

General Specifications

Use this technical guide for the establishment of native plants for wildlife or pollinator habitat improvement, or restoration of natural communities using local ecotype plant materials (ecological restoration).

SITE SELECTION:

Remnant Natural Areas: In these sites, other practices such as prescribed fire or pine canopy thinning can stimulate growth of the local native seeds and plants already present.

Un-farmed Sites: If the soil at the site has never been farmed or otherwise disturbed, practices that will release native seed sources may be more appropriate than establishing new cover (prescribed fire, mulching woody undergrowth, thinning pine canopy, removal or treatment of invasive exotic pest plants).

Appropriate Sites: For locating Wildlife Habitat Planting include odd or converted areas within farmlands, field borders, old fields with low plant diversity, logging decks, or areas where exotic plants have been removed (including pasture grasses). First inventory sites in order to determine if this practice is appropriate. Plan to address any existing exotic invasive plant infestations resource concerns before planting.

SITE SIZE:

Ecological Restoration: Use local southeastern ecotype plant materials. For natural community restoration, the size of areas planted should depend on site condition, species availability, and the scope of the project. In some cases, species can be hand-collected in an appropriate location and transferred to the site under restoration.

Pollinator Habitat (including monarch butterflies): The attractiveness of pollinator habitat is increased on sites > ½ acre in size with > 45 % forb cover. Creating habitat patches totaling 1 -2 acres in size for every 25 acres of cropland may also support natural enemies of crop pests in farmland areas. Stands less than ½ acre provide greater benefits when located within sight of another habitat patch. These same guidelines can be applied to forest lands where logging decks or other previously cleared areas are present.

Wildlife Habitat: The attractiveness of native habitat is maximized on sites > ½ acre in size and in buffers > 33 feet wide with a diversity of plants that provide food, structural cover, and nest sites. Larger habitat patches are more beneficial. Blocks of natives can be planted in order to connect existing natural habitats.

SPECIES SELECTION:

In all habitat improvement projects, planting species that originally grew in an area and are adapted to the climate, soils, and disturbances are also the most beneficial to animal species including native pollinators. Seeds or plants may be used for establishment. Here are some common target projects but benefits certainly overlap:

Ecological Restoration: When restoring a natural community such as a longleaf pine savanna or Piedmont prairie, it is important *not* to introduce plants with genetic origins from outside the eco-region. These plants may overtake and displace native flora thus reducing habitat quality and bio-diversity within natural community. Only species with genetic origins from the Southeast shall be planted. To promote greater diversity, include numerous species.

Pollinator Habitat: It is important to provide nectar and pollen food resources throughout the growing season.

Butterflies and moths also need host plants for their eggs and larvae. Bees use hollow stems and bunch grass clumps for egg-laying, as well as grass and forb structure for protection from rain and wind.

Monarch Habitat: It is important to provide preferred nectar and pollen food resources throughout the growing season and particularly during fall migration. Monarchs primarily use milkweed as larval host sites.

Wildlife Habitat: Bunch or clump forming grasses provide nest sites, cover, and seeds. Forbs, especially legumes, provide



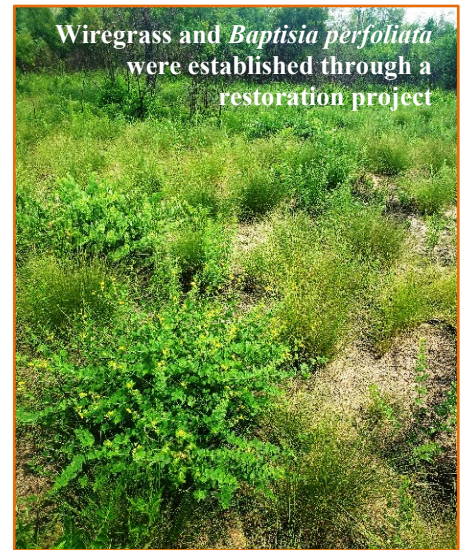
Swamp sunflower (*Helianthus angustifolius*)

seeds and fruit for wildlife as well as attracting the insects and larvae on which many mammals and birds feed.

