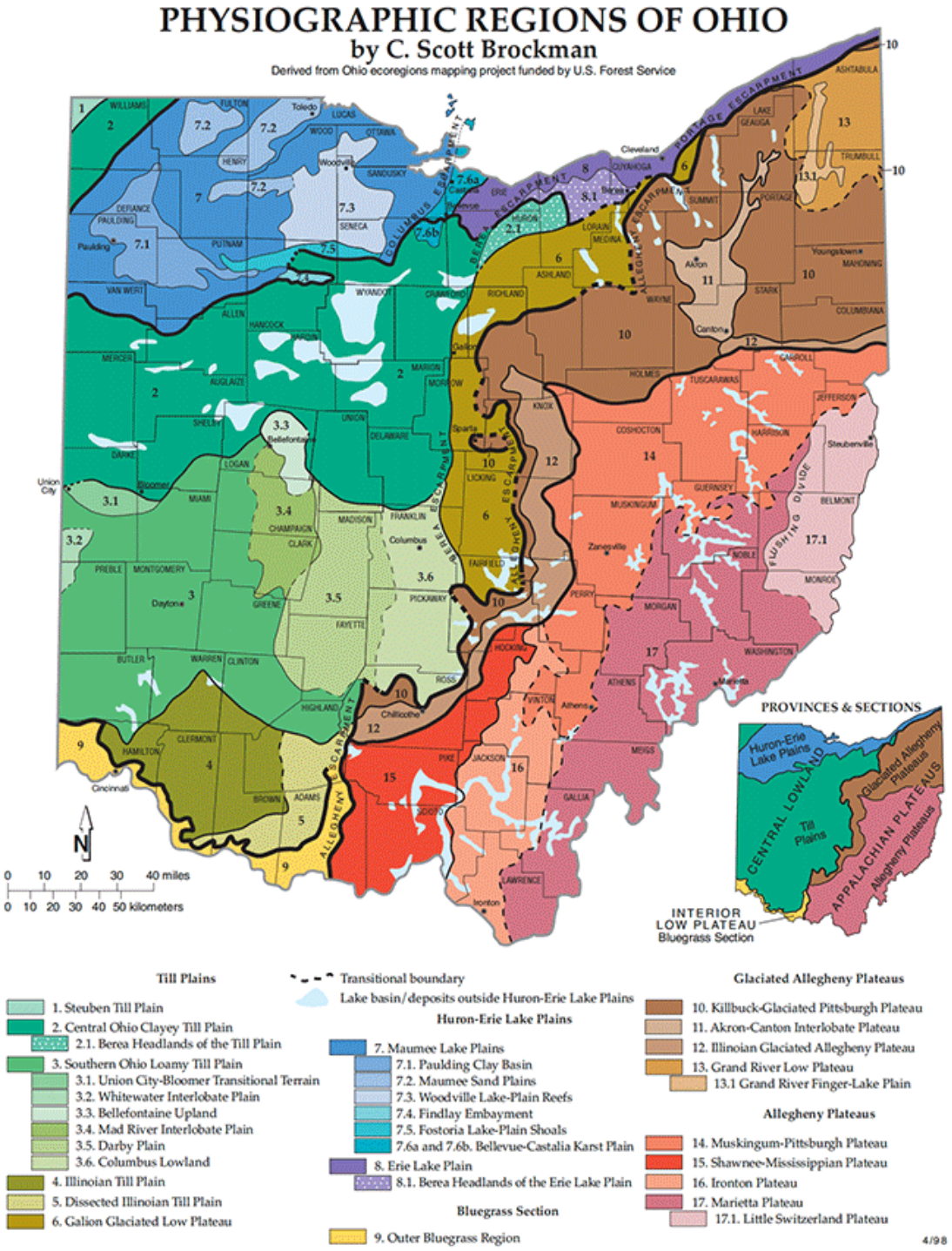
Tree species

Quercus alba, White Oak

Description: Tree has long, straight trunk with a broad, rounded crown (treetop). Leaves grow on opposite sides of branches, with alternating distance from the trunk. Lobed leaf parts extend from leaf center, with 6-10 lobes. Lobes are thin and rounded at the tips. Acorns are oblong, initially green, and changing to tan or brown later in the season. Small acorn cap has a curly fringe around the edges and small oval-shaped pieces, that will fall off as acorn matures.

Finding Native Species in Nature

This section describes different ecoregions that these 13 plants may inhabit and includes an explanation of where such ecoregion conditions commonly arise around urban environments.



(OH Natural Heritage Program.) Map of Ohio's ecoregions, with SW Ohio in till plains and outer bluegrass region.

In the image above, prairies, grasslands, and savannas are typically in the “till plain” or “bluegrass” regions. Plants that require high moisture content can be looked for in regions labeled as “clayey”, though other environmental factors can affect soil moisture, as is detailed below, and plants that require sandy soil can be looked for in regions labeled as “sandy”.

1) *Baptisia australis*

This perennial wildflower is a prairie or grassland plant, and will also grow in sandy floodplains and stream bands, as well as along woodland edges or in wooded areas with open canopies.

Baptisia plants thrive in full sun, like in prairies and grasslands, but can tolerate up to partial shade (around 6 hours of direct sunlight per day), which is typical around woodland edges and inside forests.

The soil in prairies and grasslands are typically silty, sandy, or clay-rich, and have thick A and B horizons that are rich in organic matter and materials. Sandy floodplains and stream bands are more variant in soil composition, but are typically sandy, loamy, and rich in organic matter. These ecoregions generally have moist soil.

When looking for *Baptisia australis* around Cincinnati, seek out disturbed areas around railroad yards, abandoned development sites, or other developed areas with natural spaces around them. *Baptisia australis* can also likely occur along sunny woodland edges in local parks, or undeveloped banks along the Ohio river. There are also grassland and prairie preservations north and east of Cincinnati, including the Adams Lake Prairie State Nature Preserve.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

2) *Platanthera leucophaea*

This perennial wildflower's habitat is mainly wet prairies, bogs, or other wetlands. Wetlands and bogs are some of the most threatened habitat in the US. This plant has also been found along the edges of stream bands, sedge meadows, marsh edges, and in open grassland areas with high soil moisture.

Plananthera leucophaea requires full sun for optimal growth and flowering, and all of its habitat locations reflect this.

Wet-mesic prairies and bogs have loam or silt loam soils, with a neutral pH, high organic matter content, and high water retention. High soil moisture is required for Platanthera leucophaea, and this plant can even tolerate seasonal flooding.

Due to wetland habitat loss in the immediate Cincinnati area, this plant should be looked for further north in Ohio, around the Dayton area. Look for *Platanthera leucophaea* in areas with wet soil and full sun, around sunny stream banks, or areas of lower elevation than the surrounding area where water may collect. This plant does not like woody encroachment, so an open stream area is a better place to search than a stream surrounded by woodland.

Some of these spaces may be private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

3) *Liatris aspera*

This perennial wildflower naturally appears in prairies, glades, savannas, and in disturbed areas. The regions with Liatris aspera commonly have low soil nutrient levels, as this plant can thrive in spaces where other plants cannot.

Liatris aspera requires full sun for optimal growth and flowering, and this is reflected in all its natural habitat conditions. Shading and woodland encroachment is a main threat to this plant's native population.

The soil in prairies and savannas is typically silty, sandy, or clay-rich, which can be high in organic matter content. Liatris aspera prefers dry soils, and is more likely to be found in dry prairies with "poor" soil, which are typically sandy or rocky in composition. Disturbed areas typically have rocky or compacted soils, and *Liatris aspera* is a tough plant that can thrive in areas like this where other plants may struggle.

Looking for Liatris aspera around the Cincinnati area involves seeking out disturbed areas around railroad yards, or railroad tracks with bare soil around them, abandoned development sites, or other developed areas with natural spaces around them. Liatris aspera prefers dry soil, and full sun, but as these are some of its only habitat requirements, finding this species around disturbed urban spaces is likely.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

4) *Lupinus perennis*

This perennial wildflower occurs in woodlands with semi-open canopies, woodland edges, and along floodplains, roadsides, or disturbed sites.

Lupinus perennis requires full sun to part shade, (at least 6 hours of direct sunlight per day), and this is reflected in its habitat sites. With regard to flowering of *Lupinus perennis*, more sun produces more blooms and more seeds.

Soil conditions for these habitat areas range from moist to dry, and can be sandy or clayey, with high or low organic matter content. With a wide range of soil conditions,

seeking out Lupinus perennis based solely on soil factors is difficult. Areas with well-drained soil are the most likely to have favorable conditions for this plant.

Seek out Lupinus perennis around Cincinnati in areas along hiking trails with open canopies, along the Ohio River bank in undeveloped areas, along woodland edges with undisturbed habitats, and around railroad yards or construction sites with sunny conditions and nearby woodland encroachment.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

5) *Mertensia virginica*

This perennial wildflower is a woodland plant, and commonly occurs in moist woodlands or in floodplains.

Mertensia virginica can tolerate some sun but prefers partial to full shade. The plant needs at least two to three hours of indirect sunlight per day, and in areas with more sun will require more soil moisture.

Woodlands and floodplain soils are clayey, silty, or sandy, and are typically well drained for most of the season, but do occasionally flood. *Mertensia virginica* growing season is short, and does not occur during a time with flooding. In floodplains, soil can also be gravelly, as rocks are moved up into the soil during floods. Woodland soils and floodplains are typically high in organic matter.

When looking for M*ertensia virginica* around Cincinnati, seek out hiking trails in forests with thick canopies, or look in shady areas around relatively undeveloped lands. This plant occurs in parks in several regions of Cincinnati, including the Parker woods nature preserve in Northside.

Some of these spaces (like undeveloped lands) may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

6) *Phlox divaricata*

This perennial wildflower occurs in woodlands, along woodland edges, and in meadows or open fields without tall grass species.

Phlox divaricata prefers part sun to part shade, around 4-6 hours of sun per day, and in areas with more sun, flowers may shrivel more quickly, making seed collection more difficult.

Before maturity, *phlox divaricata* requires moist, well-drained soil, but once established can tolerate dry soil and clay soil, and there's also drought tolerant when established. The soil conditions of Woodlands and meadows are typically moist and well drained, but variation in *phlox divaricata'*s habitat needs indicate a wider range of possible growth areas.

When looking for *phlox divaricata* around Cincinnati, seek out hiking trails with some sun, or woodland edges with similar conditions. *Phlox divaricata* is used ornamentally in parks and in private gardens around Cincinnati, so finding this species in highly developed area is possible. Looking for shady spaces with gardens, or shady woodlands can help to find this species around urban areas.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

7) *Quercus alba*

This tree species is a woodland canopy tree, with a height of 50-100 feet, and a spread of 50- 90 feet.

Quercus alba requires full to part sun, but can tolerate part shade (at leats 4-6 hours of indirect light) when young. Only mature trees produce acorns, so sunny areas are likely to have this tree.

Quercus alba prefers dry to evenly moist soil, and likes when soil drains quickly. This tree does not like “wet feet,” and will not be in areas with overly wet soil.

Around Cincinnati, search for Quercus alba trees in our local parks. These plants are used for landscapes in natural areas of parks, including in Burnett Woods in the lower swing area. These trees are also along many hiking trails, and can even be found in open areas on roadsides in greater Cincinnati.

8) *Rudbeckia hirta*

This perennial wildflower lives in prairies, plains, meadows, pastures, and along woodland edges.

Rudbeckia hirta thrives in full sun but can tolerate up to part shade, but for optimal flowering and seeding, rudbeckia plants should be sought out in sunny areas.

Prairie and meadow soils are typically silty, sandy, or clay-rich, and are high in organic matter content. Woodland edges are similar in soil composition, but can be slightly more wet, but if an area has well drained soil, *Rudbeckia* plants can be found there as well.

Around Cincinnati, search for *Rudbeckia hirta* in prairie or meadow preserves, along undeveloped forest edges, or in park garden displays.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

9) *Solidago canadensis*

This wild plant is actually considered invasive across Europe, but is native to the midwestern US, and projected to become a threatened plant in the future. *Solidago canadensis* lives in prairies, meadows, grasslands, along stream banks, in open woods, and in disturbed areas.

Solidago canadensis requires full sun, and this is reflected in its most common habitat ranges, prairies, meadows, and woodlands with open canopies.

Solidago canadensis grows well in soil with clay content, like is common around Cincinnati. This plant also prefers moist, well-drained soil year-round, but does not like wet soil. These conditions are common in prairies and meadow preserves around Cincinnati.

When seeking out *Solidago canadensis* around Cincinnati, look for prairie or meadow lands north of the city. The University of Cincinnati Center for Field Studies has a significant population of *Solidago canadensis* in its prairie land. This plant is often used ornamentally in Cincinnati Parks, with a population in Smale Riverfront Park. Disturbed areas with full sun can also be good places to look for this native plant, and so would any open field space with moist soil and full sun conditions.

Some of these spaces with these conditions may be on private property, so be careful when looking for areas to explore, and do proper research before entering a natural space with the intent to forage for seeds.

10) Sporobolus heterolepis

This native grass is a tallgrass prairie and mixed grass prairie species. It is a bunch or clump-forming grass, and a warm season grass that across across North America in our prairie regions. This plant is also used ornamentally across the US, and is even found at times in very urban places, in parking lot garden beds or in road median garden spaces.

This grass prefers spaces with full sun, as is common in prairie spaces, or in the very open parking lots where it is used as an ornamental groundcover.

Sporobolus heterolepis prefers well-drained to dry, rocky soil. This makes it a good candidate for tallgrass prairies, where plants with more extensive root systems than this grass will be using more moisture. The shallow beds of parking lot gardens also allow this plant's habitat to dry out quickly, as the thin layer of soil over the concrete parking layer will likely be full of gravel or other rock debris due to the bed's surrounding.

When looking for *Sporobolus heterolepis* around Cincinnati, look for tallgrass or mixed grass prairie preserves (categorized with other, taller grass species around, like Big/Little Bluestem, Indiangrass, Switchgrass, Sideoats grama, or other common grass species. This ecosystem is well-quantified, and a plant identification app should be able to indicate if a space is a good fit for

Sporobolus heterolepis, as many of these tallgrass plants have similar or the same habitat requirements. Another great place to search would be parking lot gardens or road median spaces with gardens, as this clumping grass is commonly used to fill in ground space around taller plants in these low-maintenance garden types.

11) Tradescantia ohioensis

This perennial wildflower lives in moist to wet prairies, Oak savannas, woodland edges, or in sandy prairies and along stream banks. It has also been seen around railroads or roadside ditches with some water accumulation.

This wildflower likes full sun, but can tolerate up to part shade, which is reflected in its range of habitat areas. For optimal blooming, though, more sun is better, so open prairies, or woodland edges with direct sun for at least 6 hours per day is most likely to suit our seed collecting purposes.

Tradescantia ohioensis prefers moist soil, and likes soil with sand content or a slightly acidic pH, around 5.5. The soils in our area tend to be alkaline, so keep that in mind when searching for this plant. Urban areas frequently have more acidic soil due to pollution runoff and its contact with the soil immediately around cities or in park spaces. This plant can grow in dry soil as well, but blooming is likely to be less frequent and fewer blooms at a time.

When looking for *Tradescantia ohioensis* specimens, seek out prairie preserves at lower elevations than its surrounding area, as this is likely to mean wet soil conditions for the prairie land. Roadside ditches along less developed areas around the greater Cincinnati region are also a good place to search, as this is a natural habitat for *Tradescantia ohioensis.* Any region with sufficient sun (at least 4-5 hours of direct sun daily) and with wet soil conditions would be a good spot to look for this plant.

Some of these spaces may be on private property, so be careful when looking for areas to explore, and do proper research before entering a nature space with the intent to forage for seeds.

12) Trillium cuneatum

This perennial wildflower is a semi-rare woodland plant with a long time period to maturity, only blooming after 3-5 years of establishment. It is not receptive to a wide range of conditions, and needs specific conditions listed here to be found naturally. This plant is not at all likely to be found in an urban environment and is typically found off hiking trails in large woodland preserve spaces.

Trillium cuneatum requires part shade to full shade, and ideally grow with morning sun and afternoon shade, as direct sunlight has a high probability of overheating and scorching this plant.

Trillium cuneatum prefers part shade deep, organic matter rich, humusy, moist, well-drained soil, which is descriptive of its typical woodland habitat. This plant is also sensitive to pH, and prefer a pH around exactly 6.0 in the soil.

When looking for *Trillium cuneatum* around Cincinnati, two sites are notable, including Clifty Falls Indiana State Nature Preserve, where there is a large, established population slightly off many of the hiking trails, and in northern Winton Woods, where there are Trillium populations in sparse numbers well off the hiking path. Wandering in woodland areas that are at least 1 mile from developed areas is the best bet for finding this plant, although from my personal experience, several ecologists and horticulturalists who own property have found this plant in their personal woodland spaces, so reaching out to landowners with woody areas on their property may lead to finding some *Trillium cuneatum* specimens.

Before entering a space that is on private property, be careful to ask permission, and do proper research before entering a nature space with the intent to forage for seeds. The

rarity of this plant makes this step especially important, as disrupting a natural population of a rare plant is specifically risky.

If there is only one *Trillium cuneatum* specimen in an area, unfortunately, it should not be harvested for seed collection. Look for spaces with multiple specimens, and ideally, take no more than 10% of the seed pods from any one area. This means if there are 10 trillium specimens in a park space, take only 1 of the seed pods to grow a new specimen. Looking for 10 separate specimens may seem taxing, but trilliums typically grow in clumps, and more than 1 specimen at a time is likely to be found growing together.

