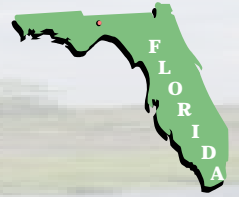


Plant Materials Fact Sheet No. 3

Planting Native Species for Flower Rich Pollinator Habitats



October 2009



Native bee approaching starry rosinweed (*Silphium asteriscus*) flower

Insects make up 99% of the more than 200,000 species (e.g., insects, birds, and bats and other mammals) that act as pollinators. When most people think of insect pollinators, they think of bees, in particular honeybees, but certain types of flies, beetles, moths, and butterflies are also important. The common honeybee, a species introduced to North America by the European settlers, has been managed by humans for centuries for its pollination benefits, honey, and other products. In recent years, populations of the European honeybee have declined by over 50% worldwide due to diseases and pest. Because it was so easy to utilize European honeybees, the importance of native pollinators to North American ecosystems and agriculture has been overlooked. Studies have shown that adequate populations of native pollinator species, particularly native bee species, can provide 100% of the pollination activity needed for many farm crops. It has been estimated that wild, native bees pollinate over \$3 billion worth of crops in the United States each year.

Unfortunately, destruction and fragmentation of pollinator habitat by human activity has resulted in sharp declines in the populations of North American native pollinator species. New language in the Food, Conservation, and Energy Act of 2008 (the Farm Bill), makes preservation and restoration of

pollinators and their habitat a priority for every USDA land manager and conservationist.

What to Consider When Establishing Pollinator Habitat by Seed

Establishing pollinator habitat from seed can be a challenging experience, particularly when using native flowering species. Studies have shown that fall planting often gives the best results with Florida natives. This is because many native plants need to go through a rosette stage during the winter or have developed adaptations that require exposure to cold temperatures and damp conditions for germination to occur (cold stratification). These types of seed planted in the fall will not emerge until the following spring. Fall plantings also do not have the increased weed competition from summer annuals that occur with spring planting.

Site Selection: Weed competition is the most common cause for stand failure when direct seeding native pollinator species. Scout your prospective planting site during the growing season prior to planting. Knowing what weeds may be present will assist you in selecting site preparation methods that minimize weed problems. Perhaps the best way to handle weeds is to avoid sites with heavy weed stands. This is particularly true if yellow or purple nutsedge (*Cyperus* spp.) are present. These species are difficult to control and spread rapidly. Selecting a site that is already in a good, weed-free stand of introduced turf or pasture species may be easier to convert to wild flowers and other native species than old row crop fields that have not had weed control in several years. Avoid sites that have higher levels of inherent fertility. Many wildflowers prefer low or poor soil fertility and are often out competed by weeds in loose, well-drained, nutrient-rich soils.

Species Selection: Species choice affects the probability of successful stand establishment. Using species that are native to your ecoregion or state and adapted to your site conditions is crucial to initial establishment and long-term sustainability. Soil type, moisture, cold and/or heat tolerance, and sun or shade preference all need to be considered. Consult the Brooksville Plant Materials Center,

State Extension Service, or local Native Plant Society for lists of species adapted to your area of the state. Appendix 1 list the names and 2009 prices of some of the more readily available native wildflower species for Florida.

In addition to species selection, seed source can also affect success. When discussing seed purchase with a supplier, ask about the origin of the seed. Studies have shown that seed derived from wildflower populations that originate close to your area of the state or ecoregion often have better growth, survival, and flowering than seed of the same species collected in other areas of the country. Most wildflower seed has not been selected for wide adaptability and thus is most adapted to its area of origin.

Seeding Rate: Current recommendations are to plant between 40 – 60 pure live seed (PLS) per square foot. The only way to ensure this is to purchase seed that has been tested by a registered seed laboratory. This seed should have a label that lists percent germination and percent purity, which will enable you to calculate PLS by using the following formula:

$$\text{PLS} = (\% \text{ purity} \times \% \text{ germination}) / 100$$

Seed sold on a bulk pound basis may or may not



Clouded sulfur butterflies feeding on tropical sage (*Salvia coccinea*)

provide the desired 40 to 60 seed per square foot. Only by calculating seeding rates using PLS can you be assured that you are planting correct amount of seed. If tested seed is not available, use rates recommended by grower.