HOW MANY SPECIES TO PLANT:

Specialized Habitat

- **Pollinator Habitat:** A stand with a minimum of 15 wildflower (forbs, legumes) species should be established, including at least 3 flowering species that bloom during each season (spring, summer, and fall) and a minimum of 1 native bunchgrass for a total of 15 or more species. Each species must comprise less than 20% (no more than 20% per species, especially grasses) of the mix. Refer to the pollinator and/or monarch habitat documents for more details. Pollinator/monarch habitat establishment requires 50 PLS per square foot minimum (60 PLS better if broadcasting).
- **Monarch Habitat:** Follow same parameters above plus must include a minimum of 4% native *Asclepias* (milkweed) seed; the genera most utilized by monarchs as larval host sites.
- **Ecological Restoration:** Include at least 15 local ecotype species in plantings. Plant lists found in this document and in the SC Native Seed Calculator show which species with local origins may be available. Also see the vendor list for native and local ecotype plant availability, several vendors will work on a custom local ecotype mix for specific projects and locations. Establishment requires 50 PLS minimum per square foot (60 PLS is better if broadcasting). Each species must comprise less than 20% (no more than 20% per species, especially grasses) of the mix. For special projects the species ratio can be up to 50% grasses if for specific natural community restoration goal such as wiregrass/grassland/savannah/sweetgrass projects (provide documentation).



High Species Diversity

- **Pollinator Habitat** mix with 10+ Native Species (9 + forbs and 1 grass, even ratios with no species over 20% of mix, with 3 species blooming per 3 seasons), low grass content <20% for pollinator goal. Establishment requires 40 PLS per square foot (50 PLS is better if broadcasting).
- **Diverse Wildlife** mix with 10+ Native Species (even ratios with no species over 20% of mix, but can be up to 50% grasses if for specific wildlife goal or restoration goal, provide documentation). Establishment requires 40 PLS per square foot (50 PLS is better if broadcasting).

Low Species Diversity

- **Wildlife Habitat:** A stand with a minimum of 3 (more recommended) locally native forbs/wildflowers shall be planted (even ratios with no species over 40% of mix). Legumes are especially beneficial. Seed planting rate to improve wildlife habitat or for natural community restoration (local ecotype) is 30 or more pure live seed (PLS) per square foot (higher rate better if broadcasting).

WHICH SPECIES TO PLANT:

Species mixtures for target site can be created with the SC NRCS Seed Calculator and Planting Worksheet (FOTG/Section IV/Ecological Sciences Tools). Choose species from tables in this document or those found in SC NRCS native beneficial plant lists. Many vendors will create a custom mix or carry native wildlife, pollinator, monarch, and southeastern ecotype seed mixtures*. Ecosystem restoration projects should use species known to be appropriate by referencing nearby high-quality natural habitats. Monarch habitat plantings must include a minimum of 4% native *Asclepias* (milkweed) seed along with wildflower species preferred by monarchs for pollen and nectar. Certain tall-growing native grass species can become problematic (excessive thatch, outcompeting forbs, etc.) when planted at high rates. Therefore, these species should not be planted in excess of 0.5 lbs PLS/acre including, Big bluestem, Indian grass, and switchgrass. Additionally, switchgrass varieties and cultivars developed for forage and biofuel should not be included in any mix planted for wildlife (do not plant “Alamo”, “Kanlow”, “Cave-in-Rock”, “Shawnee”, “Colony”, “Performer”, “Cimarron” or “Timber”). If using switchgrass, opt for more beneficial Southeastern and smaller ecotypes such as “Carthage”, “Blackwell”, “Shelter”, or “NB 28”.

Flowering Shrubs: can be included as nectar sources or to improve diversity, food resources, and wildlife habitat structure. Species lists are included in Table 5 and in the Native Seed Calculator. Plant shrubs 6 to 12 feet apart.

Adding Annuals: Nurse crops and/or native annuals can be planted with perennial plant materials to stabilize soil, reduce weed growth, and to give an early indication of establishment success. Native annuals like small-flowered partridge pea, Illinois bundleflower, Indian blanket, lemon mint, and showy tickseed sunflower can be included as one of the minimum number of species required, while nurse crop species such as oats, rye grain, buckwheat, and millet can be added to the mix. *Never use winter wheat, winter rye, perennial rye, or introduced clovers since some of these have properties that can suppress germination of planted seeds or can out-compete planted seedlings.*

Planting Seedlings: Live plants in the form of plugs, sprigs, tublings, bareroot, or containerized material can be used for species such as wiregrass. Plant seedlings in clumps of 10 to 20, 2-5 feet apart. Clumps can be situated about 25 feet apart with a goal of 1200 to 2000 plants per acre. This type of planting may require irrigation.