13) Trillium undulatum

This perennial wildflower is a rare woodland plant with a long time period to maturity, only blooming after 2-4 years of establishment. It is not receptive to a wide range of conditions, and needs specific conditions listed here to be found naturally. This plant is not at all likely to be found in an urban environment and is typically found off hiking trails in large woodland preserve spaces.

Trillium undulatum requires part shade to full shade, and ideally grow with morning sun and afternoon shade, as direct sunlight has a high probability of overheating and scorching this plant.

Trillium undulatum prefers part shade deep, organic matter rich, humusy, moist, well-drained soil, which is descriptive of its typical woodland habitat. This plant is also sensitive to pH, and prefer a pH around exactly 6.0 in the soil.

When looking for *Trillium undulatum* around Cincinnati, it is necessary to explore areas well away from developed areas, and the Winton Woods State Park or Clifty Falls Indiana State Nature Preserve are two good places to search, as they contain other trillium species. However, *Trillium undulatum* is not confirmed to be growing there. Another possible growth location for *Trillium undulatum* is woodland spaces in Adams County, southeast of Cincinnati, where undeveloped areas of hiking and nature spaces are plentiful. Woodland spaces that have remained largely undisturbed for long periods of

time are also good places to search, as these plants take years to establish to maturity, and to form a large enough population to harvest from takes even longer for this picky woodland plant. Seeking this plant on private property is possibly necessary, as undeveloped woodland areas can be rare in urban spaces.

Before entering a space that is on private property, be careful to ask permission, and do proper research before entering a nature space with the intent to forage for seeds. The rarity of this plant makes this step especially important, as disrupting the natural population of a rare plant is specifically risky.

If there is only one *Trillium undulatum* specimen in an area, unfortunately, it should not be harvested for seed collection. Look for spaces with multiple specimens, and ideally, take no more than 10% of the seed pods from any one area. Look for spaces with multiple specimens, and ideally, take no more than 10% of the seed pods from any one area. This means if there are 10 trillium specimens in a park space, take only 1 of the seed pods to grow a new specimen. Looking for 10 separate specimens may seem taxing, but trilliums typically grow in clumps, and more than 1 specimen at a time is likely to be found growing together.

Seed Collection Best Practices

1) *Baptisia australis*

Blue false indigo seeds are ready to harvest in the late summer or early fall.

Wait until the seed pods turn entirely black, fuzzy, and either begin to open on their own, or begin to rattle when shaken, as this shows that the inner seeds are fully developed.

Use sharp shears or a pruning knife to cut off entire seed pods from the plant.

Open the seed pods, and pull the individual seeds from their pods.

Inspect individual seeds for signs of weevil infestations (small worms that burrow into the seed, leaving bean or round-shaped holes into the seeds. Discard any seeds with such markings.

Place seeds on a paper plate away from the sun and leave them to dry for 2-3 days in a cool, dry, dark place, such as a cupboard or in a shed.

After this, either sow seeds immediately in the proposed outdoor space, or transfer the seeds to Ziploc bags or paper envelopes, and they can be stored outdoors in a cool shed or a garage for the winter months.

This seed germinates most reliably when fresh, but storage and stratification practices are also fairly successful.

2) *Platanthera leucophaea*

These seed pods will be ready to harvest in late summer to early fall, after flowers have withered and turned brown or fallen off entirely. Do not harvest green seed pods, and wait until the entire pod has turned golden brown, with small crispy brown pieces on the end of each seed pod.

The seeds inside the plant are very fine, when pods are dry, they may split easily.

Place the seed pods into a plastic bag immediately after collection to avoid losing seeds. The image below shows what the seeds look like inside the pods, assuming all seeds would remain attached to their fruiting body after removing the seed.

Remove seed pods from the mother plant directly using sharp shears or a pruning knife.

When seed pods are dry, remove the seeds by carefully cutting into the seed pod, and placing the small seeds into a plastic bag away from direct light.

The seeds of this plant are very small, and are described as dust-like. For this reason, it is recommended to harvest whole seed pods.

Due to the rarity of this plant, it is advised to not take any more than ½ of the seed pods from any one plant, and only taking that many when multiple plants with pods are found in an area.
If only one plant with seed pods is found, only 3-4 seed pods should be harvested from each plant.

3) *Liatris aspera*

Rough Blazing Star seeds are ready for harvest typically in November, once flowers have stopped blooming, and turned brown and crispy.
Using sharp shears or a pruning knife, cut off the entire top of the flowering section from the main stem.
Place the seed pods and flower stalk face down into a paper bag and store them in a dry location. Flower stalks may need cut again to fit entirely into the paper bag, as the paper bag needs to be closed after collecting the flower stalks.
To remove the seeds from the flower stalk, use your entire hand and rub down the flower stalk to knock off all flower debris and seed pods. Seed pods should be dry enough at this point that they break open and spill seed when rubbing hand down the stalk.
Once the flower stalk is empty of debris, the small seeds with their brown fluff should be visible. Separate flower and plant debris from seed, leaving the seeds attached to brown fluff.
Store these seeds in a paper bag in a cool(above 40F) and dry location until late November, when they will be ready to plant.

4) *Lupinus perennis*

The seed pods of Wild Lupine begin developing after the flowers have bloomed and withered, around May or June.
The seed pods turn brown and begin ejecting seeds in mid summer, typically around June or July. The seeds inside the pod should be deep brown to almost black in color, and should not feel overly moist or squishy.
Green or yellowish seeds in open pods are not mature, and should not be harvested.
Harvest unopened seed pods that are brown, and have seeds large and hard enough to be felt solidly though the pod's exterior skin.
Pluck or cut off the seed pods from the plant's stalk using sharp shears, a pruning knife, or fingers.
Similarly, green or yellowish green seed pods are not mature, and should not be removed from the plant. Mature seed pods will make a rattling sound when shaken, and this is a sign that the inner

seeds are mature. The seeds of this plant are large, and can be removed from the main pod by pulling each from the pod's exterior. Inspect the large seeds for small holes, as this can be a sign of weevil infestation. Discard seeds with small holes, or that are very flat or squishy, as these seeds are likely not viable.

Store the oval, hard brown seeds in a paper bag for 2-3 weeks after harvest to allow the seeds to dry out entirely.

5) *Mertensia virginica*

Virginia Bluebells in the Cincinnati area begin producing seed in late May to early June, and goes dormant soon after, leaving the seeds about a 2-week period to mature.

The pods with mature seed can be light yellow in color, but ideally will become slightly golden brown, and pod will either fall off or become easy to remove by picking open .

The longer you can wait to harvest the seeds, the better the chance is that the seeds will be mature, but the seeds are frequently consumed by local wildlife, which gives a short opportunity to harvest the seeds.

Mature seeds within pods should be able to be felt when applying slight pressure to the overall pod.

The pod skin when mature should be papery, light brown, and less moist-feeling than the surrounding tissue when seeds are ready inside.

Using sharp shears or a pruning knife, cut the seed pod open, and check for ripe seeds (shown above.) Cut off entire ripe pods, and place ripe seed pods into a plastic or paper bag. Take the pods to an indoor location to remove the seeds.

Cut open each pod on a clean, dry surface, and remove the individual seeds (which should be brown- light gray in color) from the pod.

Remove any excess plant debris, and place the seeds in a mixture with moist, sterile soil immediately after removal.

Store-bought seeds have typically been treated to allow the seeds to dry out, but naturally-harvested seed does not respond as well to this, and should not be dried.

6) *Phlox divaricata*

These seeds are typically ready to harvest in May. The flowers will be brown and withered, or fallen off. The seed pod should be tan/brown, and some seed pods will begin to pop open.

The seed pods are covered in fine hairs, which have been noted to irritate the skin of certain people. Wear gloves when harvesting these seeds.

Using sharp shears or a pruning knife, cut off the entire seed pod and the 5 base leaves surrounding the pod.

Place the pods in a paper bag, and place them in a cool, dry place to allow the seed pods to dry. Some seed pods may pop open during drying, so ensure the bag has no holes.

Once the seed pods feel very thin and papery, they can be broken open by hand or with scissors, and the seeds can be extracted.

Remove the seeds from the pod by hand, carefully pulling the seeds from the sacs. Separate the small, brown seeds from any extra plant debris.

These seeds can be stored in a paper envelope to dry further. for about 3-5 months without reducing seed viability.

These seeds should not be stored dry for longer than 6 months, so plan to plant the seeds next spring, and begin germination treatments about 6-7 weeks before nighttime temperatures are reliably above 40F.

Waiting longer than 6 months to begin germination processes on these seeds may cause issues with germination or plant growth and is not recommended.

7) *Quercus alba*

White Oak acorns are typically ready for harvest in the Cincinnati area around early fall, when acorns start turning brown everywhere but the cap, and acorns begin falling off trees.

Acorns lying on the ground have a higher likelihood of weevil infestation. For this reason, acorns should be harvested while still attached to the tree, and not from the ground.

Check acorns for visible holes or spotted patterns on acorn body. These can be signs of pests or disease, and acorns with these signs should not be harvested. The acorns shown on the right are healthy acorns. The whitish, waxy layer is normal, and not a sign of any seed issues.

When acorns are mature, they should be easy to pull off the tree by hand.

The acorn cap may come entirely off or break in some places when pulling the acorn off the tree. This is normal and will not affect the acorn’s storage or germination.

After harvesting the acorns, place them in a plastic bag to take them to an indoor location to test for seed viability and begin germinating the acorns.

Do not leave these seeds in the bag for an extended period (more than 1 day, as these seeds cannot dry out, or they will lose viability.

8) *Rudbeckia hirta*

Seeds of Black Eye Susan plants are ready to harvest from mid-September to mid-October. Wait for petals to shrivel, or fall off completely.

Mature seeds on the flower (shown below) should be slightly triangular, gray to black, and about 1 cm long.To harvest, remove whole flower heads, leaving some stem attached, with scissors or pruning shears.

The flower heads should be put in paper bags, and hung upside down (by stems) to let seeds dry.

Once dry, the cone (flower head) should be brittle, and seeds can be scraped or shaken off.

The seeds may need cleaned off after this, as parts of the flower cone may stick to the seeds. Rolling seeds between fingers should be sufficient to remove the cone pieces.

9) *Solidago canadensis*

Yellow Goldenrod seeds are ready to be harvested in October through the first half of November. Harvest when yellow flowers have fallen and turned brown, and white hairs appear around seed clusters.

Begin harvesting by bending the plant's main stem slightly downwards, and placing a paper bag around the entire seed and fluff cluster on top of the plant.

Cut off the entire top of plant from the main stem, and lay the whole cluster carefully into the paper bag to allow drying. Once thoroughly dry (which may be immediately, depending on fall heat levels), remove small clusters from main stems using fingers. Seeds should slide off easily, but will stay attached to fluff and other plant debris.

10) *Sporobolus heterolepis*

These seeds are ready for harvest in late summer, around August, through in early fall, through September, depending on variable weather during this time of year.

These seeds can have issues germinating, so collect a bit more than you will want to grow, to ensure you get enough viable seeds.

Seed pods and plant will be yellow to golden brown around harvest time, and the plant's grass blades may be drying and yellowing at this point, or still green, depending on weather conditions.

Seeds can be harvested with sharp shears or a pruning knife. Cut the plant's upper stem by the seed pod's branches, and place the seeds and stems into a plastic or paper bag.

At the time of harvest, seeds pods and upper stems should be mostly dry. If seed pods or stems feel squishy or moist, place the seed pods and stems into a paper bag to let the seeds dry out more fully.

Take the bag to an indoor location to prevent the small seeds from blowing away. Remove the seed pods from the stems by rubbing fingers along the stem, knocking off the seeds.

Seeds have a husk on them that should be removed, and rubbing seeds between fingers should remove the seed's thin husk.

Separate seeds from husks as much as possible, and separate from any extra plant material.

Store these seeds in a cool (around 40F), dry location, preferably in a paper bag, to prevent mold from forming.

11) Tradescantia ohioensis

After harvest, and thorough drying of these seeds, they can be stored in a dry container in a refrigerator for 1 day.

After this, the soil and seeds should be mixed with moist sand and stored in the refrigerator for 4 months of cold moist stratification.

These seeds should not be stored for longer than this time period, and can be planted into their proposed growing space after their stratification period, regardless of outdoor temperature, though fall or early spring sowing is ideal. These seeds do not transplant well, and should not be moved from indoors to outdoors after growth begins.

There is another option for these seeds, which is to sow them outdoors in their proposed growing space immediately after harvesting, drying, and removing from seed pod capsules.

The seeds will get a natural cold stratification from Cincinnati's weather. The seeds will not grow until next spring season, however, and there will not be a way to test the success of your harvest until the plants germinate next spring, but in general, this method yields good results.

Plant these seeds 1/8-1/4 an inch deep, with a thin soil covering on top. Water seedlings daily, giving about 1 inch of water to young seedlings. Water every 2 days throughout the plant's first growing season, and maintain moist soil conditions to help this plant thrive.

12) Trillium cuneatum

These seed pods will be ready to harvest around Cincinnati from early June to early July, after the seeds have had about 4-6 weeks to mature in the seed pod since the pod's formation in May.

When the pod is ready for harvest, it should be light green on external edges and light pink in the centers. The pod should feel soft, pliant, and slightly fleshy, seeds should be felt when applying light pressure to the pod.

As noted on earlier pages, do NOT harvest from Toad Trilliums when there are less than 2 or 3 specimens in a group, and NEVER take all seed pods from any group of Trilliums. This protects the plant's natural populations.

Using your hand, carefully pluck the ripe seed pod from the center of the flower.

After removing seed pods from flowers, place the pods in a paper or plastic bag, and take them to an indoor location to remove the seeds.

Carefully cut open the outer seed pod to reveal the reddish-brown seeds. Some white material may be on the seed, or some seeds may still be entirely white. Entirely white seeds are not mature, and if possible, return these seeds to the collection location, where insects will naturally disperse them, and they can continue maturing.

Pluck off the red-brown seeds, and place them in a plastic bag with a damp mixture of sterile soil immediately after removal from the seed pod.

13) Trillium undulatum

Seed pods of Painted Trillium mature 5-6 weeks after the plant flowers, which in Ohio is around early March to early April. Seed pods then should begin forming and maturing around May to early June in Ohio.

When these berry-shaped seed pods are mature, they begin to split open, and attract ants to spread the seeds. A mature Painted Trillium seed pod with a red, glossy color is likely ready to harvest. If a seed pod can be found that is beginning to split open is a perfect indicator of seed maturity, and these seeds are definitely ready to harvest.

Do NOT harvest from Painted Trilliums when there are less than 2 or 3 specimens in a group, and NEVER take all seed pods from any group of Trilliums. This protects the plant's natural populations.

Due to this plant's rarity, more than 2 seed pods should not be harvested from any group of Painted Trillium.

Mature seed pods should feel thin, but slightly springy and moist, as these seeds stay relatively wet, and the pod contains fatty tissue to attract ants.

Using sharp shears or a pruning knife, cut off the entire seed pod from the stem, cutting just below the 3 small leaf-like structures that surround it.

Place the seed pod into a plastic bag, and take it to an indoor location to remove seeds. Carefully cut open the seed pod, or peel the pod open by hand. Remove as much of the pod's outer coating as possible, and rub fingers on the inner red-brown seeds to detach them from the pod.

Do not attempt to store these seeds indoors.

Seed Storage and Plant Growth Conditions

1) *Baptisia australis*

   To store seeds of Baptisia australis, place them in a cool, dry, sealed, and refrigerated container.

   These plants take 3 years to fully establish, and before this point will require the specific conditions listed above.

2) *Platanthera leucophaea*

   To store seeds of *platanthera leucophaea,* place them in a cool, dry, sealed, and refrigerated container.

3) *Liatris aspera*

   To store *liatris aspera* seeds, put seeds in an envelope in a cool dark place. Do not store these seeds in a refrigerator, as excess cold can negatively impact seed viability.

   To grow *liatris aspera*, place the seeds in moist, sterile soil and place in a refrigerator for a one day cold stratification process.

4) *Lupinus perennis*

   To store *lupinus perennis* seeds, place them in a cool area, above 40°F, in a dry, dark, airtight container.

   To grow *lupinus perennis* seeds, soak them in water overnight and place them in a container with hot water (around 120°F) for at least 30 minutes before planting them in soil for germination.

5) *Mertensia virginica*

   To store seeds of *Mertensia virginica*, immediately after harvest, seeds should be mixed with sand. Store seeds and sand in a sealed container in a refrigerator for four to six weeks to allow for cold stratification.

   After this period, seeds can be introduced into their intended growth area to begin germination. Transplanting of these plants after seed germination typically does not have favorable results and should be avoided when possible.

6) *Phlox divaricata*

Store *Phlox divaricata* seeds in a paper bag to prevent mold. These seeds need to be kept dry. Cold moist stratification (mixing seeds with sterile sand and placing into the refrigerator) for about 1 week is required before these seeds will germinate.

These seeds require complete darkness to germinate, and this can be done in plug containers in a dark space, such as in a cabinet, or by covering the seeds with a cloth that does not allow light to penetrate.

After germination and about two weeks of growth in a plug container, these plants can be moved into their proposed environment.

7) *Quercus alba*

The acorns of *Quercus alba* cannot tolerate storage over one year. After harvesting of the acorns, mix them with moist sawdust, sand, or sterile soil. These seeds cannot dry out, and if they do, they will no longer be viable. Store the acorns in a breathable container at room temperature in a dark place. Germination should begin during the storage process of these seeds, ensuring that the mixture is kept moist, and in a dark place.