Site Preparation: The goal of site preparation is to minimize interference from weeds and forage/turf grasses while maximizing wildflower seed germination and growth. If mechanical site preparation is to be used, the goal is a clean, weed-free seedbed. Be careful to avoid the use of herbicides with soil residues that inhibit native forb seed germination. The final operation prior to planting is cultipacking or rolling to produce a firm, mineral-soil seedbed. A good rule of thumb for checking seedbed firmness is that a footprint leaves an impression no deeper than ¼ inch.

In no-till situations, all that may be necessary is to kill the existing vegetation with one or two applications of herbicide followed by mowing and removal of dead clippings by burning or raking off. If the soil is not loose and the seed is to be broadcast, then a light scarification of the soil surface with disk or harrow with no or little offset will be necessary. Disking or harrowing twice in perpendicular directions will increase the amount of soil surface that is scarified. Try to disturb the soil surface as shallowly as possible to avoid turning up weed seed.

Seeding Methods: Seeding with a no-till native seed drill is the optimum method to use, however these may not be available to all customers. Alternative methods may be used that take advantage of equipment available to customers.

1. Scattering By Hand If the planting site is well prepared (see Site Preparation), broadcasting seed by hand can be a low cost, low tech option. Wildflower seed are often very small and may need to be mixed with a carrier to achieve even distribution. Carriers such as sawdust, coarse sand, peat moss, rice hulls or vermiculite may be used. When mixture of species are to be planted, if possible, combine the seed of the different species into two or three lots based on seed size (e.g., one lot of small seed and one lot of large seed). These lots should be broadcast separately to ensure even distribution. Regardless of seed size, divide the individual lots into two equal portions and apply the first half of the lot walking in one direction. Take the second half of the lot and spread it by walking in the perpendicular direction. This will result in a relatively equal distribution of seed over the planting site.

After planting, running a cultipacker or turf roller over the planted area is essential to ensure seed to soil contact and will assist in preventing seed loss.



Partridge pea (*Chamaecrista fasciculata*) is a “buzz pollinated” species, meaning the pollen needs to be shaken out of the anthers by large bees such as bumblebees

Applying a thin (half inch or less) layer of weed and seed free straw or hay (straw from forages such as bahiagrass is typically not seed free) or mulch after cultipacking will also help prevent seed from being lost to seed predation or blown or washed away.

2. Mechanical Broadcaster A hand-operated, broadcast seed spreader or one mounted on an ATV can be used for small areas. For larger areas, a tractor-mounted spreader or drop seeder may be preferred. A tractor mounted drop seeder (i.e., Brillion seeder) typically used for alfalfa or grass mixtures may be used. However, use of this equipment may require replacing the standard seed box agitators with special native seed, bristle agitators. Depending on the planting equipment and the seed mix, inert carrier material, as described in the hand broadcasting section, may be needed to ensure proper seed distribution. This method should only be used on well prepared sites or bare ground.

Following the same method as with hand broadcasting, the seed mixture should be divided in half and planted in perpendicular passes to ensure proper seed distribution. Broadcast seedings should be cultipacked or rolled and can additionally be protected by a thin layer of weed free mulch as described in the previous section or by use of a cultipacker or turf roller.

1. No-till native Seed Drill Specialized native seed planters are the best way to plant flower rich habitats, however these may not be available in many areas. These native seed drills are able to plant seed in rough, untilled soil. Using this technique is advantageous in areas where large amount of dormant weed seed are present and may germinate when brought to the surface by conventional cultivation. Seed drills, which provide better planting depth and spacing control, usually require half the amount of seed that

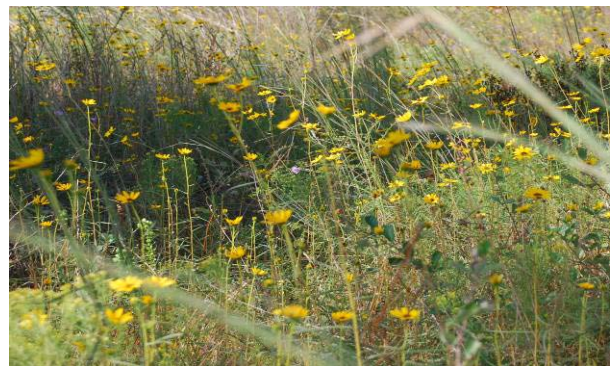
broadcasting requires for the same area. The negative aspect of drill seeding is equipment availability in Florida. In some locations, these machines can be rented from private conservation or local hunting organizations. Large native seed producers may have this equipment and provide custom planting on a contract basis.