SEED BED PREPARATION:

Sites with Significant Vegetation: Prior to seeding, as much vegetation should be removed as possible by grazing, cutting and raking, or burning. For erodible sites, vegetation removal may need to be delayed until just prior to seeding or a cover crop can be utilized to hold the soil and then be killed just prior to seeding. Since this is a perennial planting, avoid cultivating close to seeding time so that weed seeds are not brought to the surface.

Sites Conventionally Tilled: To prevent seed from becoming buried too deep, conventionally tilled sites need to be smoothed by disking and dragging. After smoothing, the site should be conditioned by using a culti-packer, roller, or other equipment to compact the soil surface.

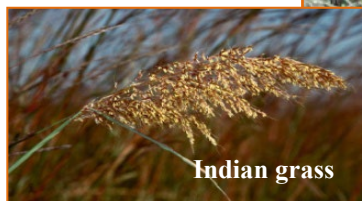
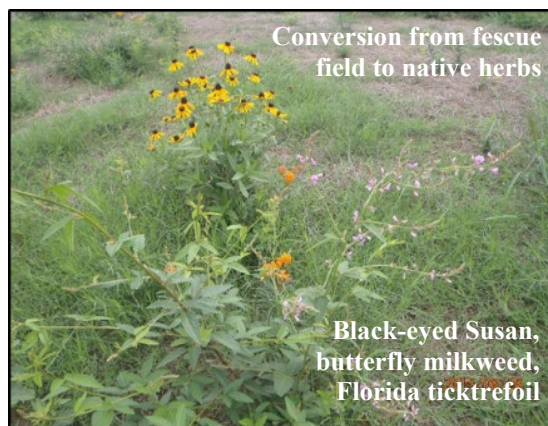
Crop Field Sites: To prevent bringing up weed seed, avoid tillage. Heavy crop residue may need to be burned, mowed and raked, or incorporated into the soil to ensure good seed to soil contact. Also, tillage may be needed to smooth out crop ridges. If conventional tillage is required, the soil should be culti-packed or rolled prior to seeding.

WHEN TO PLANT:

Spring Planting: should occur prior to last frost (coastal plain- April 1, piedmont- April 15). Fall planting should be finished at least 6 weeks before hard-freezing weather occurs (coastal plain- Oct. 20, piedmont- Oct. 10). Mixtures of primarily warm-season grasses may do better if planted in the spring.

Dormant Season: it is important to wait until soil has cooled to less than 55 degrees F (Nov.- mid Feb.).

Fall Planting: or dormant season is recommended for forbs/ wildflowers since seed germinates better after exposure to a period of cold and moisture (stratification). On sites where weeds have been eliminated by fall, forb seed can be planted in late fall by hand/drill with no soil tillage (seed will work down as the soil freezes and thaws over winter).



COMPETING VEGETATION CONTROL:

Conventional seedbed preparation, prescribed burning, herbicide application or a combination may be needed to control competition prior to planting. Several steps are required to successfully reduce competition when using herbicide, especially on difficult to eradicate bahiagrass, bermudagrass, or fescue stands. *Recommendations in Table 1.*

ESTABLISHMENT METHODS:

The site may be broadcast seeded, no-till drilled, or hand seeded. For pollinator habitat or high forb content plantings, broadcast seeding may be more successful since small seeds may be planted too deeply with a drill. Fertilizer or other soil amendments are not recommended. Good seed to soil contact is important. *Never Plant seeds deeper than ¼ inch.*

Broadcast Seeding: Conventionally tilled sites can be mechanically (broadcast spreader) or manually (push seeder, hand crank seeder, or by hand) broadcast-seeded, however, it is critical that the site surface be culti-packed or rolled prior to seeding and then again after seeding to press the seed into the soil. When broadcast seeding, it is best to broadcast at a half rate and seed over the area twice with the second pass at a right angle to the first pass to insure equal coverage. For small forb seed and light fluffy grass seed use a damp carrier such as pelletized lime, cat litter, sawdust, sand, rice hulls, cracked corn, etc. in order to facilitate good seed coverage. About a truck bed full of carrier per acre or a 5 gallon bucket per 1,000 square feet is not too much to use. The more the seed is diluted, the better it will be distributed. Roll the site with roller, or drive across it with truck/tractor tires to firm the seed into the soil (if soil is wet, wait until it dries to roll).