8) *Rudbeckia hirta*

Store *Rudbeckia hirta* seeds in a paper envelope inside a sealed glass container in a cool, dry, place, above 40°F. These seeds can require up to three full months of cold stratification before they can germinate.

To germinate Black Eye Susan seeds, cold stratify them in a sealed container with a moist paper towel or moist sand in refrigerator for 3 months, or about 90 days.

Seeds should be sown into moist soil after this period, and should germinate within 2 weeks.

9) *Solidago canadensis*

Store *Solidago canadensis* seeds in a metal or glass container, sealed in a cool, dry, dark place, above 40°F.

10) *Sporobolus heterolepis*

Store in a cool, dry place, at around 40°F. These seeds require up to 10 weeks (about 2 1/2 months) of cold dry stratification in a refrigerator before germination can occur.

11) Tradescantia ohioensis

This plant performs best with one day of refrigeration and slightly moist soil immediately after harvesting. After this, the soil and seeds should be mixed with moist sand and stored in the refrigerator for four months of cold moist stratification. These seeds should not be stored for longer than this time period, and can be introduced into their proposed growing space after their stratification period, regardless of outdoor temperature. These seeds do not transplant well, and should not be moved from indoors to outdoors after growth begins.

12) Trillium cuneatum

Trillium cuneatum seeds should not be allowed to dry out, and should be stored in their seed pod in a container mixed with moist spaghnum. The container with the mixture should be sealed and stored in the refrigerator. Cold stratification in a transplanting container that is kept moist is required for germination to begin.

The transplanting container should be large enough that the plant is not overly disturbed during transplanting into the proposed growth space, as these plants are sensitive to environmental changes.

Transplant this plant into the proposed environment in early to mid spring, being careful to mind frost or overly cold (below freezing) night time conditions in the space, as this can kill the plant.

13) Trillium undulatum

Trillium undulatum seeds should not be allowed to dry out, and should be stored in their seed pod in a container mixed with moist spaghnum. The container with the mixture should be sealed and stored in the refrigerator. Cold stratification in a transplanting container that is kept moist is required for germination to begin.

The transplanting container should be large enough that the plant is not overly disturbed during transplanting into the proposed growth space, as these plants are sensitive to environmental changes.

Transplant this plant into the proposed environment in early to mid spring, being careful to mind frost or overly cold (below freezing) night time conditions in the space, as this can kill the plant.

Native Plant Adaptation into Urban Settings

Successfully integrating these 13 native species into urban areas requires adhering closely to the species natural growth requirements listed in the field guide's sections for each plant.

Refer to each plant's growing conditions for their sun needs. Some plants need growing sites full sun, at least 6 hours of direct sunlight per day, and some require growing sites with partial to full shade, where there is no more than 4-6 hours of indirect sunlight daily.

Plants that are found in woodland spaces will require high organic matter content in their soil, which means that adding an organic compost or fertilizer mixture to the soil may be necessary.

If plants prefer wet soil conditions, they would be a good choice for a rain garden or any garden space where water tends to collect. On the other hand, if a plant likes dry or rocky soil, it needs to be planted somewhere that the soil consistently dries out or contains a lot of gravel or other non-porous material.

Generally, most plants in this guide will perform well in well-drained, evenly moist soil, unless otherwise specified in that plant's section.

Sensitive plants, like *Trillium undulatum* or *Trillium cuneatum,* will react negatively to pollution runoff from road salt or other common urban pollutants. Keep this in mind when choosing growing sites for these plants, and try to plant away from roadways, or in areas with lots of other green space for plants like this.

Many of these plants could be eaten by deer, which are abundant in the Cincinnati area. "Deer Spray," a bad-smelling mixture, is available commercially. This typically prevents deer from eating garden plants, but will need reapplied after every rain. If garden plants disappear frequently, it is likely that deer are eating your plants. Deer spray can also be made at home, using a mixture of beaten egg, hot sauce, vinegar, garlic powder, dish soap, and water. Other

natural scents deer do not like include peppermint, oregano, sage, and rosemary. Planting these herbs near your native species or around your garden can also prevent deer from eating your plants.

Case Study 1

Kentucky Native Plant Society's Guide to Collecting, Processing, and Germinating Native Seeds

This guide from 2023 begins with a section recommending anyone desiring to collect native seeds begin by setting their goals for doing so. Do they want to collect native seed to incorporate into a farm, or for ecological land management purposes? The goal behind seed collection is important when selecting species for seed collection. The guide continues by saying gathering baseline data for the planting site one wishes to incorporate native seeds into, as this will affect what species can be chosen. Knowing the size of the planting site also aids in choosing quantity of seed to collect, as natural areas should not be harvested from excessively in order to preserve the natural population. In ecosystem restoration, data from the intended planting site will be integral in finding it's natural ecosystem trajectory, which should also be considered when choosing plant communities to harvest for restoration (Kubesch).

For collection of native seeds, the guide says that an important issue to consider is when to collect your seed, based on when the plants will mature and produce seed. Most grassland natives, like *Schizachyrium scoparium* studied here, will not have a set number of days to maturity like domesticated crops, and will have to be checked for seed development before harvest. "Scouting trips" were used here to decide when to harvest *Schizachyrium scoparium* and *Andropogon ternarius*. The guide recommends using clean, sharp pruners to harvest the grass seed, and says not to "harm the plant." Presumably, that means to only cut off the area of the plant producing seed. The seed was harvested at the same time as the natural area was surveyed for soil nutrient content and other surrounding plants, including *Rudbeckia hirta*, which was not harvested on this day. Seed collection in this case was done to capture the genetic diversity of the bluestem plants and to generate seed yields for the proposed site (Kubesch). This study's focus on grass seed meant that they collected no other native seeds from the site. Harvesting native

seeds with these specific goals in mind served to not overharvest the area, thereby preserving the collection area's biodiversity.

The guide explains that different native seeds require different processing and germination methods, and that commercially, seed is already processed before it reaches the consumer. When collecting one's own seed, it will have to be processed manually. This process may involve scarification or cold stratification of seeds. For germination of seeds, it is recommended to provide the right combination of light, temperature, and moisture that each species requires. Many native wildflowers require cold stratification, or scarification of the seed's hard outer coat. The *Schizachyrium* and *Andropogon* plants here required no scarification, but to germinate, required cold moist stratification. The guide continues that drying is crucial for most native seeds to prevent mold and plant diseases. In their example, seed and stem sections were left to dry atop a layer of soil from the proposed site, to determine the optimal rate of "hay transfer," a process of allowing nutrients from the degrading grass stems to enter the disturbed soil, which helps to suppress invasive species, shields the exposed soil from erosion from wind/water, and offers a conducive microhabitat for seeds to germinate and seedlings to root (Kubesch). This hay transfer process is part of an important element of many ecological restoration projects, soil remediation. Healthy, nutrient rich soil is the first step towards any healthy landscape, and methods like hay transfer or addition of organic matter are natural methods of creating healthy soil.

This guide's recommendations for site preparation, proposed site habitat data collection, seed harvest area collection data, and specific goal setting are especially useful for the collection of native seed regarding ecological restoration. Setting specific goals allows each project to be tailored exactly to its site habitat, particularly in which species to collect, based on the proposed

site's ecological trajectory. Such goal conclusions also require the data from the proposed site and the collection site, as with dissimilar habitats, the integration of native plants may not be successful into the new site.

Andropogon ternarius and *Schizachyrium scoparium* hay transfer experiment (Kubesch, J.)

Summary:

This resource is an online guide to collecting, processing, and germinating specific plants in the Kentucky region, and included harvesting, processing, and germination examples of its own on specific plants, *Schizachyrium scoparium* (Little Bluestem) and *Andropogon ternarius* (Splitbeard Bluestem). This case study discusses some of what this project does, including the importance of biodiversity conservation, and the methodology of preparing seeds for germination. This resource is studied focusing on user recommendations, collection methods, and utilization of seeds.

Link to guide from Case Study 1:

https://www.knps.org/a-brief-guide-to-collecting-processing-and-germinating-native-seeds/

Case Study 2

Plant Guide to Andropogon Gerardii

Big Bluestem (*Andropogon gerardii*) as shown in Western Native Seed's Guide. (WesternNativeSeed.)

This database's guide from 2004 begins with a series of alternate names for Big Bluestem beyond its common name, which is useful to account for regional differences of plant naming conventions. The conservation uses for this plant are listed as mine restoration, logging road restoration, or other sites with sandy or droughty conditions. Offering a list of sites that would be well-suited to a plant is useful for helping ecologists find what plants to put in specific disturbed sites. A historical description of the plant's uses in indigenous medicine by the Chippewa tribe details that Andropogon gerardii was used as a diuretic, fever reducer, and an analgesic. Showing a plant's medicinal uses by indigenous people is a method of preserving this plant's cultural significance in its native areas. Wildlife services offered by *Andropogon gerardii* include shelter for nesting birds and insects, and food for white-tailed deer and bison. Showing the broader ecosystem services of a plant helps one to understand the importance of the plant to its natural habitat. The necessary habitat conditions for Andropogon gerardii include moist, sandy or clay loam soils, and full sun or partial shade. However, this plant originated in prairie

ecosystems, and prairies typically have low moisture content and soil nutrient levels, and this means that this plant is well-adapted to a range of habitat conditions and can be used in a wider range of ecological restoration projects than some more specialized native species.

Regarding *Andropogon gerardii*'s needed conditions for seed germination, this plant guide outlines seed storage requirements of 50 degrees Fahrenheit and 50% humidity. It also notes that first-season establishment is often slow, as rhizomatic regeneration of *Andropogon gerardii will* not occur until after its first growing season. Information like this is important for ecological restoration projects, as a plant that does not seem to be performing well during the early stages may be replaced without knowledge of it being a plant's normal growth habit.

This guide does not list the conservation status, invasive status, or control methods for this plant in a site, as such measures are regional specific, and not applicable to a general plant guide, but it does state that *Andropogon gerardii* is invasive in some areas. Many plants are considered threatened or endangered in one area, but invasive in another. One example of a plant like this is Solidago canadensis, which is threatened in Cincinnati (and included in this project) but is considered invasive across continental Europe. Remembering these nuances is important for this project, as each plant will perform differently depending on its site conditions, and plants considered invasive in some places could likely overgrow in a small urban area, and maintenance of the plant needs to be explained before it is planted in an area where it may outcompete other species.

Summary:

This resource is a guide to the specifics of *Andropogon gerardii*, Big Bluestem. It discusses different facets of this plant, including its history, natural habitat, uses for ecological restoration, wildlife services, and establishment and of this plant in a landscape. This resource is studied for

its descriptions of the plant and their application to this project, and for the information it does not offer due to regional differences in this plant's growing zone.

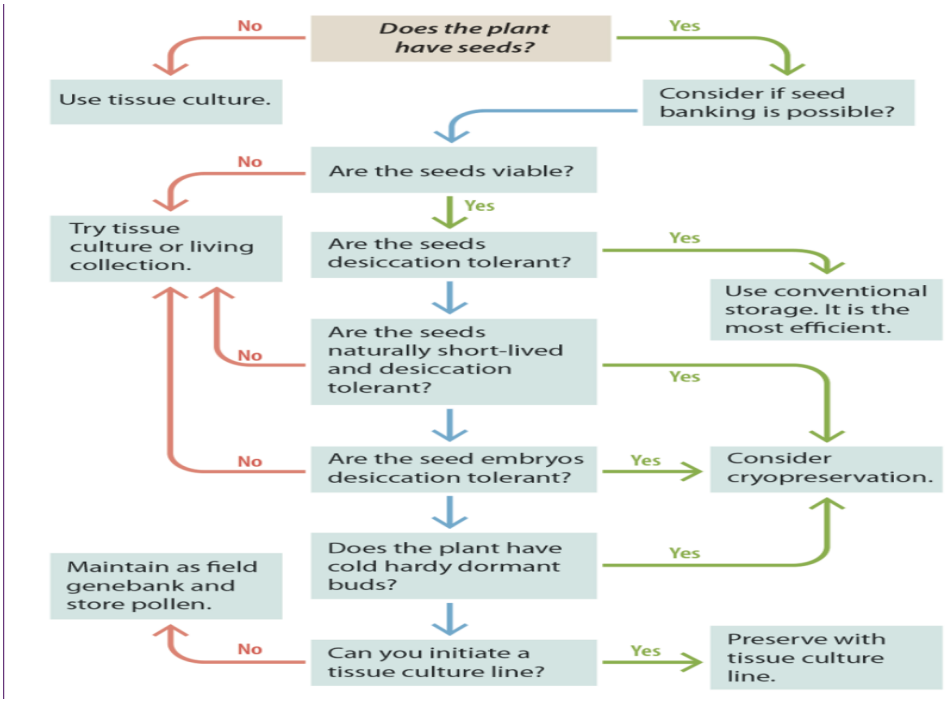
Link to Plant Guide from Case Study 2:

https://www.westernnativeseed.com/plant%20guides/andgerpg.pdf

Case Study 3

Center for Plant Conservation's Collecting Seed from Wild Rare Plant Populations

This article from 2020 begins with a list of "questions to ask" before one begins the process of collecting native seeds from rare plant populations. The most important questions relating to this project regard if the seed collection from its natural area will be used to benefit the species survival and reduce extinction risks, and if the collected seeds can be stored in a seed bank and still be viable. Seed should not be collected from threatened or endangered plants for reasons other than to benefit the survival of that species, as disturbing natural ecosystems always carries risk of damaging that ecosystem, and collection should only be done if one harvests with the intention of spreading that species to an area to benefit another ecosystem. Seeds also should not be collected if the viability of the stored seeds is not able to be done properly. Some native plants require immediate planting, and it is important to know each species' requirements for seed viability, and to plan accordingly for planting.



Flowchart showing "if" one should collect seed from a certain rare species. (CPC.)

This article, much like Case Study 1, recommends preparing the seed's proposed introduction site before harvesting seeds. It also recommends collecting data not just from your site and the collection site of the seed, but also to collect data on your chosen species of seed collection, to ensure seed storage preparations can be made before seed harvest. Such data greatly increases the likelihood of success when integrating a native plant into a new area.

This article also emphasizes the importance of knowing local laws when collecting native seeds, as some states prohibit such collection in public spaces, and agreements with local landowners will need to be made before harvesting seed in these states. Other states allow seed collection but require permits before collecting seed (Center for Plant Conservation). Knowing the local laws in areas is very important to protect existing local populations of endangered plants.

The 10% rule is also noted in this article, which states that no more than 10% of any individual population's seed production should be collected in one season, and that collection should not happen more than 10 years in a 90-year period (Center for Plant Conservation). This requires accurate recordkeeping in georeferenced latitude and longitude, to ensure no ecosystem is harvested from more frequently than is healthy for its population. Ecosystems are slow to "bounce back" after human interference, and minimizing that interference is all people can do directly to protect existing ecosystems.

This article states that seed collection should capture the representative genetic diversity of species in the area. Collect seed from plants of large and small size, and collect multiple times throughout the harvest season, as even the same population of a species will not all produce seed at the same time. This is an evolutionary trait to ensure the survival of each plant's offspring. Multiple sites of seed collection are the best way to accomplish this, as geographic distance is a

good indicator of genetic dissimilarity, even in the same species (Center for Plant Conservation). Collecting a genetically diverse population of seeds certifies that the proposed site will mimic the natural genetic diversity of a native plant species, which helps promote biodiversity even when collecting seed from one species of plant.

Summary:

This resource is an article aimed at protecting existing populations of native plants when performing seed collection. It contains a list of questions regarding the seed collection to decide if the collection is worth the risk of disturbance to the collection site, and guidelines for how to harvest seed without overly disturbing the local seed populations, including a section on legal parameters for collecting seeds of rare plants. This article is studied for its information and guidelines on protecting existing natural populations of native seed, as this project's goal is to promote biodiversity in urban areas without detracting from natural biodiversity in healthy ecosystems.

Link to article from Case Study 3:

https://saveplants.org/best-practices/collecting-seeds-wild-rare-plant-populations/

Historical Context of Native Seed Collection

Seed collection of native plants is historically important because of its impacts on biodiversity conservation and adaptive capacity for climate change, ecological restoration projects, and scientific research on native plants. Also, although the plants discussed in this project are not intended for agricultural use, indigenous people's methods of agriculture involved a method of "saving seed," meaning that they kept seeds from last year's crops to be sown in the future, which is culturally significant for indigenous people, and ecologically significant as well.

For biodiversity conservation, collecting and preserving seeds from a variety of different native plants helps to conserve the genetic diversity originally present in any given region. This is especially integral for the long-term survival of ecosystems, as the more diverse an ecosystem's gene pool is, the more resilience the ecosystem has against diseases, pests, and environmental changes (such as global warming or other climate-based stressors). This is because the impact of diseases, pests, or other stressors is not the same across species of plants. For example, starting in 2003, the Emerald Ash Borer beetle decimated the Ash tree population in Ohio, but did not negatively impact Oak tree species under the same conditions. This concept is equally as important today as it was in the past, with highly biodiverse ecosystems faring better against stressors than areas with low biodiversity. Climate change stressors affect plant species differently as well, with some plants (for example, *Asclepias tuberosa,* Butterfly Weed) tolerating a range of soil and light conditions, while other plants (like *Ranunculus hispidus*, Bristly Buttercup) only tolerate moist soils under part shade.

