

Formulating and Implementing a Planting Plan

Establishing New Plantings from Seed

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While information in this document is designed for FDOT personnel and contractors, many of the concepts and methods are applicable to meadow plantings, and commercial and residential landscapes.

Establishing Wildflower Areas (WAs) by seed is an important aspect of FDOT's Wildflower Program even though the emphasis of the program has shifted toward locating and managing naturally occurring wildflower populations and native plant community remnants.

Using wildflowers native to Florida and adapted to Florida's environment is strongly encouraged. For information about the best species to establish by seed on Florida's roadsides, [click here](#). Using [Plant Range Maps](#) are also useful when deciding which species to plant.

Seed should always be ordered by scientific (Latin) name. For more information about obtaining seed, see [Ordering Process](#).

When preparing planting plans, keep in mind the issues noted below. Please contact Jeff Norcini, FDOT State Wildflower Specialist (OecoHort@comcast.net; 850-491-0910), for assistance with planting plans or questions about wildflower species.

Selecting A Site

Locate wildflower plantings in non-residential and non-commercial areas. Consider median plantings as they have high aesthetic impact and are self-contained.

Selecting a site with environmental conditions appropriate for wildflower plantings is the most critical factor affecting establishment and sustainability. The less appropriate the site, the greater likelihood of failure.

Evaluate each potential site separately – even ones that are close to each other – since every site is unique. The most important issues are:

Weeds^{1,2}

- Scout potential wildflower sites up to 12 months in advance of seeding but no later than late winter the year of seeding.
- Be aware of weeds that might interfere with establishment, sustainability, or aesthetics. Avoid any site where vegetation of any type is dense or cogongrass (*Imperata cylindrica*) is present or nearby. See also "[Common Weeds That Can Interfere with Establishment, Sustainability, and Aesthetics of Wildflower Plantings](#)" is anything but sparse.
- The soil seed bank is the main source of weeds; disturbing the soil "awakens" many of the 100s of weed seed and causes more weediness than in an undisturbed soil.

¹ Use the smart phone app *IveGot1* to record the location and image of exotic invasive species.

² Any un-wanted species (even native species) that could interfere with aesthetics, establishment, or sustainability.

- Best sites:
 - Dry to periodically wet (ditch or swale that drains quickly) where bahiagrass turf density is moderate or less, with sparse other vegetation
 - Moist – moderate density of native herbaceous species with bare soil between vegetation

Soil

- Best sites
 - Sandy soil
 - No standing water shortly after a heavy rain
 - Rebar can easily be pushed by hand a foot into the soil
 - Naturally moist swales for appropriate species; will help offset effects of limited rain
- Sites to avoid
 - Consistently waterlogged soil; dig a test hole a foot deep – consistently waterlogged soil will be bluish gray to gray
 - Muck soils (muck is black)
 - Blue-green algae is common (indicator of poor drainage)

Light Exposure

- Most showy wildflowers require 6 to 8 hours of direct sun (commonly known as *full sun*).
Under lower light or fewer hours of sun, full sun plants may survive but they may get leggy and are less likely to thrive and be sustainable.

Size

- A small, high quality planting is better than a large one in which parts are unsightly.
- Large sites are not likely to have uniform soil conditions, and weediness probably will vary.
Large sites increase the time commitment for evaluation, monitoring and management.

Hiring A Contractor

- Best contractors are those that have a documented record of successfully establishing large scale wildflower plantings from seed, or has a subcontractor with that documented experience
- Contractor should be keenly aware of why plantings fail, and should diligently implement practices that minimize the likelihood of failures
- Contracts should be performance-based

Site Preparation

The goal of site preparation is to create the best possible conditions for establishing a sustainable, showy wildflower planting. Regardless of the method, there must be bare soil after any site is

prepared. And as weed competition³ is a leading cause of planting failure, it is best to minimize soil disturbance. The main exception has been using tillage to establish spring annuals⁴ in north Florida as noted in the table below.

	Site Type	Method Overview	Comments
No Till			
Mechanical	Dry to slightly dry bahiagrass turf	Mow turf to leave ~1 inch of stubble 2 days or less before seeding	Works well in sandy soil for <i>Coreopsis basalis</i> and <i>Phlox drummondii</i>
Chemical	Dry to periodically wet bahiagrass turf	Same as above, but glyphosate is applied 2x, starting ~1 month before mowing	
	Moist site where there is a native plant community remnant	Limit to spot spraying of glyphosate, and only where manual removal of weeds would be inefficient	
Till			
Mechanical	Dry to periodically wet bahiagrass turf	Up to 1 week before seeding, mow/string trim to leave 1-2 inches of stubble. Till at least 6 inches deep; do not till when soil is wet. Hand-rake to remove soil clods, rocks, debris, etc.	High potential for weediness; however, successfully used in District 2 for <i>Coreopsis basalis</i> , <i>Phlox drummondii</i> , and <i>Lupinus texensis</i>
Chemical	Dry to periodically wet bahiagrass turf	Same as above, but glyphosate is applied 2x, starting ~1 month before mowing	High potential for weediness

³ High density seeding of wildflowers may overcome the negative effects of weed competition. Contact the State Wildflower Specialist for more information.