No-till Seeding: Specialty warm-season grass drills are needed to seed other than conventionally tilled sites, especially if the seed is not de-bearded or contains harvest chaff. Some of these drills have features that compensate for the light fluffy seed and insure accurate seed depth placement. De-bearded seed and seed with the chaff removed can be drilled with conventional drills in some mixes. Specialty drills are recommended for large areas in conventional tilled sites due to other features normally included that aid in accurate seed placement. Carriers like oats, cracked corn, or rice hulls may be used to facilitate movement of fluffy and small seed through drill. Drills can also be used in sites prepared via herbicides only (to avoid disturbing competing weed seed). Seeds can be no-tilled directly through the thatch. On firm cultivated seed beds, roll after seeding.

OPERATION AND MAINTENANCE (be sure not to transport pest plant materials via machinery):

Planted stands should not be disturbed by the turning of machinery or driving within the stand. However, maintenance will be required in order to facilitate establishment and maintain desired species and structure. Monitoring and controlling weeds is very critical in the first and second years.

First Year: Most native wildflower seeds take at least three weeks to germinate. Do not expect to see blooms the first or possibly even the second year. Supplementing your planting with a few annual wildflowers will give you a show of color the first year. Expect a weed problem in the first year. Avoid the temptation to pull the weeds, because the wildflower seedlings may be dislodged.

- Mowing is the most effective method for controlling annual weed competition. If annual weeds are present, mow to about 8" once vegetation is about 12" tall. This allows light to reach the slower growing perennials, helps prevent annual weed seed development, and avoids smothering the desirable species with the cuttings (if allowed to grow taller). Mow several times as needed over the growing season if competition continues to be a problem.
- Spot spraying and hand rouging can be very effective for small areas or limited invasions of perennial or otherwise troublesome weeds.
- Wicking with glyphosate herbicide is very effective on tall weeds like johnsongrass and Nodding Thistle.

Second Year: Mow once, with blades set above 8", in early spring. It is beneficial to rake off the cuttings. Postponing mowing until early spring provides winter cover for wildlife. If weeds remain a problem in the second year, mow again in late spring or early summer. If you mow too late in the fall, you may destroy the seed heads of natives that feed birds in winter. However, if annual weeds are still predominant, it is better to prevent them from going to seed during the initial establishment. Unmaintained areas are beneficial as refugia (rotate management).

Established Stand:

- Controlled burning is the preferred maintenance method. Rotational burning that covers the site over a three or more year period best supports wildlife. Burning removes thatch build-up, suppresses invasive woody growth, and invigorates the stand. Burning on a warm day, above 70 degrees F promotes more flowering stems. Burning should be implemented by the 3rd growing season.
- Mowing does not remove the buildup of prior year's biomass from the site and may lead to smothering thatch. Cutting and raking or haying to remove thatch build-up and invasive woody growth are viable alternatives to burning.
- Very light winter strip disking is sometimes conducted on thick stands, can help reduce grass density and encourage forb growth. However, it may also release weed seeds in the soil bank. Disking should not be used to manage sensitive areas such as remnant wiregrass or Piedmont prairie communities because it may destroy rare or sensitive plants in these systems.

- Small areas and isolated infestations of undesirable species, *wicking*, *spot spraying*, and *hand rouging* may be effective, but may not prevent smothering thatch build-up. Rouging involves the use of a special implement with a hooked and sharpened metal blade-end; the implement is pushed into the soil to sever the roots and the plant then is pulled from the soil.
- Maintenance practices: must be adequate to *control noxious and exotic invasive species*.

Precautions:

- Pesticide and herbicide use on or near a pollinator planting can have significant negative effects.
- Chemical drift. Install pollinator habitat where chemical drift will not be an issue. Alternative means of addressing pest issues (mowing, haying, burning, etc.) should be used.
- Disturbance pattern. Some pollinator eggs/larvae may be killed during prescribed burns or management actions. Therefore, no more than 1/3 - 1/2 of stand should be mown, hayed, or burnt at a time.
- Growing season fire will maximize improvements to biodiversity and woody plant control.
- Rotate maintenance activities throughout managed areas to maximize spatial and temporal diversity.

Table 1. Recommended options for controlling competing, non-desirable vegetation during plant establishment. Eastern Gama grass and some forbs/wildflowers may not be compatible with imazameth containing products (check label). All herbicides shall be applied and used according to label recommendations. See the Clemson Pest Management Handbook for more details: <https://www.clemson.edu/extension/agronomy/pest%20management%20handbook.html> *NRCS does not require specific herbicides by trade name and recs on herbicides and specifications on rate and timing should come from a Clemson ext. agent.