For ecological restoration projects, which aim to recreate, accelerate, or even initiate the recovery of an ecosystem that has been disturbed, the premise largely relies on access to native seed stock. A past ecological restoration project in the Cincinnati area was the Greater Mill Creek Ecosystem Restoration Project, started in 1994. The Mill Creek was the most polluted and

physically degraded stream in the US, and using water purification techniques, removal of invasive species, and incorporating native plant species that thrive in this riparian area, the Mill Creek has improved in water quality, and in biodiversity, with species of fish, birds, and other macroinvertebrates that were absent during the creek's most polluted time, returning to the area as of 2022 (Swartsell, 2023).

Scientific research on plants often relies on the concept of native biodiversity, as each species presents a unique set of solutions for specific biological problems. Collection and preservation of seeds is important for this, as seed banks provide researchers with the material for experimentation and development of new techniques for medical and ecological advancements. The more diverse a seed bank is, the more possible solutions can be found through it. A historical example of this is the use of willow bark to create aspirin, a pain reliever and anti-inflammatory medicine. Willow bark was used by ancient Egyptians for these same purposes, starting around 1500 BC (World Health Organization).

For indigenous people, saving seeds is tied to their cultural, ecological, and economic well-being. The practice of collecting and saving seeds is not new, and in fact comes from generations of traditional indigenous knowledge. Such seed saving is an expression of the deep connection indigenous communities have with their lands, encompassing the preservation of native, biodiverse plant species, and indigenous people's sustainable approach to agriculture that was finely attuned to natural rhythms of the environment. Seed Savers Exchange, an indigenous seed saving group, has been preserving heirloom crop varieties of US plants since 1975, although indigenous people have always performed this practice. An example of such a practice comes from the Meskwaki settlement in central Iowa, where they grow Tama Flint Corn ("Atamini"), initially cultivated by their ancestors and grown today on their land. In the early 1900s,

approximately 1909, museums around the US began taking saved seeds from the Meskwaki tribe for display. In 2019, those displayed seeds were returned to the Meskwaki, and the heirloom plant varieties are now again being grown by the Meskwaki people. Beyond ecology, too, saving seed is a method of maintaining food security for indigenous tribes, and allows them to prosper economically by cultivating crops that they can profit from, as the plant varieties they grow from seed saving are genetically diverse, and this is rare in our modern-day food supply (Cosier).

A Meskwaki woman sifts *Atamini* corn out of shells and into a jar. (Cosier, S.)

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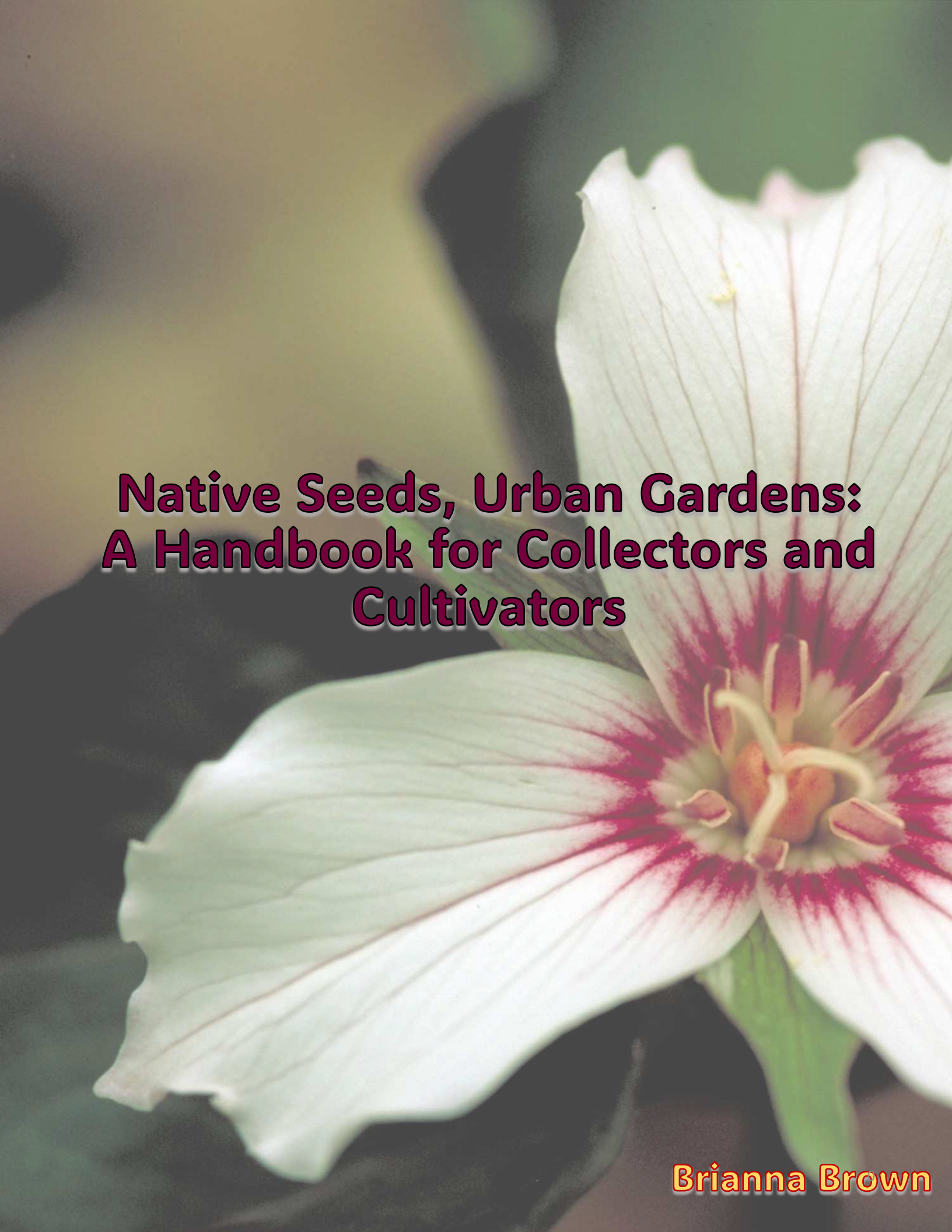

Native Seeds, Urban Gardens: A Handbook for Collectors and Cultivators

Brianna Brown

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Mission Statement

- This field guide outlines the best ways to incorporate 13 of Ohio's native plants into the urban garden spaces. Using native species in urban spaces promotes biodiversity in urban ecosystems.

Why is biodiversity so important?

- The loss of biodiversity lessens the resilience of our ecosystem. Ecosystems with less biodiversity are more prone to devastation, via infectious diseases, or natural disasters, like a warming climate. This is because each species in an ecosystem has different resistances, and weaknesses. If an ecosystem with many similar plants contracts a disease those plants are sensitive to, all those plants will likely contract the disease. This is not the case for an ecosystem with a large variety of plants with different strengths and weaknesses.

Why are native plants important for promoting biodiversity?

- Native seed collection and native plant integration is important to biodiversity because of the specialized relationships between flora and fauna in ecosystems, which are perfected over millions of years of evolution.

- Non-native species do not have the same innate benefit, and even a non-specialized insect will choose a native host plant over a naturalized or invasive plant. This shows a need for reintroduction or enlargement in the quantity of native plant specimens into urban green spaces, to attract more beneficial insects to the area, and to supply specialized insects with their host plant species in the area.

- Providing native plants to support these flora 2and fauna's special relationships in urban green spaces supports migrating (which are in intense danger around urban spaces) and local insects, as well as other animal populations. **The web of life is connected, and it starts at the bottom with plant life.**

Setting Goals for Native Seed Harvesting

- Before you begin collecting native seeds from wild populations, it's necessary to **define your purpose for harvesting.**
- The species listed in this guide are chosen with the intent for integrating the seeds into urban garden spaces.
- Before harvesting, choose plants whose natural habitat ecosystem somewhat matches your garden space The "Finding and Growing" sections describe each plant's natural habitat, and your proposed site should somewhat match the conditions listed there. For example, the Virginia Bluebell will not grow in the same sunny and dry conditions as the Rough Blazing Star, so make plant choices based on your proposed site conditions.
- **Conduct a site analysis on where you want to grow the native species, and compare the species' natural habitat to your site.** It needs to be similar, or the proposed site needs to be altered until it aligns with the plant's natural growth habitat.
- Is your site's soil dry and rocky, or well-drained and high in organic matter? Does it get 6 hours of direct sun a day, or is it mostly shaded? How large is your site, and how much of it do you want covered with the native plant you want to harvest? Can you plant harvested seeds immediately, and allow them to naturally overwinter, or do you need to store them indoors beforehand?
- Questions like this will inform what kind of plants, and how much of each native plant you need to harvest. Harvested seeds should not be wasted, but you want to collect enough to grow the plant successfully based on each species' rate of germination.

Necessary Tools & Tips to Harvest and Store Seeds

To harvest native seeds, it is recommended to use:

- Gloves 
- Sharp pruning shears or a pruning knife 
- Paper or plastic bags 

To store, germinate, and grow native seeds, each species has different requirements, but in general it is recommended to have:

- A method of refrigeration
- Sterile sand or soil mixture, spaghnum or vermiculite
- Plastic bags, paper bags, and sealable glass or plastic containers
- A cool, dark place (below 60F and above 40F)
- Plug trays to grow seeds that can be transplanted

These are basic tools for most all plants, as many of the following species require cold stratification, sealed containers to prevent moisture loss, or breathable containers to prevent mold.

Each species has specific requirements in their section, so check those before harvesting any plants. NOT ALL SEEDS IN THIS GUIDE CAN BE STORED!

TIP: You will need multiple visits to any site you want to harvest from!

You need to be able to identify the plant while it blooms and to remember its location so you can harvest the seeds- that's at least 2 visits, but since the fruiting time of these species is slightly variant and dependent on weather in the area, it may take even more trips before seed can be harvested.

Checking a site **once during the growing season, and weekly during the fruiting/seeding season** should be enough to have success with seed harvesting.

Safety during Native Plant Seeking and Seed Harvesting

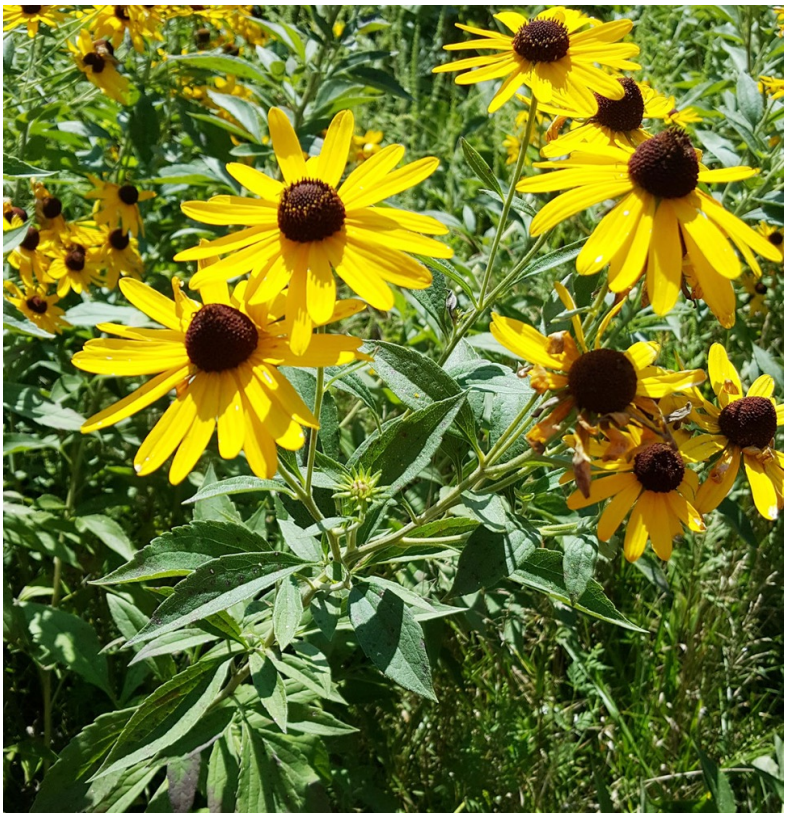
- It is safest to not enter natural spaces alone, as wild animals or simply getting lost when leaving hiking trails can pose a threat to any individual's safety.
- Alone or not, stay vigilant when in natural spaces. Stay aware of where you left the trail or the direction you're heading in. Using string, or some non-toxic paint to mark your path can prevent getting lost.
- Some of the spaces recommended in this field guide to for search for these native plants may be on private property.
- If you plan to enter a space that you think may be private property, reach out to the owner of the space before entering. Ohio has a "Stand Your Ground" Law, which allows residents of an area to use lethal force in defense if they feel reasonably threatened by your presence on their property. For this reason, contacting owners of private spaces ensures your safety, and then you can forage and harvest freely, given their permission.
- Before entering a nature space with the intent to forage for seeds, check out legal regulations in the specific state or county you are in.
- In Ohio, it is not illegal to forage for seeds in the spring and summer months, and **harvesting small amounts of seeds** from natural areas in State Parks or public spaces is **allowed with no permit**.
- **Taking rare or endangered whole plants from these areas is illegal** in most of the United States, however. That is why this field guide **never recommends taking whole plants from any natural space**, and seed pods should be carefully removed using sharp tools, or precise fingers.
- **Do not take more than 10% of the seed's population from any one area**. Careful harvesting is the only way to ensure that the local population of the foraging space is not damaged.
- **Be careful** when looking for areas to explore, and do proper research on the site's conditions, and regulations on that plant in the specific park or area.

Blooming and Seed Harvest Timeline

Plant	January	February	March	April	May	June	July	August	September	October	November	December
Black Eyed Susan Bloom Time												
Black Eyed Susan Seed Harvest Time												
Ohio Spiderwort Bloom Time												
Ohio Spiderwort Seed Harvest Time												
Yellow Goldenrod Bloom Time												
Yellow Goldenrod Seed Harvest Time												
Rpugh Blazing Star Bloom Time												
Rough Blazing Star Seed Harvest Time												
Blue False Indigo Bloom Time												
Blue False Indigo Seed Harvest Time												
Prairie Fringed Orchid Bloom Time												
Prairie Fringed Orchid Seed Harvest Time												
Virginia Bluebells Bloom Time												
Virginia Bluebells Seed Harvest Time												
Toad Trillium Bloom Time												
Toad Trillium Seed Harvest Time												
White Oak Leaf Seasons												
White Oak Seed Harvest Time												
Blue Phlox Bloom Time												
Blue Phlox Seed Harvest Time												
Wild Lupine Bloom Time												
Wild Lupine Seed Harvest Time												
Prairie Dropseed Bloom Time												
Prairie Dropseed Seed Harvest Time												
Painted Trillium Bloom Time												
Painted Trillium Seed Harvest Time												

Identifying Black Eye Susan

Rudbeckia hirta



Group of Black Eye Susans. (Dekker.)

Black Eye Susan in full bloom. (Dekker.)

Black Eye Susans, also called "Brown Eyed Susan" or "Indian Paintbrush," is a daisy shaped, bright yellow flower. The number of petals vary, but petals are thin, oval shaped surrounding the conical center of the flower body.

Black Eye Susan has a bright green stem with dagger shaped leaves close to the ground, below the blooms.

Seeds are sharp and elliptical, growing off the flower's central conical shape.

Black Eye Susan after bloom, fruiting body covered in seeds, ready for harvest. (Dekker.)

Finding and Growing Black Eye Susan

Black Eye Susans in a prairie. (Bona Tera.)

Black Eye Susan prefers medium to dry, loamy soils and full sun. It is tolerant of partial shade, 4-6 hours in sun.

After initial planting, the plant needs to establish itself before it can become drought tolerant. Give young plants about 1 inch of water every week during the first growing season. For the first 2.5 weeks after planting, water the seedling every day, about 1 inch of water.

Black Eye Susan naturally grows in many areas, including in pastures and prairies, along woodland edges, along railroad tracks, or in other disturbed areas with bare soil. Disturbed areas are common in urban environments.

Ecologically, these areas all share drier soil types, full to part sun, and frequent disturbances in soil.

Black Eye Susan seedlings. (shop.seed-balls.com.)

Harvesting Black Eye Susan Seeds

Seeds of Black Eye Susan plants are ready to harvest from mid-September to mid-October. Wait for petals to shrivel, or fall off completely.

Mature seeds on the flower (shown below) should be slightly triangular, gray to black, and about 1 cm long.

Flower head “cones” on Black Eye Susan plants that are ready for harvest. (Dekker.)

Black Eye Susan seeds, on 2 mm grid paper (Ernst Seed.)

To harvest, remove whole flower heads, leaving some stem attached, with scissors or pruning shears.

The flower heads should be put in paper bags, and hung upside down (by stems) to let seeds dry.

Once dry, the cone (flower head) should be brittle, and seeds can be scraped or shaken off.

The seeds may need cleaned off after this, as parts of the flower cone may stick to the seeds. Rolling seeds between fingers should be sufficient to remove the cone pieces.

Storing and Germinating Black Eye Susan Seeds

Store Black Eye Susan seeds in a cool, dry, dark place. Seeds will stay viable for about 2-5 years stored under these conditions.

Cold moist stratification of seeds. Done in moist soil in a refrigerator. (Butterfly Gardening.)

Black Eye Susan seeds and a dried flower cone. (Alamy stock photos.)

To germinate Black Eye Susan seeds, cold stratify them in a sealed container with a moist paper towel or moist sand in refrigerator for 3 months, or about 90 days.

Seeds should be sown into moist soil after this period, and should germinate within 2 weeks.