⁴ Spring annuals will die after seed mature by late spring.

Spring Annuals Consider designing WAs comprised of *Phlox drummondii*, *Coreopsis basalis*, or *Lupinus texensis*⁵ since they will be showiest in early to mid-spring before unsightly and competing warm season weeds can obscure wildflowers and detract from their aesthetics. See the table [Best Roadside Wildflowers to Establish by Seed](#) for Districts where these wildflowers can be established.

Coreopsis basalis and *Phlox drummondii* Wildflower Areas comprised of one or both species have a very high probability of being sustainable and very showy if site conditions are suitable, a Florida ecotype of *Coreopsis basalis* is used, and the WA is established and mowed appropriately. Both species co-exist very well with bahiagrass where bahiagrass density is moderate or less, the site is sunny, and the soil is slightly dry, sandy and well-drained. Moreover, since these are spring annuals, they die by late spring and normal mowing regimes can be resumed.

Seed Bed Soil Firmness

- Firm soil will help sown seed remain shallow; 1/8 inch is best for small seed, 1/4 inch for larger seed.

Seed sown on loose soil become buried too deep and results in poor wildflower establishment and/or weedy plantings. Use a turf roller, either pushed manually or pulled by an ATV or tractor to make the soil firm but not compact. Do NOT use a tractor alone, or truck or car.

Sowing Seed

It is best to sow seed the year of purchase. Store seed out of direct sun and in a cool, dry environment until the day seed are sown. Seed stored outdoors or in a building without climate control are likely to decline in quality and could lead to poor stand establishment.

How Much Seed to Sow

- 15 to 170 Pure Live Seed (PLS) per square foot, depending on species and other factors

For more information about this topic, including how to calculate seeding rates based on PLS, please see [Viable vs. Nonviable Seeds / Bulk Seed vs. Pure Live Seed](#).

⁵ Contact Jeff Norcini for establishment and management instructions. Paul Crist (Paul.Crist@dot.state.fl.us) in District 2 has an alternative method for successfully establishing sustainable plantings of *Coreopsis basalis* and *Phlox drummondii*; please contact Paul for details.

When to Sow Seed⁶

Region	Peak Bloom Season	When to Sow
North Florida	Spring or summer Fall	Mid-September to late October Mid-September to mid-November
Central Florida	Spring, summer, or fall	Mid-October to early January
South Florida	Spring, summer, or fall	November to mid-January

How to Sow Seed

- No-till drill seeder
 - Use a drill with straight drop tubes
 - Must calibrate individually for each species or mix prior to sowing
- Drop spreader or a rotary spreader can be used for sites < 1 acre
 - Use drop spreader for seeding areas near the road where vehicular breezes occur
 - Only use rotary spreader when the wind is calm
 - Calibrate so seed are distributed relatively evenly
 - Seed must be pressed into the top layer of soil; use a turf roller as noted in [Seed Bed Soil Firmness](#).
- Hand seeding
 - **Use only for seeding in native plant community remnants**
 - In clean plastic bucket, thoroughly mix 10 parts slightly moistened sand or vermiculite to 1 part seed (** only use Florida ecotype seed⁷ **)
 - Sow in bare spots only
 - Press seed into soil with feet
- “Monitor Plot”
 - Reserve a small amount of seed to establish a plot to monitor germination
 - Sow reserved seed in a distinct pattern (like an X)
 - Check at least once per week to determine when wildflower seedlings are emerging, and to distinguish wildflower and weed seedlings

⁶ Norcini, Jeffrey. 2010. *Factsheet: Seeding Dates for Florida Ecotypes of Native Wildflowers and Grasses*. Florida Wildflower Foundation: Maitland, FL. November 2010. < https://store-33ef7.mybigcommerce.com/content/SeedingDatesFinal_1-7-11.pdf >

⁷ Seed derived from wild populations in Florida; adapted to Florida’s environmental conditions.