Maintenance: Weed competition is the most common reason wildflower stands fail to establish or deteriorate in subsequent years. This is one of the main reasons site selection is so critical. Only a limited a number of herbicides are currently recommended for use with wildflowers. For more information on herbicides, see the Univ. of Florida publication ENH968, Establishment of Wildflower Plantings by Seed (<http://edis.ifas.ufl.edu/pdffiles/EP/EP22700.pdf>) and consult your local extension service.

Mowing is an effective way of controlling many weed species while the wildflower stand is becoming established. Be sure when mowing a site that you set your mower height above the developing seedlings. Once the wildflower seedlings start to exceed mower height, any additional mowing the first year should not occur until at least 3 weeks after peak bloom. In subsequent years, keep mowing to a minimum, as little as 2 or 3 times a year.

If possible, irrigate the planting about ¼ inch per day for 2 weeks after planting. Fertilizer application is not recommended for wild flower plantings. Excessive nutrition just promotes vegetative growth over flowers and the development of weeds.

2. Expect the stand to vary in subsequent years. Differences in weather, maintenance practices, and variability of the species planted will cause shifts in species composition.



Natural stand of tickseed (*Coreopsis* sp.) in Columbia County

References:

Daniels, J.C., J. Schaefer, C.N. Huegel, and F.J. Mazzotti. 2008. Butterfly Gardening in Florida. Univ. Florida, IFAS WEC.22.

(<http://edis.ifas.ufl.edu/UW057>)

Deyrup, M., J. Edirisinghe, and B. Norden. 2002. The diversity and floral hosts of bees at the Archbold Biological Station, Florida (Hymenoptera: Apoidea). *Insecta Mundi* 61:87-120.

(<http://digitalcommons.unl.edu/insectamundi/544/>)

Lady Bird Johnson Wildflower Center

(<http://wildflower.org>)

Marks, R. 2005. Native Pollinators. USDA, NRCS Wildlife Habitat Mangle. Inst. Fish Wildlife Mangle. Leaflet No. 34. (<ftp://ftp-fc.sc.egov.usda.gov/WHMI/WEB/pdf/TechnicalLeaflets/NativePolinators.pdf>)

Norcini, J.G. 1999. Selected Native Wildflowers of North Florida. Univ. Florida, IFAS North Florida REC – Monticello Ext. Rep. BB97-14.

(http://www.fgc.org/horticulture/wildflowers/pdf/native_wildflower_groundcovers_nfla-31199.pdf)

Norcini, J.G., and J.H. Aldrich. 2004. Establishment of Native Wildflower Plantings by Seed. Univ. Florida, IFAS ENH 968.

(<http://edis.ifas.ufl.edu/pdffiles/EP/EP22700.pdf>)

Sanford, M.T. 2003. Beekeeping: Florida Bee Botany. Univ. Florida, IFAS Circ. 686.

(<http://edis.ifas.ufl.edu/pdffiles/AA/AA08800.pdf>)

Vaughan, M., and M. Skinner. 2008. Using Farm Bill Programs for Pollinator Conservation. USDA, NRCS Tech Note No. 78.

(http://plants.usda.gov/pollinators/Using_Farm_Bill_Programs_for_Pollinator_Conservation.pdf)



In one study in from South Florida, over 30 species of bees were found to visit narrowleaf silkgrass (*Pityopsis graminifolia*)

Seed/Plant Sources¹:

<http://afnn.org>

<http://www.floridawildflowers.com>

http://www.fgc.org/forms/pdf_files/wildflower_seed_order_9-05-08.pdf

<http://www.wildflowermix.com/>

<http://www.wildseedfarms.com/shoponline.html>

¹Suppliers listed here were consulted during the creation of this document. Mention of these sources does not constitute an endorsement by USDA, NRCS Plant Materials Program, nor does it exclude the use of other commercial sources of suitable material.

Prepared by:

M.J. Williams
Plant Materials Specialist
USDA, NRCS
2614 NW 43rd Street
Gainesville, FL 32606
Phone: 352-338-9544
Email: mj.williams@fl.usda.gov

Additional information on using plants to solve conservation problems can be found on the USDA, NRCS Plant Materials Program at <http://Plant-Materials.nrcs.usda.gov> and the PLANTS database at <http://plants.usda.gov>.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Appendix 1.