Water seeds and young seedlings every day throughout the first growing season.

Identifying Ohio Spiderwort

Tradescantia ohioensis

Group of Ohio Spiderwort flowers with visible green seed pods. (American Beauties Native Plants.)

Ohio Spiderwort, also called Blue Jacket, Smooth Spiderwort, or Cow Slobber, is a blue-purple wildflower. Ohio Spiderwort has a green stem with grass-like leaves, and blue-purple flowers on top with 3 clover-shaped petals.

The grassy leaves grow up from the plants base and along the lower stems of the plant, giving this plant a bushy appearance.

There are green or purple stamens in center of the flower, with yellow pollen clusters. The plant's green seed pods appear directly below flower clusters on the stem.

Seeds are flat and oval shaped, and light grey in color with brown speckling on both sides. There are indentations in the center of the seed, with the seed's embryo and storage system raised on one side of the seed and indented on the other side.

Ohio Spiderwort in full bloom. (Garden's Eye View.)

Ohio Spiderwort plants with flowers done blooming, ready for seed pod harvest. (Lady Bird Johnson Wildflower Center.)

Finding and Growing Ohio Spiderwort

This wildflower likes full sun, but can tolerate up to part shade, which is reflected in its range of habitat areas. For optimal blooming, though, more sun is better, so open prairies, or woodland edges with direct sun for at least 6 hours per day is most likely to suit seed collecting purposes, and for spreading this plant in a landscape.

Ohio Spiderwort seedling, planted outside in a natural area. (Castle.eiu.edu.)

Ohio Spiderwort prefers moist soil, and likes soil with sand content or a slightly acidic pH, around 5.5. The soils in our area are more alkaline, so keep that in mind when searching.

Ohio Spiderwort grows naturally in in moist to wet prairies, Oak savannas, woodland edges, or in sandy prairies and along stream banks. It has also been found around railroads or roadside ditches with some water accumulation.

Ohio Spiderwort growing in a rocky, dry soil in Colorado. (Wildflowers-and-weeds.com.)

However, urban areas frequently have more acidic soil due to pollution runoff and its contact with the soil immediately around cities or in park spaces.

This plant can grow in dry soil as well, but blooming is likely to be less frequent and fewer blooms at a time.

Harvesting Ohio Spiderwort Seeds

Seeds of Ohio Spiderwort plants are ready to harvest in mid to late July, as a spring blooming plant.

Wait until flower heads have shriveled and turned brown, and some seed pods have burst open. Harvest seed pods that are still surrounded by green stem, and brown in the center. Seed pods ready for harvest should have thin, papery skin, and the whole seeding body can be easily cut from the central stem with sharp shears or a pruning knife.

Ohio Spiderwort seed pods attached to plant, ready for harvest. (Project Noah.)

Ohio spiderwort seeds on a 2- mm grid. (Ernst Seeds.)

After harvesting the full seeding body (multiple seed capsules), separate each seed pod, leaving the green covering and stem attached.

Each seed pod can then be put into a separate paper bag. Spread the bags with the pods out to dry away from direct sunlight (excessive heat will reduce seed viability).

Once dried, the seed pods can be lightly crushed to release the seeds, and then the flat, oval, gray seeds can be separated from the plant material.

The seeds can then be stored, as is outlined on the next page.

Storing and Germinating Ohio Spiderwort Seeds

After harvest, and thorough drying of these seeds, they can be stored in a dry container in a refrigerator for 1 day.

After this, the soil and seeds should be mixed with moist sand and stored in the refrigerator for 4 months of cold moist stratification.

Ohio Spiderwort seed pods on a drying tray mixed with plant debris and soil, another drying method for seeds. (Native Plant Initiative of Greater New Orleans.)

These seeds should not be stored for longer than this time period, and can be planted into their proposed growing space after their stratification period, regardless of outdoor temperature, though fall or early spring sowing is ideal. These seeds do not transplant well, and should not be moved from indoors to outdoors after growth begins.

There is another option for these seeds, which is to sow them outdoors in their proposed growing space immediately after harvesting, drying, and removing from seed pod capsules.

Ohio Spiderwort seedling in a greenhouse. (Everwilde Farms, Inc.)

The seeds will get a natural cold stratification from Cincinnati's weather. The seeds will not grow until next spring season, however, and there will not be a way to test the success of your harvest until the plants germinate next spring, but in general, this method yields good results. Plant these seeds 1/8-1/4 an inch deep, with a thin soil covering on top. Water seedlings daily, giving about 1 inch of water to young seedlings. Water every 2 days throughout the plant's first growing season, and maintain moist soil conditions to help this plant thrive.

Identifying Yellow Goldenrod

Solidago canadensis

Yellow Goldenrod in full bloom. (Missouri Botanical Garden.)

Yellow Goldenrods growing in a group in a prairie space. (Budburst.org.)

Yellow Goldenrod, also called Canada Goldenrod, Meadow Goldenrod, Common Goldenrod, Giant/Shorthair Goldenrod, or Rough Goldenrod, is a tall plant, reaching 1-7 feet tall, with a smooth stem with fine hairs at the top near flower the clusters.

Yellow goldenrod has sharply toothed, dagger-shaped leaves, with fine leaf hairs. Tiny, bright yellow flowerheads appear on arching branches, in a long or flat-topped cluster at the stem's end.

The flowers of yellow goldenrod grow in clusters that can be pyramidal, spreading, or cascading downwards, and each cluster can contain 100-1300 small flowers.

The flowers of yellow goldenrod are about 1/8 an inch, and have 8-15 petals surrounding the central disk-shaped flower with 3-6 separate disc-shaped pollen-covered centers with a slightly darker yellow coloring. Flowers have yellow leaf-like structures directly beneath them, with a pale yellow coloring and light green tips.

Close up of Yellow Goldenrod flowers, showing flower centers and small petals. (Plants.ces.ncsu.edu.)

Finding and Growing Yellow Goldenrod

Yellow goldenrods growing in a meadow space. (Missouri Department of Conservation.)

When seeking out Yellow Goldenrod around Cincinnati, look for prairie or meadow lands north of the city. The University of Cincinnati Center for Field Studies has a significant population of yellow goldenrod in its prairie land. This plant is also used ornamentally in Cincinnati in park areas. Disturbed areas with full sun can also be good places to look for this native plant, and so would any open field space with moist soil and full sun conditions.

Yellow Goldenrod lives in prairies, meadows, grasslands, along stream banks, in open woods, and in disturbed areas.

Yellow Goldenrod seedling. (Cornell Weed Identification.)

Yellow Goldenrod requires full sun, and this is reflected in its most common habitat ranges, prairies, meadows, and woodlands with open canopies.

Yellow Goldenrod grows well in soil with clay content, like is common around Cincinnati. This plant also prefers moist, well-drained soil year-round, but does not like wet soil.

Harvesting Yellow Goldenrod

Yellow Goldenrod seeds are ready to be harvested in October through the first half of November.

Harvest when yellow flowers have fallen and turned brown, and white hairs appear around seed clusters.

Begin harvesting by bending the plant's main stem slightly downwards, and placing a paper bag around the entire seed and fluff cluster on top of the plant.

Cut off the entire top of plant from the main stem, and lay the whole cluster carefully into the paper bag to allow drying. Once thoroughly dry (which may be immediately, depending on fall heat levels), remove small clusters from main stems using fingers. Seeds should slide off easily, but will stay attached to fluff and other plant debris.

Yellow Goldenrod seeds on a 1-cm grid. Paper clip for scale. (Northern Wildflowers.)

Leave the seeds attached to the white or brown fluff, as removing this could damage the seed. Rolling seeds and stems in your fingers will remove most unwanted material, and make seeds easier to work with.

The fluff on the seeds can be cut off carefully, but this is not necessary, as the small fluff will not deter the seed's growth. Seeds in the above image are sold commercially, and do not have the fluff attached.

The seeds can stay in dry storage in a cool, dark place for up to 3 weeks after harvest before they need any other attention.

Goldenrod seed clusters ready for harvest. (Wildfoods 4wildlife.com.)

Storing and Germinating Yellow Goldenrod Seeds

Harvested and dried goldenrod cluster,ready for seed removal by hand. (Wildfoods4 wildlife.com)

Store dried Yellow Goldenrod seeds in a metal or glass container, sealed in a cool, dry, dark place, above 40°F.

These seeds should not be refrigerated during storage period, as this could reduce their viability.

Seeds can be stored dry for up to 1 year, but require cold moist stratification for about 2 months, or 60 days, beginning in late winter, around January 30th.

Mix the seeds with a small amount (about 1 tsp per seed) of sterile soil and place in a plastic bag in the refrigerator to cold stratify.

Goldenrod seeds attached to brown fluff. Ruler for scale. (Wildfoods4wildlife.com)

After cold stratification, the seeds should be planted outdoors in their proposed growth space.

Dig about 1/8 an inch of space and pour the soil and seed mixture into the proposed growing space. Cover the soil and seed mixture with a thin layer of soil (less than 1/16 of an inch) to ensure no seeds are visible above the soil.

After the last frost, give the seeds about 1 inch of water every 3 days, to ensure germination can occur. Small seedlings need this much water until they develop true leaves and begin growing upward, and then can be watered weekly for the first growing season.

Identifying Rough Blazing Star

Rough Blazing Star in full bloom. (Gardenia.net.)

Rough Blazing Star, also called Butterfly Magnet, Tall Gayfeather, Button Blazing Star, or Lacerate Blazing star, is a perennial prairie or meadow plant.

Group of Rough Blazing Star plants. (Allendan Seed Company.)

Liatris aspera

Rough Blazing Star is a tall, slender plant, about 1 foot tall. Flowers grow from the upright center stalk. Stalk has a reddish purple color, and the small leaf-like structures around and underneath the flower are green. Arranged around the flowers on green, spear-shaped bodies, looking similar to leaves. Leaves also appear along the flower stalk, and are green. Flowers pods that are yet to bloom are green colored.

Flowers are bright pink, with small petals around seed pods, and similar colored spider-leg tendrils growing around the flower's edge.

Rough Blazing Star seed pods after flowers have bloomed, with seed pods ready for harvest (Open Prairie, South Dakota State University.).

Finding and Growing Rough Blazing Star

Rough Blazing Star in a prairie space. (Allendan Seed Company.)

Looking for Rough Blazing Star around the Cincinnati area involves seeking out disturbed areas around railroad yards, or railroad tracks with bare soil around them, abandoned development sites, or other developed areas with natural spaces around them. Rough Blazing Star prefers dry soil, and full sun, but as these are some of its only habitat requirements, finding this species around disturbed urban spaces is likely.

This perennial wildflower naturally appears in prairies, glades, savannas, and in disturbed areas. The regions with Rough Blazing Star commonly have low soil nutrient levels, as this plant can thrive in spaces where other plants cannot.

Rough Blazing Star requires full sun for optimal growth and flowering, and this is reflected in all its natural habitat conditions. Shading and woodland encroachment is a main threat to this plant's native population.

Rough Blazing Star prefers dry soils, and is more likely to be found in dry prairies with "poor" soil, which are typically sandy or rocky in composition. Disturbed areas typically have rocky or compacted soils, and Rough Blazing Star is a tough plant that can thrive in areas like this where other plants may struggle.

Gravelly, disturbed soil. Example of soil conditions Rough Blazing Star can tolerate. (Indiamart.com)

Harvesting Rough Blazing Star Seeds

Rough Blazing Star seeds are ready for harvest typically in November, once flowers have stopped blooming, and turned brown and crispy.

Using sharp shears or a pruning knife, cut off the entire top of the flowering section from the main stem.

Place the seed pods and flower stalk face down into a paper bag and store them in a dry location. Flower stalks may need cut again to fit entirely into the paper bag, as the paper bag needs to be closed after collecting the flower stalks.

Rough Blazing Star plant with seed pods visible around past-bloomed flowers. (BlazingStarGardens.com.)

Rough Blazing Star Seeds. Dime for scale. (Mosupervs.live.)

To remove the seeds from the flower stalk, use your entire hand and rub down the flower stalk to knock off all flower debris and seed pods. Seed pods should be dry enough at this point that they break open and spill seed when rubbing hand down the stalk.

Once the flower stalk is empty of debris, the small seeds with their brown fluff should be visible.

Separate flower and plant debris from seed, leaving the seeds attached to brown fluff.

Store these seeds in a paper bag in a cool(above 40F) and dry location until late November, when they will be ready to plant.

Storing and Germinating Rough Blazing Star Seeds

Rough Blazing Star seedlings growing in a container. (South Dakota State University.)

Blazing Star flower stalks and seed pods in a paper bag to dry and store until seeds are removed from stalk. (Youtube.com/growitbuildit.)

If planting outdoors after harvest is not possible, after drying the seed during fall and winter, beginning in early February, place the seeds in a plastic bag with sterile sand, get the mixture slightly damp, and put into the refrigerator for cold moist stratification for at least 5 weeks.

During this time, keep sand slightly damp, but not wet.

After this period, sow the sand and seed mixture together in 1/8 inch deep holes in the proposed growing space.

The best option for germinating these seeds is to sow them directly into their proposed growing space during late fall, soon after harvesting.

Plant the seeds 1/8 inch deep into the prepared garden area, so the seed can overwinter naturally and germinate in the spring.

Another possibility for these plants is to germinate the seeds outdoors in pots with a sterile sand and soil mixture in late fall after harvest.

Plant the seeds 1/8 inch deep into the small pots, and place the pots so that they will experience the winter wind and snow conditions.

In spring, the seeds will germinate and begin to grow in the pots. Keep pot soil damp, but again, not wet, and transplant the plants into the growing space once they reach 2 inches tall.

Once planted in ground and large stalk is visible, water about every 3 days during the first growing season, giving about 1 inch of water.

These plants prefer dry soil, so be careful not to overwater.

Identifying Blue False Indigo

Baptisia australis

This perennial wildflower, also called Blue Wild Indigo, or Indigo Weed, is a bushy looking plant, and is about 3-5 feet tall.

Flowers and leaves are in dense clusters arranged in a whorl around the stalk's top, with flowers at the top, and leaves farther down.

Blue False Indigo has pea shaped flowers with bluish-purple, or sometimes white-purple petals, near the top of the stalk.

Green, oval-shaped leaves appear farther down the stalk, with the top 12 inches of the plant being only the flower stalks.

The plant's thick stem is slightly lighter green than surrounding leaves.

Blue False Indigo growing in a patch. (Missouri Botanical Garden.)

Close up of Blue False Indigo flowers. (Clark, Maureen.)

Blue False Indigo with newly developed seed pods. NOT ready for harvest. (Clark, Maureen.)

Blue False Indigo's large green seed pods appear in the space of the flowers after the flowers have shriveled and fallen off. During the blooming season, these seed pods will not be visible.

NOTE: None of the plants in this guide are recommended for consumption, but Blue False Indigo is mildly toxic. Wear gloves when collecting seeds.

Finding and Growing Blue False Indigo

Blue False Indigo seed pods, fully developed and ready to harvest. (Native Plant Trust- Go Botany.)

Blue False Indigo during its blooming season and its seed harvest season will look like very different plants, with only the bushy form and the leaves remaining the same.

When looking for Blue False Indigo around Cincinnati, seek out disturbed areas around railroad yards, abandoned development sites, or other developed areas with natural spaces around them. Blue False Indigo can also likely occur along sunny woodland edges in local parks, or undeveloped banks along the Ohio river. There are also grassland and prairie preservations north and east of Cincinnati, including the Adams Lake Prairie State Nature Preserve.

This perennial wildflower is a prairie or grassland plant, and will also grow in sandy floodplains and stream bands, as well as along woodland edges or in wooded areas with open canopies.

Blue False Indigo plants thrive in full sun, like in prairies and grasslands, but can tolerate up to partial shade (around 6 hours of direct sunlight per day), which is typical around woodland edges and inside forests.

The soil in prairies and grasslands are typically silty, sandy, or clay-rich, and are rich in organic matter and material.

Sandy floodplains and stream bands are more variant in soil composition, but are typically sandy, loamy, and rich in organic matter. These ecoregions generally have moist soil.

Blue False Indigo in a prairie space. (Henry Domke, from twitter.com.)

Harvesting Blue False Indigo Seeds

Blue false indigo seeds are ready to harvest in the late summer or early fall.

Wait until the seed pods turn entirely black, fuzzy, and either begin to open on their own, or begin to rattle when shaken, as this shows that the inner seeds are fully developed.

Use sharp shears or a pruning knife to cut off entire seed pods from the plant.

Open the seed pods, and pull the individual seeds from their pods.

Inspect individual seeds for signs of weevil infestations (small worms that burrow into the seed, leaving bean or round-shaped holes into the seeds. Discard any seeds with such markings.

Blue False Indigo open seed pods, with developed seed ready to harvest. (Adobe Stock Photos.)

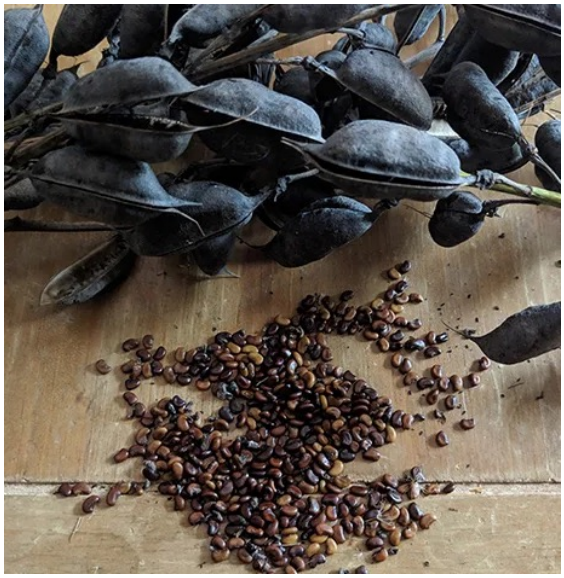
Blue False Indigo Seeds on a 2 mm grid. (Ernst Seeds.)