Competing species	Timing	Method
Old field (fennel, horseweed, broomsedge, crabgrass)	Summer and/or Fall	Mow late summer, allow vegetation to re-grow 1 foot, apply herbicide in September. The following year, treat competing vegetation with herbicide multiple times if or as needed in mid- spring, mid- summer, late summer to early fall and/or possibly mid-autumn prior to planting in fall or next spring (do not plant in field treated with "Atrazine" within 2 years).
Cropland	Spring	1. Remove excess vegetation in fall or winter (mow or burn). 2. Apply tank mixture after vegetation has grown 4 to 6 inches. Tank Mixture: per acre in April – May: Apply 1.5 quarts glyphosate base product. May be tank-mixed with a glyphosate/imazameth mixture at a rate of 10.7 oz/acre. If imazameth alone is available, it can be applied instead of the glyphosate/imazameth mixture at a rate of 4-8 oz per acre. Follow all label instructions. A second application 4 - 6 weeks later with a germination inhibitor will be needed prior to planting.
Fescue (<i>Schedonorus phoenix</i>)	Fall and Spring	The first step in killing fescue is to mow the area in late summer for a fall herbicide application. If possible after mowing and prior to herbicide application, remove the cut vegetation by prescribed burn to provide a better seed bed and allow for better herbicide contact with growing vegetation. This application should occur after the remaining vegetation has re-grown 4 – 6 inches. If needed for thick stands, a second or third herbicide application should be planned for the following year (spring and fall). All herbicide applications shall be made when vegetation is actively growing, so further mowing or burning may be necessary to stimulate new growth. <i>On forest lands</i> , apply a glyphosate herbicide as a 5-percent solution in water (2 quarts per 10 gallons mix per acre) or when there are no concerns for surrounding plants, Arsenal AC* as a 1-percent solution (25 ounces per 20 gallons mix per acre) in spring. <i>On noncroplands</i> , apply 10 to 12 ounces of Plateau* or 20 to 24 ounces of Journey* per 20 gallons mix per acre (consult the label for additives) in spring. Mixing Plateau or Journey with a glyphosate herbicide will improve control but may damage associated native plants. Vantage (sethoxydim), Poast® (sethoxydim), Assure® II (quizalofop), and Select® 2 EC (clethodim) may be useful on pastures, but they are usually more costly than a glyphosate mix with Plateau or Journey. <i>A second herbicide application is required for dense fescue where competition may not be controlled by one herbicide application. Also treat bermudagrass if found growing below fescue. Early spring burning, if repeated, inhibits fescue and encourages native warm-season grasses</i>
Bermudagrass (<i>Cynodon dactylon</i>)	Summer	<i>Bermudagrass is very competitive and difficult to control with a single application of most herbicides. Because of its aggressive nature and warm-season growth pattern, it is absolutely essential to completely eradicate bermudagrass before planting native warm-season grasses.</i> However, sites dominated by bermudagrass can be converted by applying labeled rates of imazapyr (e.g., Arsenal®, Chopper®). Imazapyr applications for bermudagrass control are most effective if applied during July through September. If imazapyr is used, the application should be made a growing season prior to establishing native warm-season grasses. The residual soil activity of imazapyr will kill germinating native warm-season grasses if planted within six months (plus or minus) of application of imazapyr. Closely note label precautions if using near nontarget trees or shrubs. Imazapyr will kill hardwoods and should not be applied within two times the width of the drip line of any desirable hardwood trees. In areas that cannot be treated by imazapyr, apply a labeled rate of glyphosate (e.g., Roundup) after