Plant	Approximate Blooming Periods	2009 Cost (\$/lb)		Seed/lb	Plant Type	Adaptation	Species Information from Plants Database
		Ecotype ¹	Common				
<i>Asclepias tuberosa</i> , Butterflyweed	May - Oct		160 - 190	70,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=ASTU
<i>Baptisia alba</i> , White Wild Indigo	April - July		180-280	30,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=BAAL
<i>Chamaecrista fasciculata</i> , Partridge pea	July - Oct	9	20	65,000	Annual	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=CHFA2
<i>Coreopsis basalis</i> , Goldenmane Tickseed	April - June	40	20-60	512,000	Annual	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=COBA2
<i>Coreopsis lanceolata</i> , Lanceleaf Tickseed	June – Oct	45	25	221,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=COLA5
<i>Coreopsis leavenworthii</i> , Leavenworth's Coreopsis	July - Sept		20	2,426,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=COLE3
<i>Coreopsis tinctoria</i> , Golden Tickseed	May – Oct	160	20-30	1,666,000	Annual	Mesic to Hydric	http://plants.usda.gov/java/profile?symbol=COTI3
<i>Echinacea purpurea</i> , Eastern Purple Coneflower	April - Sep		30	120,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=ECPU
<i>Eryngium yuccifolium</i> , Button Rattlesnakemaster	June - Oct	120		124,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=ERYUY
<i>Gaillardia pulchella</i> , Blanketflower	May - Oct	48	25	223,300	Annual	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=GAPU
<i>Helianthus angustifolius</i> , Narrowleaf Sunflower	Sep - Oct	60		504,000	Perennial	Mesic to Hydric	http://plants.usda.gov/java/profile?symbol=HEAN2
<i>Helianthus radula</i> , Rayless Sunflower	Sep – Nov	300		100,000 ²	Perennial	Mesic	http://plants.usda.gov/java/profile?symbol=HERA
<i>Ipomopsis rubra</i> , Standing Cypress	July - Oct	55	70	369,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=IPRU2
<i>Liatris elagans</i> , Pinkscale Blazing Star	Sep - Oct	400		140,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=LIEL

Plant	Approximate Blooming Periods	2009 Cost (\$/lb)		Seed/lb	Plant Type	Adaptation	Species Information from Plants Database
		Ecotype ¹	Common				
<i>Liatris gracilis</i> , Slender Gayfeather	Sep - Oct	300		100,000 ²	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=LIGR9
<i>Liatris spicata</i> , Dense Gayfeather	July - Sep	100-300	80	135,000	Perennial	Mesic to Hydric	http://plants.usda.gov/java/profile?symbol=LISP
<i>Monarda punctata</i> , Dotted Horsemint or Spotted Beebalm	Aug - Oct	200		1,472,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=MOPU
<i>Oenothera biennis</i> , Evening Primrose	July - Sep		32	1,300,000	Biannual	Mesic to Xeric	http://plants.usda.gov/java/profile?symbol=OEBI
<i>Oenothera speciosa</i> , Showy Evening Primrose or Pinkladies	Feb - July		50	1,000,000	Perennial	Mesic	http://plants.usda.gov/java/profile?symbol=OESP2
<i>Phlox drummondii</i> , Drummond Phlox	March - June	117	40-60	241,500	Annual	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=PHDR
<i>Rudbeckia hirta</i> , Black Eyed Susan	May - Oct		25	1,700,000	Weak Perennial	All soils	http://plants.usda.gov/java/profile?symbol=RUHI2
<i>Salvia coccinea</i> , Tropical Sage	May Oct		35	277,000	Annual/ Perennial	Mesic to Xeric	http://plants.usda.gov/java/profile?symbol=SACO5
<i>Solidago fistulosa</i> , Pinebarren Goldenrod	Aug - Nov	200		700,000	Perennial	Mesic to Hydric	http://plants.usda.gov/java/profile?symbol=SOFI
<i>Solidago nemoralis</i> , Gray Goldenrod	June - Oct		220	1,000,000	Perennial	Mesic to Xeric	http://plants.usda.gov/java/profile?symbol=SONE
<i>Vernonia gigantea</i> , Giant Ironweed	April - Oct	180		300,000	Perennial	Mesic to Hydric	http://plants.usda.gov/java/profile?symbol=VEGI
<i>Vernonia angustifolia</i> , Tall Ironweed	July - Oct	190-230		200,000	Perennial	Xeric to Mesic	http://plants.usda.gov/java/profile?symbol=VEAN

¹Seed from AL, FL, GA, or SC sources.

²Estimate based on information from related species.