Place seeds on a paper plate away from the sun and leave them to dry for 2-3 days in a cool, dry, dark place, such as a cupboard or in a shed.

After this, either sow seeds immediately in the proposed outdoor space, or transfer the seeds to Ziploc bags or paper envelopes, and they can be stored outdoors in a cool shed or a garage for the winter months.

This seed germinates most reliably when fresh, but storage and stratification practices are also fairly successful.

Storing and Germinating Blue False Indigo



Blue false indigo seed pods and removed seeds. (Meghan Shinn, from hortmag.com)

The most reliable method for germinating these seeds is to sow them directly into the soil of the proposed growing space, planted about ¼ an inch deep and covered with soil on top.

Sow the seeds immediately after the summer/fall harvest, and they will overwinter naturally and germinate in the spring.

The best germination technique for Blue False Indigo aside from naturally overwintering is to use cold, dry stratification for at least 4 weeks, starting in mid-February.

Place the seeds in their storage container into the refrigerator for 4 weeks.

After this period, soak the seeds in hot water (115-125F) in a lightly sealed glass jar for a 24-hour period. Water will slowly cool, and does **not** need reheated during this time.

After hot water treatment, place the seeds in a plastic bag with a wet paper towel on one side, and sit the seeds in front of a window to begin germination.

Blue False Indigo seeds germinating in a plastic bag with wet paper towel. (Robert Pavlis, from gardenmyths.com)

After germination, place the seeds directly into the soil in the growing space, assuming overnight temperatures by this point are reliably above 40F. If outdoor temperatures are still too cold, the seeds can be planted indoors in small pots and transplanted outdoors once temperatures are high enough and seedlings are at least 2 inches tall.

Identifying Prairie Fringed Orchid

Platanthera leucophaea

Eastern Prairie Fringed Orchid in full bloom. (The Land Between.)

Eastern Prairie Fringed Orchid with seed pods, not yet ready for harvest. (GoOrchids.com.)

Eastern Prairie Fringed Orchid, also called White-fringed Orchid, is a perennial prairie plant with showy white fringed flowers and spiky leaves.

The plant blooms in late June to early July, and this is the best time for plant identification, as flowers only last about 1-1.5 weeks. This plant's flowers are white or creamy, with 3-lobed petals and fringed margins, with one extra unfringed petal forming a hood over the flower center. Flowers are arranged in a cylindrical spike. The center of the flowers has light green to pale yellow stamens, and seed pods will develop after flowers have bloomed and withered.

This plant has lance-shaped leaves, and can have several to many leaves scattered along the stem, from the base to the top. The seed pods of Prairie Fringed Orchid are shaped a bit like bananas, and develop after successful pollination from female to male plants, requiring more than one plant in an area to produce seed pods.

2 Prairie Fringed Orchids growing in a natural meadowland. (GoOrchids.com.)

Finding and Growing Prairie Fringed Orchid

Eastern prairie fringed orchids growing in a natural grassland. (Bill Glass, from USDA Forest Service.)

This perennial wildflower's habitat is mainly wet prairies, bogs, or other wetlands. Wetlands and bogs are some of the most threatened habitat in the US. This plant has also been found along the edges of stream bands, sedge meadows, marsh edges, and in open grassland areas with high soil moisture.

Prairie Fringed Orchid requires full sun for optimal growth and flowering, and all of its habitat locations reflect this.

Wet-mesic prairies and bogs have loam or silt loam soils, with a neutral pH, high organic matter content, and high water retention.

High soil moisture is required for Prairie Fringed Orchid, and this plant can even tolerate seasonal flooding.

Prairie Fringed Orchids are federally threatened, and may be a difficult plant to find, especially in high enough volume to make seed harvesting non-problematic for local populations.

Close-up of Eastern Prairie Fringed Orchid flower. (USDA Forest Service.)

Due to wetland habitat loss in the immediate Cincinnati area, this plant should be looked for further north in Ohio, around the Dayton area. Look for Prairie Fringed Orchid in areas with wet soil and full sun, around sunny stream banks, or areas of lower elevation than the surrounding area where water may collect. This plant does not like woody encroachment, so an open stream area is a better place to search than a stream surrounded by woodland.

Harvesting Prairie Fringed Orchid Seeds

Prairie Fringed Orchid Seed Pods ready for harvest. (Society for Ecological Restoration.)

These seed pods will be ready to harvest in late summer to early fall, after flowers have withered and turned brown or fallen off entirely. Do not harvest green seed pods, and wait until the entire pod has turned golden brown, with small crispy brown pieces on the end of each seed pod.

The seeds inside the plant are very fine, when pods are dry, they may split easily.

Place the seed pods into a plastic bag immediately after collection to avoid losing seeds. The image below shows what the seeds look like inside the pods, assuming all seeds would remain attached to their fruiting body after removing the seed.

Drawing of Eastern Prairie Fringed Orchid seeds, attached to fruiting body. Seeds are very small. (Defenders-CCI).

Remove seed pods from the mother plant directly using sharp shears or a pruning knife.

When seed pods are dry, remove the seeds by carefully cutting into the seed pod, and placing the small seeds into a plastic bag away from direct light.

The seeds of this plant are very small, and are described as dust-like. For this reason, it is recommended to harvest whole seed pods.

Due to the rarity of this plant, it is advised to not take any more than ½ of the seed pods from any one plant, and only taking that many when multiple plants with pods are found in an area.

If only one plant with seed pods is found, only 3-4 seed pods should be harvested from each plant.

Storing and Germinating Prairie Fringed Orchid Seeds

These seeds typically do not respond well to typical storage practices outlined in this field guide.

For this reason, within 1-2 days after seed harvest, these orchid seeds should be sown into their proposed growing space, which should have moist to wet soil and full sun conditions.

Sow the seeds 1/16 an inch deep into the soil, and cover with a thin layer of peat moss or vermiculite to protect somewhat from freezing.

The seeds will overwinter naturally, and will germinate next spring.

Typical orchid seeds being removed from a pod. This image is not of Prairie Fringed Orchid, but seed size and texture is the same. (American Orchid Society.)

If not planted directly into the growing space, and instead put into an outdoor container for germination, these seedlings should not be transplanted until after their first full growing season, and then should be transplanted with care so as not to disturb the plant's large root system. The image shown below if of orchid seeds being germinated in a lab under very specific conditions. Indoor germination or stratification of these seeds is not likely to be successful, but the image shows what successfully germinating seeds would look like when germinated outdoors in the soil.

Eastern Prairie Fringed Orchid Seeds, just starting to germinate. (Chicago Botanic Garden.)

Identifying Virginia Bluebells

Mertensia virginica

Virginia Bluebells, with open blooms and closed flower pods. (Missouri Botanical Garden.)

Virginia Bluebells with visible seed pods beginning from dropped flowers. (NC State Extension.)

Virginia Bluebells with newly developed, unmatured seed pods. (Kuse Nature Preserve.)

Virginia Bluebells, also called Blue & Pink Ladies, Virginia Cowslip, Chiming Bells, or Smooth Lungwort, are showy perennial woodland flowers.

The bright, blue-purple bell-shaped flowers hang down from small, darker green stems off of the green center stalk. There are 5 rounded petal shapes that connect all around the flower.

Unopened flower pods are showy, and are bright pink-purple just before bloom.

The stamens inside the flower are the same blue as the flower petals, with white to yellow pollen tips.

Oval-shaped leaves in the same green shade as the main stems occur close to the ground and up higher on stem by flowers.

Seed pods appear on this plant in the flower's locations after the flowers have bloomed and begin to mature when green leaves begin to yellow.

Seed pods can form directly from flowers, or elsewhere on the stems. The base of the flowers form an inverted cup, which is the seed pod. A sharp, fleshy spike extends from inside the seed pod during early growth phases.

The seed pod will lighten in color as seeds mature, and become more rounded in shape. The seed pods have separate compartments for each seed, and swollen, balloon-like compartments indicate seed maturity.

Finding and Growing Virginia Bluebells

This perennial wildflower is a woodland plant, and commonly occurs in moist woodlands or in floodplains.

Virginia Bluebells can tolerate some sun but prefers partial to full shade. The plant needs at least two to three hours of indirect sunlight per day, and in areas with more sun will require more soil moisture.

Virginia Bluebell's short growing season begins around late March to early April around Cincinnati, and will bloom and grow for about 3 weeks before it begins producing seed pods.

Shortly after seed pods are mature, which occurs in about a 2-week period, the plant will start to yellow or wither in the summer heat, and then goes dormant.

Virginia Bluebells in its dormancy phase, with most plant matter dry and dying off. (University of Wisconsin-Madison Hort Extension.)

Woodland and floodplain soils are clayey, silty, or sandy, and are typically well drained for most of the season, but do occasionally flood. Virginia Bluebells' growing season is short, and does not occur during a time with flooding. In floodplains, soil can also be gravelly, as rocks are moved up into the soil during floods. Woodland soils and floodplains are typically high in organic matter.

Virginia bluebells growing in a woodland space with some sun peeking through. (Plantcetera .com.)

When looking for Virginia Bluebells around Cincinnati, seek out hiking trails in forests with thick canopies, or look in shady areas around relatively undeveloped lands. This plant occurs in parks in several regions of Cincinnati, including the Parker woods nature preserve in Northside.

Harvesting Virginia Bluebell Seeds

Virginia Bluebells in the Cincinnati area begin producing seed in late May to early June, and goes dormant soon after, leaving the seeds about a 2-week period to mature.

The pods with mature seed can be light yellow in color, but ideally will become slightly golden brown, and pod will either fall off or become easy to remove by picking open .

The longer you can wait to harvest the seeds, the better the chance is that the seeds will be mature, but the seeds are frequently consumed by local wildlife, which gives a short opportunity to harvest the seeds.

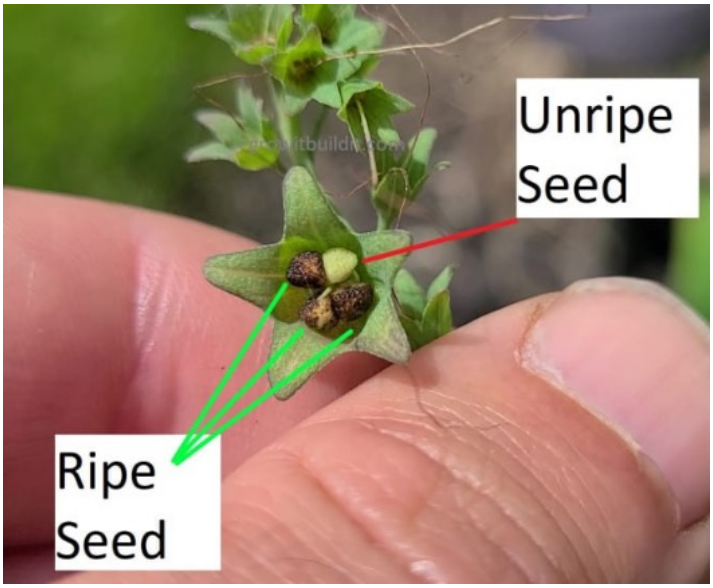
Mature seeds within pods should be able to be felt when applying slight pressure to the overall pod.

The pod skin when mature should be papery, light brown, and less moist-feeling than the surrounding tissue when seeds are ready inside.

Using sharp shears or a pruning knife, cut the seed pod open, and check for ripe seeds (shown above.) Cut off entire ripe pods, and place ripe seed pods into a plastic or paper bag. Take the pods to an indoor location to remove the seeds.

Cut open each pod on a clean, dry surface, and remove the individual seeds (which should be brown- light gray in color) from the pod.

Remove any excess plant debris, and place the seeds in a mixture with moist, sterile soil immediately after removal.



Virginia Bluebell Seeds with seed pod removed. (Grow It Build It.com.)

Virginia Bluebell seed pods, with lowest pod almost ready for harvesting. (Go Botany.)

Store-bought seeds have typically been treated to allow the seeds to dry out, but naturally-harvested seed does not respond as well to this, and should not be dried.

Storing and Germinating Virginia Bluebell Seeds

These seeds respond best to direct sowing into the proposed growing space after harvesting in the late spring or early summer.

If direct sowing, plant seed and soil mixture from harvest in 1/8 inch deep pit or holes and cover with a thin layer of soil.

Do not allow soil to dry out in the summer months, and maintain moist-wet soil conditions during this seed's dormancy/cold stratification period.

These seeds should be planted in a semi-shady area, as direct sun will scorch these plants and make blooming unlikely, as well as possibly killing the plant.

Virginia Bluebells germinating in a plastic bag. (Lovessivs.life.com.)

Virginia bluebell seeds growing in an outdoor container, after being left outside and watered during winter. (Growitbuildit.com

These plants require consistently wet soil, meaning that young seedlings and even mature plants will likely require at least one inch of daily water during the first growing season. These plants have a deep tap root, and should be watered evenly throughout their lifespan, although in shady spaces with good soil conditions, this will become less pertinent after the plant's first growing season.

Plants do not need watered during dormancy after the germination period.

If starting these seeds in an outdoor container, try to transplant the seedlings when the main leaves are about 1 inch long, as the root system becomes extensive and does not like to be disturbed.

Identifying Toad Trillium

Trillium cuneatum

Toad Trillium in bloom. (Missouri Botanical Garden.)

The Toad Trillium blooms beginning around late March until late April.

After flowers bloom and begin to wither, around early May, the seed pods appear as small berry-like fruits in the center of the plant where the flowers were.

The seed pods can vary in color, from deep reds to lighter greens, but are relatively small fruits, with a smaller green fleshy piece sticking out from within the seed pod.

The seed pods are oval-shaped, with six fleshy edges protruding around the sides of the pot. The seeds pods should feel soft, fleshy and slightly moist around time for harvest.

The Toad Trillium, also called Toadshade, Trillium sessile, or Sessile Wakerobin, is a perennial woodland wildflower.

The leaves of Toad Trillium are deep blue-green, with a lighter green speckling throughout the leaf and an oblong line with smaller green sections of the same lighter green running from the leaf's base to tip.

The plant has a single maroon flower, with 3 upright and 3 prone petals shaped like daggers, with 3 mottled blue-green and light green leaves surrounding it.

The stamens in the center of the flower are the same maroon color as the petals, with small yellow or white pollen covered tips.

Group of Toad Trilliums in a sunny woodland space. (American Meadows.com.)

Finding and Growing Toad Trillium

2 Toad Trilliums growing in a relatively sunny forest area. (USDA Forest Service.)

This perennial wildflower is a semi-rare woodland plant with a long time period to maturity, only blooming after 3-5 years of establishment. It is not receptive to a wide range of conditions, and needs specific conditions listed here to be found naturally. This plant is not at all likely to be found in an urban environment and is typically found off hiking trails in large woodland preserve spaces. Toad Trillium requires part shade to full shade, and ideally grow with morning sun and afternoon shade, as direct sunlight has a high probability of overheating and scorching this plant.

When looking for Toad Trillium around Cincinnati, two sites are notable, including Clifty Falls Indiana State Nature Preserve, where there is a large, established population slightly off many of the hiking trails, and in northern Winton Woods, where there are Trillium populations well off the hiking path. Wandering in woodland areas that are at least 1 mile from developed areas is the best bet for finding this plant, although from my personal experience, several ecologists and horticulturalists who own property have found this plant in their personal woodland spaces, so reaching out to landowners with woody areas on their property may lead to finding some Toad Trillium specimens.

If there is only one Toad Trillium specimen in an area, unfortunately, it should not be harvested for seed collection. Look for spaces with multiple specimens, and ideally, take no more than 10% of the seed pods from any one area. This means if there are 10 trillium specimens in a park space, take only 1 of the seed pods to grow a new specimen. Looking for 10 separate specimens may seem taxing, but trilliums typically grow in clumps, and more than 1 specimen at a time is likely to be found growing together.

Toad Trillium prefers part shade deep, organic matter rich, humusy, moist, well-drained soil, which is descriptive of its typical woodland habitat. This plant is also sensitive to pH, and prefer a pH around exactly 6.0 in the soil.

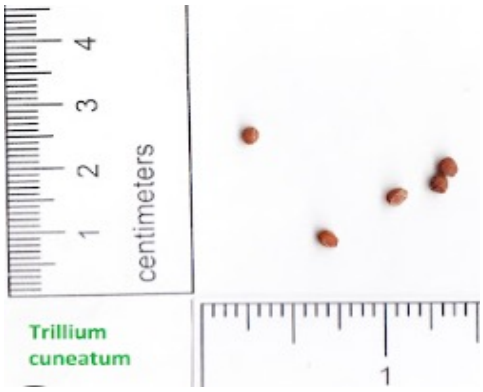
Harvesting Toad Trillium

These seed pods will be ready to harvest around Cincinnati from early June to early July, after the seeds have had about 4-6 weeks to mature in the seed pod since the pod's formation in May.

When the pod is ready for harvest, it should be light green on external edges and light pink in the centers. The pod should feel soft, pliant, and slightly fleshy, seeds should be felt when applying light pressure to the pod.