		bermudagrass seedhead initiation. Glyphosate will not eradicate bermudagrass as effectively as imazapyr, and <i>multiple applications (2-4) of glyphosate will be required.</i>
Competing species	Timing	Method
Bahiagrass (<i>Paspalum notatum</i>)	Spring and Summer	Apply a labeled rate of metsulfuron methyl (e.g., Escort®) in spring after full green-up. Native warm season grasses are mostly tolerant of metsulfuron methyl, but observe applicable replanting intervals on the product label. Metsulfuron methyl can be absorbed through the roots, so be cautious of applications around desirable hardwood trees and shrubs. Closely note label indications if using near nontarget trees or shrubs. Applied at lower rates (less than 1 ounce per acre), metsulfuron methyl will probably not injure most desirable hardwood trees. However, if there is any doubt, do not apply within two times the width of the drip line of any desirable hardwood trees. In desirable hardwood areas that cannot be treated by metsulfuron methyl or if johnsongrass is also present, apply a labeled rate of imazapic (e.g., Plateau) or imazapic plus glyphosate (e.g., Journey) after bahiagrass has reached full green-up. These treatments may be adequate to release existing native warm-season grasses or to prepare a site for planting native warm-season grasses if bahiagrass is the only grass problem present. Be aware that herbicides containing glyphosate may kill native warm-season grasses if applied when they are actively growing. Another treatment option for areas that cannot be treated by metsulfuron methyl is application of a labeled rate of glyphosate after bahiagrass seedhead initiation. However, <i>multiple (2-4) glyphosate-only applications will likely be required to control bahiagrass</i> , and this treatment will also kill any desirable vegetation. If there is a significant presence of bermudagrass, it is best to treat the site as recommended below; otherwise, spot-treat bermudagrass if it occurs in patches.
Johnson grass (<i>Sorghum halepense</i>)	Summer or Fall	Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (June to October with multiple applications applied to regrowth). <i>Recommendation for mature grass control:</i> apply Outrider as a broadcast spray at 0.75 to 2 ounces per acre (0.2 to 0.6 dry ounces per 3-gallon mix) plus a nonionic surfactant to actively growing Johnsongrass. For hand-held and high-volume sprayers, apply 1 ounce of Outrider per 100 gallons of water plus a non-ionic surfactant at 0.25 percent. Outrider is a selective herbicide that can be applied over the top of other grasses to kill Johnsongrass, or apply Plateau as a 0.25-percent solution (1 ounce per 3-gallon mix) when plants are 18 to 24 inches (45 to 60 cm) tall or larger. <i>Recommendation for seedling control:</i> apply Journey as a 0.3-percent solution (1.2 ounces per 3-gallon mix) before johnsongrass sprouts and when desirable species are dormant or apply a glyphosate herbicide as a 2-percent solution (8 ounces per 3-gallon mix).
No herbicide/ small areas	Spring, Summer, Fall	Just prior to planting (for all these methods), excess vegetation should be cleared from the site to ensure good seed to soil contact. Burn or mow closely, but do not till just prior to planting (tilling exposes weed seeds, which generally require sunlight to germinate). For broadcasting, site should be free of vegetation, while for drilling, stubble is okay. <u>Site preparation options:</u> 1. Solarize vegetation on small areas with UV stabilized clear plastic, or smother with plywood, cardboard, or a thick layer of newspaper covered with leaves or grass clippings, leave for an entire growing season to kill plants underneath. 2. Till in early spring, then till once or twice more after 4-6 weeks. Note that tilling can destroy ground nests of bees, so avoid deep tillage, if possible. Plant a summer smother crop like buckwheat, sorghum-sudan grass, or millet. In fall, crimp planting to kill; then remove excess vegetation by burning or mowing closely. If weed competition is heavy, a fall smother crop of rye grain or oats can be planted. Tilling prior to planting should be avoided. Tilling is not recommended for slopes or erosion prone areas.
Plan for possible <u>Herbicide Carryover</u> : Carryover from herbicide treatments in prior years can pose a threat to new plantings. Seedlings are particularly sensitive to herbicide carryover. Herbicides such as glyphosate have very short persistence and generally do not pose a risk for carryover. Herbicides such as <u>atrazine</u> have medium to long persistence and can pose a risk of carryover. The persistence of herbicides is directly affected by factors such as soil pH and moisture. To assess risks before planting, read the herbicide label or contact the manufacturer for specific information on persistence.		
<u>References:</u> Miller, James H.; Manning, Steven T.; Enloe, Stephen F. 2010. <i>A management guide for invasive plants in southern forests</i> . Gen. Tech. Rep. SRS-131. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 120 p. https://www.srs.fs.fed.us/pubs/gtr/gtr_srs131.pdf Publication 2435, Native Grass Restoration in Mississippi, <i>Mississippi State University Extension Service, Mississippi State University</i> . By Rick Hamrick, L. Wes Burger, Jeanne Jones, and Bronson Strickland. http://extension.msstate.edu/sites/default/files/publications/publications/p2435_web.pdf Roundstone Native Seed Establishment and Maintenance Guidelines: https://roundstoneseed.com/pdf/SixBasicElements%20-%20including%20coastal%20plains.pdf		

Table 2. Beneficial Native Wildflowers (SC Native, available commercially).