Post Seeding Establishment and Management Practices

Length of Time for Wildflowers Plantings to Become Fully Established

- Usually 2 years; high density seeding might reduce the time

Weed Management

- Plantings are most susceptible to weed infestations from the day of seeding until the WA is fully established; ****for contracts, allow 2 years for establishment****.
- Regularly monitor plantings during the first 6 months. Every couple of weeks is not too often, especially during periods of frequent rain.
- After a planting is established, monitor the planting every 6 to 8 weeks; monitor more often during periods of frequent rainfall.

Manual Weed Management

- String trim weeds extending above wildflower seedlings.
- Keep the area around the perimeter of the planting mowed to prevent weeds from flowering. Direct the mower discharge away from the planting.
- Hand weeding
 - Most effective when soil is moist
 - Bag weeds and dispose of off-site in accordance with all Federal, State, FDOT, and local laws, regulations, rules and ordinances

Chemical Weed Management

- If manual weed control methods are not effective, or not likely to be, contact the State Wildflower Specialist to determine if the use of chemical weed control is warranted, and if so, for guidance.

Irrigation

- Supplemental irrigation may be necessary during dry falls and/or winters.
- Irrigating a newly seeded planting
 - Irrigate 2 to 3 times per week.
 - Apply 1/3 to 1/2 inch water per irrigation event.
 - Water droplets should be no larger than that of a lawn sprinkler, and applied with no more force than that of a lawn sprinkler.
 - Do not irrigate on a windy day.
 - When wildflower seedlings emerge over most of the planting, taper off frequency over 2 to 3 weeks.

Mowing

- In late winter or spring, cease mowing once wildflower seedlings are about 4 inches tall.
- Plantings with summer or fall flowering species
 - Do not mow until after Thanksgiving.

If mowing is required earlier, allow time for seed maturation of all species (typically ~4 weeks after all flowering ceases) before mowing to enable re-seeding.

- Set mower deck to allow at least 4 inches of stubble, although 6 inches is best.

Best roadside wildflowers to establish by seed.^{1,2} Seed of Florida ecotypes (seed derived from wild populations in Florida, and adapted to Florida’s environmental conditions) may be available for species in bold font. **Main Bloom Season** – season when wildflowers are showiest; however, some species may have flowers throughout the year, especially in southern Florida. For species that occur in more than one region of the state, flowering starts and peaks earliest in the most southerly region. **Best Districts** – districts where a species is expected to perform well based on range maps and anecdotal evidence. ****Always order seed by scientific name.****

Wildflower Species		Native to Florida	Main Bloom Season	Soil Moisture	Best Districts	Comments ³
Scientific Name	Common Name					
<i>Coreopsis basalis</i>	Goldenmane or Goldenwave Tickseed	Yes	Spring	Dry	2,3 [5]*	*Marion County and north; however, probably can use further south since it performs well in Districts 4 and 7, where it blooms in winter when seeded in fall. Annual re-seeding may be necessary south of Marion County. Pollinators: Bees; Butterflies (N)
<i>Coreopsis lanceolata</i>	Lanceleaf Tickseed	Yes	Spring	Slightly moist	2,3 [5,7,8]*	*Best for Orlando and north. The common garden variety is much larger than the Florida ecotype; however, the common garden variety often must be re-seeded, and flowering may be limited the first season. Pollinators: Bees; Butterflies (N)
<i>Coreopsis leavenworthii</i>	Leavenworth’s Tickseed	Yes	Late Spring to mid Summer	Moist	1-8	Only Florida ecotype seed is available. Will tolerate periodic inundation for up to a week. Pollinators: Bees; Butterflies (N)
<i>Cosmos bipinnatus</i>	Cosmos	No	Summer, Fall*	Slightly moist	1,2 4-8	*Main bloom season varies by cultivar. Must be re-seeded each year. Pollinators: Bees; Butterflies (N)

Table 1. Best roadside wildflowers to establish by seed.^{1,2} (continued)