As noted on earlier pages, do **NOT** harvest from Toad Trilliums when there are less than 2 or 3 specimens in a group, and **NEVER** take all seed pods from any group of Trilliums. This protects the plant's natural populations.

Toad Trillium seed pod (left), cut from main plant, with seeds ready to be removed from pod. Seed pod (right) from a different Trillium species. (Edgewood Gardens.com)



Toad Trillium seeds, rulers for scale. (Lake Side Endeavors).

Using your hand, carefully pluck the ripe seed pod from the center of the flower.

After removing seed pods from flowers, place the pods in a paper or plastic bag, and take them to an indoor location to remove the seeds.

Carefully cut open the outer seed pod to reveal the reddish-brown seeds. Some white material may be on the seed, or some seeds may still be entirely white. Entirely white seeds are not mature, and if possible, return these seeds to the collection location, where insects will naturally disperse them, and they can continue maturing.

Pluck off the red-brown seeds, and place them in a plastic bag with a damp mixture of sterile soil immediately after removal from the seed pod.

Storing and Germinating Toad Trillium

Toad trillium seed pod after harvest. (Nomad Seed Project.)

These seeds **cannot dry out**, and for best results, **should NOT be stored** for dormancy, and instead should be planted into the growing location within 1-2 days of harvest.

Immediately mixing the seed with damp soil after removal from their seed pod makes the seeds able to be stored for a few days, but generally, these seeds do not respond well to storage, and should be planted as soon as possible in a growing location.

Cold stratification indoors has not had great results with these seeds, and for this reason, is not recommended.

Toad Trilliums early in their growing season. (Betsy George, from namethatplant.net.)

The growing site for the Toad Trilliums should be mostly shady, with at most morning sun and afternoon shade. The soil needs to have a high organic matter content, and stirring an organic fertilizer (or compost) mixture into the soil before sowing seeds is recommended.

Plant the Toad Trillium seeds 1/8 an inch deep into outdoor ground, and after planting, cover the area with a thin layer of mulch to help with soil moisture retention. **These seeds typically will not germinate until the second year after they are planted.**

As these seeds are harvested in early summer, do not allow the ground the seeds were planted in to dry out during the summer months. Maintain damp soil conditions during the seed's dormancy period.

Ensure the soil stays well moistened for the plant's first growing season, but the plant will do best in moist, humusy soil for its entire lifespan.

Identifying White Oak

Quercus alba

White Oak Tree leaf, with characterizing medium indentation, thick center, and round leaf lobes. (Iowa State University.)

White Oak leaves and acorns, with brown acorn ready to harvest. (Iowa State University.)

The American White Oak Tree, also called Stave Oak, Basket Oak, or "The King of Kings" tree, is a large deciduous tree. It can reach up to 100 feet tall, with a trunk diameter of 38-50 inches.

The tree's crown is large and spreading, but grows irregularly, and will look different based on the tree's site, but is typically wide to round, and spreading down with low hanging and high leafy branches.

The leaves of White Oak are the best way to identify this tree. White Oak leaves are lobed, with a relatively thick center, about 2-3 inches, and rounded edges all around. These leaves look similar to other White Oak species, but typically have wider leaf centers than other Oaks, and do not have the pointed leaf tips of Red Oak.

The acorns of White Oak are another identifying feature. White Oak acorns have flat-topped to slightly rounded caps, with uneven edges and oval-shapes pieces. The entire acorn is more oblong than other White Oak species, with each acorn being about 1.5-2 inches long, including the cap. Caps will come off easily as acorns mature.

These trees are grown ornamentally around Cincinnati, but are also abundant in forested areas.

Shape of White Oak tree grown in a non-forested area. Trees in forests have longer trunk spaces without leaves, and typically have wider, more flat crowns. (New England Forestry Foundation.)

Finding and Growing White Oak

This tree is currently abundant around Cincinnati, but is a preferred tree for lumber, and is projected to possibly become threatened or endangered within the next 30 years.

White Oak acorns can germinate readily under natural conditions, but forest competition with invasive species and space limits in urban areas are making this tree's population dwindle.

White Oak requires full to part sun, but can tolerate part shade (at leats 4-6 hours of indirect light) when young. Only mature trees produce acorns, so sunny areas are likely to have this tree.

White Oak prefers dry to evenly moist soil, and likes when soil drains quickly. This tree does not like "wet feet," and will not be in areas with overly wet soil.

Around Cincinnati, search for White Oak trees in our local parks, or in more natural ornamental landscapes. These plants are used for landscapes in natural areas of parks, including in Burnett Woods around the lower swing area. These trees are also along many hiking trails, and can even be found in open areas on roadsides in greater Cincinnati, or growing near sidewalks in green spaces.

White Oak Leaves and acorns on a low hanging branch. (I-Naturalist.)

White Oak trees begin producing acorns far earlier in the season than when acorns are ready to harvest. Green acorns on trees are may not be mature, and harvesting brown acorns is best.

Oak and hickory trees growing in a forest stand, with long, branchless trunks characterizing typical forest stand Oak growth. (University of Minnesota Extension.)

Harvesting White Oak Acorns

White Oak acorns are typically ready for harvest in the Cincinnati area around early fall, when acorns start turning brown everywhere but the cap, and acorns begin falling off trees.

Acorns lying on the ground have a higher likelihood of weevil infestation. For this reason, acorns should be harvested while still attached to the tree, and not from the ground.

Check acorns for visible holes or spotted patterns on acorn body. These can be signs of pests or disease, and acorns with these signs should not be harvested. The acorns shown on the right are healthy acorns. The whitish, waxy layer is normal, and not a sign of any seed issues.

When acorns are mature, they should be easy to pull off the tree by hand.

The acorn cap may come entirely off or break in some places when pulling the acorn off the tree. This is normal and will not affect the acorn's storage or germination.

White Oak acorns on a branch, not yet ready for harvest. Wait for brown acorns before harvesting. (I-Naturalist.)

White Oak acorns, ready for harvest. (University of Missouri Extension.)

After harvesting the acorns, place them in a plastic bag to take them to an indoor location to test for seed viability and begin germinating the acorns.

Do not leave these seeds in the bag for an extended period (more than 1 day, as these seeds cannot dry out, or they will lose viability.

Storing and Germinating White Oak Acorns

A mature White Oak acorn, ready to be germinated. (Dr Ansur Rahman, from Medium.com)

Immediately after harvesting these seeds, test their viability by placing them in a container of water. The seeds that float up to the top will not germinate, and the seeds that sink and stay at the bottom of the vessel are viable. These seeds can continue to the germination processes.

Leave the seeds in the water for 5-10 minutes to ensure no seeds float up during this period.

After determining viable seeds, place the acorns into a plastic bag with moist (but not wet) sterile soil.

These seeds cannot be dried, so do not attempt cold storage without a moist soil mixture.

These seeds germinate readily in the soil mixture, so will likely not be able to be stored for long periods of time, but germination can take 5 days- 2 weeks, depending on external factors.

White Oak acorns do not require cold stratification, and can be planted into transplant containers at any point after this, even before germination has occurred.

White Oaks growing in containers need evenly moist, well-drained soil, and if starting indoors, likely will require some type of grow light to ensure proper germination.

However, results are usually best when the acorns are germinated before planting, which involves storing the acorns in a plastic bag with a moist soil mixture and keeping the bag in a cool (above 40F), dry, dark place.

If not pre-germinated, plant the acorns horizontally, with the acorn's tip and cap area facing the sides of the container. If germinated, plant the roots downward into the pot.

Plant the acorns just deep enough to cover the acorn body , covering the acorn with just enough soil so that it is not visible.

These trees are relatively slow growers, so wait to transplant from the containers until the main stem is about ¼ inch wide, and the tree has at least 2-3 oak-shaped leaves.

Germinated Oak acorns, with roots emerging. (Green Thinking, Youtube.com)

Identifying Blue Phlox

Phlox divaricata

Blue Phlox in full bloom. (Missouri Botanical Garden.)

Blue Phlox after blooming, with seed pods just starting to develop. (Wisconsin Horticulture)

Blue Phlox growing in a woodland space, with longer stems than an average specimen. (Plant It Wild.net.)

Blue Phlox, also called Woodland Phlox, Louisiana Phlox, Wild Phlox, or Wild Sweet William, is a perennial woodland wildflower.

Blue Phlox blooms from early April to late May, depending on environmental conditions like sun and soil moisture.

This plant's overall height can vary, being shorter in more sunny conditions, and taller with less sun in an area.

Seed pods develop after flowers have turned brown, fallen off, or become crispy, and are typically ready to harvest between late May and mid June.

Blue Phlox has lavender purple-colored flowers. Flowers have a light blue rimmed hole in center of 5 heart-shaped purple leaves.

Blue Phlox has green stems with tapering, grass-like or lance-shaped leaves, and short, fine hairs on its leaves and stem. Leaves can occur up by flower pods and lower down on the stem.

Seed pods develop from the flower's calyx, the protective leaf area surrounding the flowers.

Seed pods are green, oval-shaped, and covered with the same fine hairs as the rest of the plant body.

Mature seed pods are large, swollen, and look like grapes.

Finding and Growing Blue Phlox

This perennial wildflower occurs in woodlands, along woodland edges, and in meadows or open fields without tall grass species, and is frequently used in garden spaces.

Blue Phlox prefers part sun to part shade, around 4-6 hours of sun per day, and in areas with more sun, flowers may shrivel more quickly, making seed collection more difficult.

Before maturity, Blue Phlox requires moist, well-drained soil, but once established can tolerate dry soil and clay soil, and there's also drought tolerant when established. The soil conditions of woodlands and meadows are typically moist and well drained, but variation in Blue Phlox's habitat needs indicate a wider range of possible growth areas.

Blue Phlox in bloom, with open and closed flower pods. Characteristic hairs on stems. (Flutterby Meadows.com)

Blue Phlox with multiple developing seed pods. (Master Gardeners of Northern Virginia.)

When looking for Blue Phlox around Cincinnati, seek out hiking trails with some sun, or woodland edges with similar conditions. Blue Phlox is used ornamentally in parks and in private gardens around Cincinnati, so finding this species in highly developed area is possible. Looking for lightly shady spaces with gardens, or shady woodlands can help to find this species around urban areas.

This plant looks similar to other species of Phlox, and is most similar to Creeping Phlox. Blue Phlox has a more upright shape and taller growth form, while Creeping Phlox is a low-lying plant that spreads horizontally, and does not grow upwards.

Harvesting Blue Phlox Seeds

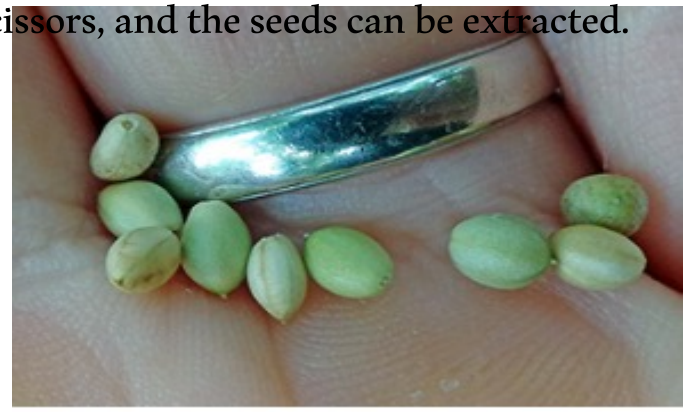
These seeds are typically ready to harvest in May. The flowers will be brown and withered, or fallen off. The seed pod should be tan/brown, and some seed pods will begin to pop open.

The seed pods are covered in fine hairs, which have been noted to irritate the skin of certain people. **Wear gloves when harvesting** these seeds.

Using sharp shears or a pruning knife, cut off the entire seed pod and the 5 base leaves surrounding the pod.

Place the pods in a paper bag, and place them in a cool, dry place to allow the seed pods to dry. Some seed pods may pop open during drying, so ensure the bag has no holes.

Once the seed pods feel very thin and papery, they can be broken open by hand or with scissors, and the seeds can be extracted.



Blue Phlox seed pods, not yet mature. (Wisconsin Horticulture)

Blue Phlox seed pod, ready for harvest. (Wisconsin Horticulture)

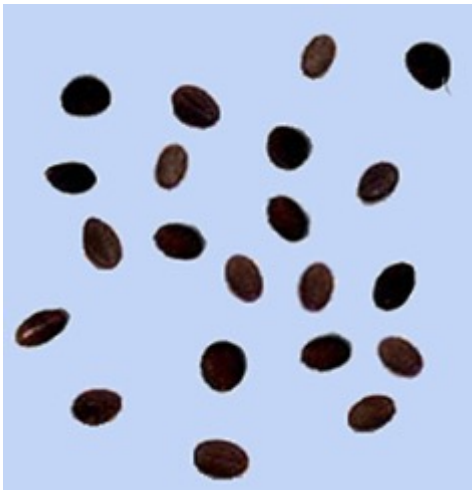
Remove the seeds from the pod by hand, carefully pulling the seeds from the sacs. Separate the small, brown seeds from any extra plant debris.

These seeds can be stored in a paper envelope to dry further. for about 3-5 months without reducing seed viability.

These seeds should not be stored dry for longer than 6 months, so plan to plant the seeds next spring, and begin germination treatments about 6-7 weeks before nighttime temperatures are reliably above 40F.

Waiting longer than 6 months to begin germination processes on these seeds may cause issues with germination or plant growth and is not recommended.

Storing and Germinating Blue Phlox Seeds



Blue Phlox seeds after drying, ready to be stored and germinated. (Wisconsin Horticulture)

These seeds can be kept in dry storage in a paper envelope in a cool (above 40F), dry, and dark place, throughout the summer and fall months.

Seeds should be stored alone in paper for dry storage, but before germination can occur, cold moist stratification is required, which means either mixing the seeds with a damp, sterile sand mixture, or cold stratifying the seeds via the following method, which requires a coffee filter, and a plastic bag to store the seeds in.

Blue Phlox seedlings in spring. (Wisconsin Horticulture.)

These seeds require a 60 day cold-moist stratification before planting. The most common method is to wrap a damp coffee filter around the seeds, place that into a plastic bag, and to store that in a refrigerator for 60 days.

After the cold stratification period, these seeds can be sown into transplant containers indoors, or directly into the outdoor space, if nighttime temperatures are above freezing.

Blue Phlox seeds **require complete darkness to germinate**, so when planting them, cover them thoroughly with about 1/8 inch of soil.

If put into a transplant container, do not transplant into the ground until seedlings have 2-5 leaves per plant, and about a 1/8 inch stalk width.

Do not allow the planting medium to dry out during the germination period, and give about 1 inch of water daily.

Maintain moist soil and partial shade in the plant's growing area for the plant's entire growing season.

Identifying Wild Lupine

Lupinus perennis

Wild Lupine, with blooming flowers and closed flower pods. (US Wildflower's Database of Blue Wildflowers.)

Wild Lupine, also called Sundial Lupine, Blue Lupine, Indian Beet, or Old Maid's Bonnets, is a perennial sand prairie, stream bank, or woodland edge plant.

This plant has green, palmate pointed oval shaped leaves that radiate from a central point just below flower stems. Flower stems are more yellow gray than leaves.

Small, bud-shaped blooms surround stem, forming an upright flower appearance. Flower buds open from the base, opening to a purple blue color, and the white or green buds on flower stem's top are the last buds to open.

Wild Lupine radial leaf pattern. (North Carolina State Extension.)

The green seed pods of Wild Lupine develop along the flower stalk in pea-shaped pods after the flowers have withered and fallen off.

Seed pods turn brown or black when fully mature.

Wild Lupine flower in full bloom. (John Hilty, from Illinois Department of Natural Resources. gov)

Finding and Growing Wild Lupine

This perennial wildflower occurs in woodlands with semi-open canopies, woodland edges, and along floodplains, roadsides, or disturbed sites.

Wild Lupine requires full sun to part shade, (at least 6 hours of direct sunlight per day), and this is reflected in its habitat sites. With regard to flowering of Wild Lupine, more sun produces more blooms and more seeds.

Soil conditions for these habitat areas range from moist to dry, and can be sandy or clayey, with high or low organic matter content. With a wide range of soil conditions, seeking out Wild Lupine based solely on soil factors is difficult. Areas with well-drained soil are the most likely to have favorable conditions for this plant.

This plant thrives in slightly sandy soil, so mixing planting soil with about ¼ part sand to ¾ part soil will yield best growth results.

Seek out Wild Lupine around Cincinnati in areas along hiking trails with open canopies, along the Ohio River bank in undeveloped areas, along woodland edges with undisturbed habitats, and around railroad yards or construction sites with sunny conditions and nearby woodland encroachment.

Wild Lupine Plant with developed seed pods, ready for harvest. (Urban Tomato.)

Wild Lupine plants on a woodland edge. (Lady Bird Johnson Wildflower Center.)

Harvesting Wild Lupine

The seed pods of Wild Lupine begin developing after the flowers have bloomed and withered, around May or June.

The seed pods turn brown and begin ejecting seeds in mid summer, typically around June or July.

The seeds inside the pod should be deep brown to almost black in color, and should not feel overly moist or squishy.

Green or yellowish seeds in open pods are not mature, and should not be harvested.

Harvest unopened seed pods that are brown, and have seeds large and hard enough to be felt solidly though the pod's exterior skin.

Pluck or cut off the seed pods from the plant's stalk using sharp shears, a pruning knife, or fingers.

Similarly, green or yellowish green seed pods are not mature, and should not be removed from the plant. **Mature seed pods will make a rattling sound when shaken**, and this is a sign that the inner seeds are mature.