Common Name (* preferred by monarchs)	Scientific name	Bloom Season			Growth Type	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs	Flower Color
Annual Phlox*	<i>Phlox drummondii</i>	sprg	sum		A	P, CP	na	low	sun, pt shade	pink, red
Arrowhead	<i>Sagittaria latifolia</i>		sum		P	ALL	OBL	high	full sun	white/ yellow
Aster, Calico*	<i>Aster laterifolius</i>		sum	fall	P	All	FAC	moderate	full sun	purple, white
Aster, Common Blue Wood*	<i>Aster cordifolius</i>		sum		P	P	na	low	full sun	white, lavender
Aster, Eastern Showy - NC ecotype*	<i>Aster spectabilis</i>		sum	fall	P	P	na	low	full sun	purple
Aster, False*	<i>Boltonia asteroides</i>		sum	fall	P	P, CP	FACW	moderate	full sun	white
Aster, Health*	<i>Aster pilosus</i>		sum	fall	P	All	FACW	moderate	sun, pt shade	white
Aster, New England *	<i>Aster novae-angliae</i>		sum	fall	P	M	FACW	moderate	part shade	purple
Aster, New York *	<i>Aster novi-belgii</i>			fall	P	P, CP	OBL	moderate	sun, pt shade	blue
Aster, Purple Stemmed*	<i>Aster puniceus</i>			fall	P	M, P	OBL	high	full sun	purple
Aster, Silverleaf	<i>Pityopsis graminifolia</i>		sum	fall	P	All	UPL	moderate	sun, pt shade	yellow
Aster, Smooth Blue*	<i>Aster laevis</i>		sum	fall	P	All	na	moderate	part sun	blue
Aster, White Wood	<i>Aster divaricatus</i>			fall	P	M, P	na	low	shade, pt sh	white
Aster, White/Flat-Topped	<i>Aster umbellatus</i>		sum	fall	P	CP	FACW	moderate	sun, pt shade	white
Beard Tongue, Appalachian* - SC ecotype	<i>Penstemon laevigatus</i>	sprg	sum		P	All	FAC	high	full sun	purple
Beard Tongue* - NC ecotype	<i>Penstemon australis</i>	sprg	sum		P	ALL	FACU	low	part shade	lavender
Bear's Foot	<i>Smallanthus uvedalius</i>		sum		P	ALL	na	moist-dry	pt shade, sun	yellow
Beggarsticks* - NC, SC ecotypes	<i>Bidens aristosa</i>		sum	fall	A	All	FACW	mod to high	sun, pt shade	yellow
Beggarsticks, Devil's*	<i>Bidens frondosa</i>		sum	fall	A	ALL	FACW	high	sun, pt shade	yellow
Blazing Star, Elegant* - GA ecotype	<i>Liatris elegans</i>			fall	P	P, CP	na	low	full sun	pink
Blazing Star, Grass-leaf*	<i>Liatris graminifolia</i>		sum		P	All	na	low	full sun	purple
Blazing Star, Marsh or Spiked*(FL ecotype)	<i>Liatris spicata</i>		sum	fall	P	M, P	na	moderate	pt shade, sun	pink, purple
Blazing Star, Rough or Tall*	<i>Liatris aspera</i>		sum	fall	P	P, CP	na	low to mod	full sun	purple
Blazing Star, Scaly* (VA ecotype)	<i>Liatris squarrosa</i>		sum		P	All	na	low	full sun	purple
Blazing Star, Slender*	<i>Liatris gracilis</i>		sum	fall	P	CP	FACU	dry to moist	full sun	purple
Blue Mistflower* (VA ecotype)	<i>Eupatorium coelestinum</i>		sum	fall	P	All	FAC	moderate	sun, pt shade	blue, purple
Blue Vervain*	<i>Verbena hastata</i>		sum	fall	P	ALL	FAC	moist-wet	sun to shade	purple, blue