Wildflower Species		Native to Florida	Main Bloom Season	Soil Moisture	Best Districts	Comments ³
Scientific Name	Common Name					
<i>Gaillardia pulchella</i>	Blanketflower, Indian Blanket, Firewheel	Yes	Spring to Summer	Dry	1-8	Annual to short-lived perennial. Good for coastal areas. If mixing with other species be aware that it is an aggressive re-seeder. Pollinators: Bees; Butterflies (N)
<i>Glandularia aristigera</i> (aka <i>Verbena tenuisecta</i>)	Moss Verbena	No	Spring to early Fall	Dry	2,3,5,7 [1,8]*	*Best for Polk County and north, although it has naturalized in St. Lucie and Miami-Dade counties. Drought tolerant ground cover. Pollinators: Butterflies (N)
<i>Ipomopsis rubra</i>	Standing Cypress, Spanish Larkspur	Yes	Very late Spring to mid Summer	Dry	2,3,5,7 [1,4,8]*	Best for Pinellas to Indian River counties, and north. Performs best in deep, sandy soils. Performs well in alkaline soils. Should perform well in coastal areas. Very susceptible to disease in clay, loamy, or moist soil. Pollinators: Butterflies (N)
<i>Lupinus texensis</i>	Texas Bluebonnet	No	Spring	Dry	2,3	Hard-seed; seed may need to be scarified to maximize germination. Use in sandy soil. Pollinators: Bees; Butterflies (N, L)
<i>Mimosa strigillosa</i>	Sunshine Mimosa, Powderpuff	Yes	Spring to early Summer	Slightly dry to slightly moist	1-8	Ground cover. Hard-seed; non-scarified seed will germinate very slowly. Drought tolerant. Can spread quickly once established. Pollinators: Bees; Butterflies (N, L)

Table 1. Best roadside wildflowers to establish by seed.^{1,2} (*continued*)

Wildflower Species		Native to Florida	Main Bloom Season	Soil Moisture	Best Districts	Comments ³
Scientific Name	Common Name					
<i>Monarda citriodora</i>	Lemon Beebalm	No	Late Spring*	Slightly dry	7*	*Best for District 7 and north based on range maps and performance in District 7. Flowering season in north Florida probably in early summer. Pollinators: Bees; Butterflies (N)
<i>Monarda punctata</i>	Spotted Beebalm, Dotted Horsemint	Yes	Late Summer to mid Fall	Dry to slightly moist	1-5, 7,8	Aromatic scent. Bracts are the showy part of inflorescence; bract color can vary from purplish to white. Very attractive to bees and wasps. Pollinators: Bees; Butterflies (N)
<i>Phlox drummondii</i>	Annual Phlox, Drummond Phlox	No	Late Winter to Spring	Dry to slightly dry	2,3,5,7 [1,8]*	*Best for Manatee County and north, although it has naturalized in some portions of Martin, Palm Beach, and Miami-Dade counties. Available as multi-colored or red. Pollinators: Butterflies (N)
<i>Rudbeckia hirta</i>	Black-eyed Susan	Yes	Mid Spring to mid Summer	Slightly dry to moist*	1-8	*North Florida – sow in slightly dry soil, and use northern Florida ecotypes; Central/South Florida – sow in slightly moist to moist soil, and use central or southern Florida ecotypes. Pollinators: Bees; Butterflies (N)
<i>Rudbeckia mollis</i>	Softhair Coneflower	Yes	Summer	Dry to slightly dry	2,3 [5,8]*	*Best for Lake County and north. Performs best in deep, sandy soils. Very susceptible to disease in clay, loamy, or moist soil. Can become shrub-like if browsed. Pollinators: Bees; Butterflies (N, L)

Table 1. Best roadside wildflowers to establish by seed.^{1,2} (*continued*)

Wildflower Species		Native to Florida	Main Bloom Season	Soil Moisture	Best Districts	Comments ³
Scientific Name	Common Name					
<i>Trifolium incarnatum</i>	Crimson Clover	No	Spring	Slightly dry to slightly moist	2, 3	Must purchase inoculant, or pre-inoculated seed. Will perform well in loamy or sandy clay soils that are well-drained. Pollinators: Bees; Butterflies (N)

¹ These wildflowers are known to occur in ruderal habitats (disturbed sites). Ruderal wildflowers have excellent potential to perform well under suitable roadside conditions when established and managed appropriately.

² **The planting of *Coreopsis tinctoria* and *Gaillardia aristata* is strongly discouraged.** *Coreopsis tinctoria*, which probably is not native to Florida, will hybridize with *Coreopsis leavenworthii*, which is nearly endemic to Florida. Except for a few counties in Alabama, the only place in the world that *Coreopsis leavenworthii* is known to occur is in Florida. Not planting *Coreopsis tinctoria* will help to maintain the integrity of *Coreopsis leavenworthii* in Florida. Sarah Smith and Zhanao Deng (University of Florida/IFAS) noted in their research that hybridization of these two *Coreopsis* species "...would result in deleterious effects to both species." *Gaillardia aristata* is not native to Florida and easily hybridizes with our native *Gaillardia pulchella*. Not planting *Gaillardia aristata* will help to maintain the integrity of *Gaillardia pulchella*.

³ Pollinators – Bees: source of nectar or pollen. Butterflies: larval plant (L).and/or source of nectar (N).