Wild Lupine Seed Pods with exposed seeds. (Seed Saving Lupins).

Wild Lupine seed pods, not yet mature. (North Carolina State Extension.)

The seeds of this plant are large, and can be removed from the main pod by pulling each from the pod's exterior. Inspect the large seeds for small holes, as this can be a sign of weevil infestation. Discard seeds with small holes, or that are very flat or squishy, as these seeds are likely not viable.

Store the oval, hard brown seeds in a paper bag for 2-3 weeks after harvest to allow the seeds to dry out entirely.

Storing and Germinating Wild Lupine Seeds

These seeds are relatively large, and have a thick outer coating on the seed. This thick outer coating needs to be somewhat removed to allow water to permeate these seeds for germination.

Rub the seeds between 2 pieces of sandpaper to scrape away some of the thick outer coating on the seeds. Scrape seed until white inner coat is visible (no black outer coat) on at least 1/8 of the seed's surface. This process is called scarification.

After scarification, there are two possible methods of cold stratifying these seeds. One method is to sow the seeds in the proposed growing space in late fall, to allow the seeds to overwinter naturally and germinate in the spring.

The other method needs to be started around mid to late February, about 5 weeks before outdoor night temperatures are reliably above 40F.

The other method is to mix the seeds with moist, sterile **sand AND soil** in a plastic bag, and to alternate the bag between the freezer and refrigerator for 1 week. Begin with the seeds in the refrigerator, and leave them there for 1 day. The next day, place the seeds in the freezer, and switch between freezing and refrigerating the bag every day for 1 week.

Wild Lupine Seeds, Pencil tip for scale. (American Meadows.com.)

Example of mechanical scarification. (EpicGardening.com.)

After indoor cold stratification, the seeds can be planted in transplant containers. Plant the seeds ¼ inch deep in the container or outdoor soil, and cover seeds completely.

Give germinating seeds about 1 inch of water daily, and maintain moist soil conditions for the plant's growing season.

Identifying Prairie Dropseed

Sporobolus heterolepis

Prairie Dropseed during the growing season. (Picture This.)

Prairie Dropseed, also called Northern Dropseed, is a perennial warm season grass that grows in tallgrass and mixed grass prairies.

This plant is a fine-textured bunchgrass with thin individual stalks, bright green in color.

This grass grows in a circular and upright form around a central area.

The grass generally appears very fine and wispy, with almost hair-like blades of grass emerging from the plant's center.

Tall seed stalks appear in mid summer, with a lighter green color than grass leaves.

The grass blades of Prairie Dropseed may turn yellow to golden brown and begin to dry out around the time that seed pods mature in the early to mid fall.

Prairie Dropseed in the fall. (Garden.org.)

Prairie Dropseed seed heads attached to plant. (Garden.org.)

Prairie Dropseed's characteristic hairy appearance. (Hoffman Nursery.)

Finding and Growing Prairie Dropseed

This native grass is a bunch or clump-forming grass, and a warm season grass that occurs across prairie regions. This plant is also used ornamentally, and is even found in very urban places, in parking lot garden beds or in road median garden spaces.

This grass prefers spaces with full sun, as is common in prairie spaces, or in the open parking lots where it is used as an ornamental groundcover.

Prairie Dropseed prefers well-drained to dry, rocky soil. The shallow beds of parking lot gardens also allow this plant's habitat to dry out quickly, as the thin layer of soil over the concrete parking layer will likely be full of gravel or other rock debris due to the bed's surrounding.

Close-up of Prairie Dropseed seed pods. (Prairie Future Seed.com.)

When looking for Prairie Dropseed around Cincinnati, look for tallgrass or mixed grass prairie preserves (categorized with other grass species like Big/Little Bluestem, Indiangrass, Switchgrass, or Sideoats grama, as well as Prairie Dropseed.

Another great place to search would be parking lot gardens or road median spaces with gardens, as this clumping grass is commonly used to fill in ground space around taller plants in these low-maintenance garden types.

Prairie Dropseed with seed pods still maturing, not yet ready to harvest. (Better Homes & Gardens.)

Harvesting Prairie Dropseed

These seeds are ready for harvest in late summer, around August, through in early fall, through September, depending on variable weather during this time of year.

These seeds can have issues germinating, so **collect a bit more than you will want to grow**, to ensure you get enough viable seeds.

Seed pods and plant will be yellow to golden brown around harvest time, and the plant's grass blades may be drying and yellowing at this point, or still green, depending on weather conditions.

Seeds can be harvested with sharp shears or a pruning knife. Cut the plant's upper stem by the seed pod's branches, and place the seeds and stems into a plastic or paper bag.

At the time of harvest, seeds pods and upper stems should be mostly dry. If seed pods or stems feel squishy or moist, place the seed pods and stems into a paper bag to let the seeds dry out more fully.

Take the bag to an indoor location to prevent the small seeds from blowing away. Remove the seed pods from the stems by rubbing fingers along the stem, knocking off the seeds.

Seeds have a husk on them that should be removed, and rubbing seeds between fingers should remove the seed's thin husk.

Prairie Dropseed seeds on a 2mm grid. (Ernst Seeds.)

Prairie Dropseed seed pods attached to plant. (Garden.org.)

Separate seeds from husks as much as possible, and separate from any extra plant material.

Store these seeds in a cool (around 40F), dry location, preferably in a paper bag, to prevent mold from forming.

Storing and Germinating Prairie Dropseed Seeds

Prairie Dropseed seed in husks with typical harvest time coloring. (Friends of E Louise Butler.org.)

Germination rates for these seeds has around a 40-50% success rate, so harvesting more seeds than needed will help to get enough plants to cover the proposed space.

After cold stratification, the seeds can be sown directly into the proposed growing space, or can be planted into transplant containers.

Plant the seeds about 1/8 an inch deep, and cover with soil.

Water the germinating seeds and seedlings daily, giving about 1 inch of water.

Once seedlings are large enough to transplant, or have enough grass strands to give a bunchy appearance, water 2x per week.

These plants prefer dry soil, so after the first growing season, should not need much additional water.

These seeds can be stored dry in a paper bag in a cool (around 40F), dry, dark place for about 1-2 years, however germination rate can decrease as time passes, so it is recommended to not store for longer than 1 year, and should ideally be planted the spring after they are harvested.

These seeds technically do not require cold stratification, but germination rates improve when seeds are cold stratified in a refrigerator in a dry, sterile soil mixture for at least 2 weeks before planted in moist soil.

Prairie Dropseed seedlings in transplant containers. (Arboretum Nature Notes.WordPress.com.)

Identifying Painted Trillium

Trillium undulatum

Painted Trillium in full bloom. (Missouri Botanical Garden.)

Painted Trillium's upright form. (Native Plant Trust: Go Botany.)

Painted Trillium seed pod, almost ready to harvest. (Native Plant Trust: Go Botany.)

Painted Trillium, also called Painted Lady, Painted Wake-Robin, or Striped Wake-Robin, is a perennial woodland flower.

This plant has an upright shape, and is around 8-16 inches tall with a long stalk. Leaves and flowers appear only on the top of the plant.

This plant has a single white flower, with 3 petals with ruffled edges. Flowers have a pink crescent shaped line on all petals, forming a triangle around the flower's center. The center of the flower is yellow, with whitish-yellow stamens. Light pink lines run out from the flower's center pink line to near petal's center or to the edges of the petal.

The Painted Trillium flower has three blue-green, pointed-oval shaped leaves with slightly ruffled edges. Three smaller leaf-like structures surround directly behind the flower, and it is within these 3 small leafy pieces that the seed pod will form.

Painted Trillium seed pods are green when initially formed, and turn bright red close to harvest time.

Seed pods that are ready to harvest are a slightly darker shade of red, and will have a swollen, berry-like shape. Mature seed pods typically will be slightly glossy in color.

Finding and Growing Painted Trillium

This perennial wildflower is a rare woodland plant with a long time period to maturity, only blooming after 2-4 years of establishment. This plant requires specific growth conditions, and so is not at all likely to be found in an urban environment.

Painted Trilliums would typically be found off hiking trails in large woodland preserve spaces.

Painted Trillium requires part shade to full shade, and ideally grow with morning sun and afternoon shade, as direct sunlight has a high probability of overheating and scorching this plant.

Painted Trillium prefers part shade deep, organic matter rich, moist, well-drained soil, which is descriptive of its typical woodland habitat. This plant is also sensitive to pH, and prefer a soil pH around 6.

Painted Trilliums in a woodland space. (Door County Pulse.com)

Ants, the natural disperser of Trillium seeds. (Nomad Seed Project.)

When looking for Painted Trillium around Cincinnati, it is necessary to explore areas well away from developed areas. One of the confirmed growing spaces of Painted Trillium is swampy woodlands in Ashtabula County in North East Ohio. Another possible growth location for Painted Trillium is woodland spaces in Adams County, southeast of Cincinnati, where undeveloped areas of hiking and nature spaces are plentiful. Woodland spaces that have remained largely undisturbed for long periods of time are also good places to search. Seeking this plant on private property is possibly necessary, as undeveloped woodland areas can be rare in urban spaces.

If there is only one Painted Trillium specimen in an area, unfortunately, it should not be harvested for seed collection. Look for spaces with multiple specimens, and ideally, take no more than 10% of the seed pods from any one area. This means if there are 10 trillium specimens in a park space, take only 1 of the seed pods to grow a new specimen. Trilliums typically grow in clumps, and more than 1 specimen at a time is likely to be found growing together.

Harvesting Painted Trillium Seeds

Seed pods of Painted Trillium mature 5-6 weeks after the plant flowers, which in Ohio is around early March to early April. Seed pods then should begin forming and maturing around May to early June in Ohio.

When these berry-shaped seed pods are mature, they begin to split open, and attract ants to spread the seeds. A mature Painted Trillium seed pod with a red, glossy color is likely ready to harvest. If a seed pod can be found that is beginning to split open is a perfect indicator of seed maturity, and these seeds are definitely ready to harvest.

Do **NOT** harvest from Painted Trilliums when there are less than 2 or 3 specimens in a group, and **NEVER** take all seed pods from any group of Trilliums. This protects the plant's natural populations.

Trillium seeds, exposed from pod. (Native Plant Trust: Go Botany.)

Painted Trillium seed pod, with coloring indicating it is ready for harvest. (Pavlis, Mary).

Due to this plant's rarity, more than 2 seed pods should not be harvested from any group of Painted Trillium.

Mature seed pods should feel thin, but slightly springy and moist, as these seeds stay relatively wet, and the pod contains fatty tissue to attract ants.

Using sharp shears or a pruning knife, cut off the entire seed pod from the stem, cutting just below the 3 small leaf-like structures that surround it. Place the seed pod into a plastic bag, and take it to an indoor location to remove seeds.

Carefully cut open the seed pod, or peel the pod open by hand. Remove as much of the pod's outer coating as possible, and rub fingers on the inner red-brown seeds to detach them from the pod.

Do not attempt to store these seeds indoors.

Storing and Germinating Painted Trillium Seeds

These seeds cannot be allowed to dry out, and for this reason, after removing seeds from their pod, they should be mixed with moist, sterile soil and put into a plastic bags.

Painted Trillium seeds will usually not stay viable if they are stored indoors. For this reason, introduce the trillium seeds to a the proposed growing site as soon as possible after seed collection and harvest.

The growing site for the Painted Trilliums should be mostly shady, with at most morning sun and afternoon shade. The soil needs to have a high organic matter content. Stirring an organic fertilizer (or compost) mixture into the soil before sowing seeds is recommended.

Trillium seedlings in a woodland and seed starting soil mixture. (Woodlands and Waters.)

Trillium seeds, just starting to germinate. (Native Plant Trust: Go Botany.)

Plant the Trillium seed and soil mixture into a 1/8 an inch deep trough dug into outdoor ground, and after planting, cover the area with a thin layer of mulch to help with soil moisture retention. **Sometimes, these seeds will not germinate until the second year after they are planted.**

As these seeds are harvested in early summer, do not allow the ground the seeds were planted in to dry out during the summer months. Maintain damp soil conditions during the seed's dormancy period.

Ensure the soil stays well moistened for the plant's first growing season, but the plant will do best in moist, humusy soil for its entire lifespan.

Urban Integration of Native Plants

- **Successfully integrating these 13 native species into urban areas requires adhering closely to the species natural growth requirements listed in the "Finding and Growing" sections for each plant.**
- **Refer to each plant's growing conditions for their sun needs**. Some plants need growing sites full sun, at least 6 hours of direct sunlight per day, and some require growing sites with partial to full shade, where there is no more than 4-6 hours of indirect sunlight daily.
- Plants that are found in woodland spaces will require high organic matter content in their soil, which means that adding an organic compost or fertilizer mixture to the soil may be necessary.
- If plants prefer wet soil conditions, they would be a good choice for a rain garden or any garden space where water tends to collect. On the other hand, if a plant likes dry or rocky soil, it needs to be planted somewhere that the soil consistently dries out or contains a lot of gravel or other non-porous material.
- Generally, most plants in this guide will perform well in well-drained, evenly moist soil, unless otherwise specified in that plant's section.
- **Sensitive plants, like the Painted or Toad Trillium species, will be sensitive to pollution runoff from road salt or other common urban pollutants.** Keep this in mind when choosing growing sites for these plants, and try to plant away from roadways, or in areas with lots of other green space for plants like this.
- **Many of these plants could be eaten by deer, which are abundant in the Cincinnati area.** "Deer Spray," a bad-smelling mixture, is available commercially. This typically prevents deer from eating garden plants, but will need reapplied after every rain. If garden plants disappear frequently, it is likely that deer are eating your plants. Deer spray can also be made at home, using a mixture of beaten egg, hot sauce, vinegar, garlic powder, dish soap, and water. Other natural scents deer do not like include peppermint, oregano, sage, and rosemary. Planting these herbs near your native species or around your garden can also prevent deer from eating your plants.

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Optimizing Urban Biodiversity: Seed Collection and Cultivation of Ohio's Native Plants: A Field Guide

This research project addresses the current issues facing native seed collection and the growing of native plant species in urban environments.

The research's main question asks: how can enhancing research on the collection of native seeds and the methods for cultivating native plants contribute to urban biodiversity initiatives?

13 different plant species are included in the project and were chosen based on both their threatened or endangered IUCN status, and their capacity for integration into urban green spaces.

This project culminates in a field guide that outlines how to collect, process, and store native seeds, as well as how to cultivate the 13 chosen plants from seed. This field guide is written to be accessible, allowing people who may not be familiar with horticulture or plants to harvest these species' native seeds, and to grow them successfully. This allows in Cincinnati to participate meaningfully in urban biodiversity protection and restoration projects.

The field guide also provides a cohesive resource for horticulturalists, to streamline the cultivation process for these 13 native species, and make biodiversity goals easier for urban spaces to achieve.

Painted trillium, *Trillium undulatum*, in bloom. (Lady Bird Johnson Wildflower Center.)

Black Eye Susans, Rudbeckia hirta, in bloom. ((Missouri Botanical Garden.)

Virginia Bluebells, *Mertensia virginica*, in bloom. (Missouri Botanical Garden.)

Eastern Prairie Fringed Orchid, *Platanthera leucophaea*, in bloom. (The Land Between.)

Rough Blazing Star, *Liatris aspera*, in bloom. (Gardenia Plant Database.)

Yellow Goldenrod, Solidago Canadensis, in bloom. (Missouri Botanical Garden.)

How can enhancing research on the collection of native seeds and the methods for cultivating plants indigenous to the Ohio region contribute to urban biodiversity initiatives in Ohio?

BRIANNA BROWN

Final Project in Horticulture

HORT4092, SPRING 24, B.S. HORTICULTURE

PROFESSOR STEVIE FAMULARI

An image from a study on collecting seeds from rare plant populations, showing a person collecting seed from a species of Deergrass, native to the SW United States. (Saveplants.org)

Case Studies, Historical Context, and General Project Info

Historically, native seed collection has been important based on the protection of rare agricultural crops or rare native species in threatened habitat ranges.

3 analyses of different plant and seed harvesting guides were reviewed for this project.
The 3 sources for this project all emphasize the need for proper goal setting before harvesting from native populations, as the accidental wasting the seeds detracts from an existing ecosystem, while also not benefiting a new one.

These studies all imply a need for utmost vigilance and care during seed harvest from rare plants of native populations, as the goal is to produce no harm for the existing ecosystem through removal of important native plant specimens.

What's so important about biodiversity?

The loss of biodiversity lessens the resilience of our ecosystem. Ecosystems with less biodiversity are more prone to devastation, via infectious diseases, or natural disasters, like a warming climate. This is because each species in an ecosystem has different resistances, and weaknesses.
If an ecosystem with many similar plants contracts a disease those plants are sensitive to, all those plants will likely contract the disease. This is not the case for an ecosystem with a large variety of plants with different strengths and weaknesses.

Why are *native* plants important?

Native seed collection and native plant integration is important to biodiversity because of the specialized relationships between flora and fauna in ecosystems, which are perfected over millions of years of evolution. Non-native species do not have the same innate benefit, and even a non-specialized insect will choose a native host plant over a naturalized or invasive plant (Tallamy). This shows a need for reintroduction or enlargement in the quantity of native plant specimens into urban green spaces, to attract more beneficial insects to the area, and to supply specialized insects with their host plant species in the area.
Providing native plants to support these flora and fauna's special relationships in urban green spaces supports migrating (which are in intense danger around urban spaces) and local insects, as well as other animal populations. **The web of life is connected, and it starts at the bottom with plant life.**