Common Name (* preferred by monarchs)	Scientific name	Bloom Season			Growth Type	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs	Flower Color
Blue-eyed Grass, Narrowleaved*	<i>Sisyrinchium angustifolium</i>	sprg			P	All	FAC	moderate	sun, pt shade	blue
Boneset* (FL ecotype)	<i>Eupatorium perfoliatum</i>			fall	P	All	FACW	mod to high	sun, pt shade	white
Butterfly Pea, Spurred (legume) vine	<i>Centrosema virginianum</i>		sum		P	All	na	low	full sun	purple
Cardinal Flower	<i>Lobelia cardinalis</i>		sum	fall	P	All	FACW	high	pt sun, shade	red
Columbine, Red *	<i>Aquilegia canadensis</i>	sprg	sum		P	All	FACU	dry to moist	part shade	red, orange
Common Ragweed	<i>Ambrosia artemisiifolia</i>		sum		A	All	FACU	low	sun to shade	green
Coneflower, Clasping	<i>Rudbeckia amplexicaulis</i>	sprg	sum		P	CP	FAC	dry to moist	sun, pt shade	yellow
Coneflower, Purple *	<i>Echinacea purpurea</i>		sum		P	All	na	moderate	full sun	purple
Coneflower, Orange - VA ecotype	<i>Rudbeckia fulgida</i>		sum	fall	P	All	FAC	moderate	full sun	yellow
Coreopsis, Greater* - AL ecotype	<i>Coreopsis major</i>	sprg	sum		P	All	na	low to mod	full sun	yellow
Coreopsis-Goldenmane Tickseed* (FL ecotype)	<i>Coreopsis basalis</i>		sum		A	P, CP	na	low	full sun	yellow/red
Coreopsis-Lance Leaved* (NC ecotype)	<i>Coreopsis lanceolata</i>	sprg	sum		P	All	UPL	low	part shade	yellow
Coreopsis-Largeflower Tickseed* (GA ecotype)	<i>Coreopsis grandiflora</i>	sprg	sum		P	All	na	low	full sun	yellow
Coreopsis-Tall* (AL ecotype)	<i>Coreopsis tripteris</i>		sum	fall	P	M, P	FAC	moderate	part shade	yellow
Coreopsis-Whorled* (SC, VA ecotype)	<i>Coreopsis verticillata</i>	sprg	sum		P	P	na	low to mod	full sun	yellow
Crimson-eyed Rose Mallow	<i>Hibiscus moscheutos</i>		sum		P	All	OBL	high	full sun	white
Culiver's Root*	<i>Veronicastrum virginicum</i>		sum	fall	P	M, P	FACW	dry to wet	full sun	white, pink, blue
False Indigo / River Locust *	<i>Amorpha fruticosa</i>	sprg	sum		P	All	FACW	moderate	sun, pt shade	purple
False Indigo, Clusterspike* (NC ecotype)	<i>Amorpha herbacea</i>	sprg	sum		P	P, CP	FAC	low	sun, pt shade	pink, purple
Golden Alexanders*	<i>Zizia aurea</i>	sprg	sum		P	All	na	moderate	sun, pt shade	yellow
Goldenrod, Anise-scented* (GA ecotype)	<i>Solidago odora</i>		sum	fall	p	All	na	moderate	full sun	yellow
Goldenrod, Early*	<i>Solidago juncea</i>	sprg	sum		P	M	na	dry to moist	sun to shade	yellow
Goldenrod, Erect*	<i>Solidago erecta</i>		sum	fall	P	All	na	dry to moist	full sun	yellow
Goldenrod, Flat top / Lance-Leaved*	<i>Euthamia graminifolia</i>		sum	fall	P	CP	FAC	moist	full sun	yellow
Goldenrod, Gray* (VA, PA ecotypes)	<i>Solidago nemoralis</i>		sum		P	All	na	moderate	full sun	yellow
Goldenrod, Pinebarren* (FL ecotype)	<i>Solidago fistulosa</i>		sum		P	CP	FAC	moderate	full sun	yellow
Goldenrod, Rigid*	<i>Solidago rigida</i>		sum	fall	P	P	FACU	moderate	sun, pt shade	yellow
Goldenrod, Rough-Leaved*	<i>Solidago patula</i>			fall	P	All	OBL	high	sun, pt shade	yellow
Goldenrod, Showy* (GA, WV ecotypes)	<i>Solidago speciosa</i>		sum	fall	P	All	na	high	part shade	yellow

Common Name (* preferred by monarchs)	Scientific name	Bloom Season			Growth Type	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs	Flower Color
Goldenrod, Tall*	<i>Solidago altissima</i>			fall	P	All	FACU	moderate	part shade	yellow
Goldenrod, Wand*	<i>Solidago stricta</i>			fall	P	P, CP	OBL	moist-wet	full sun	yellow
Goldenrod, Wreath*	<i>Solidago caesia</i>	sprg			P	All	FACU	moderate	sun, pt shade	yellow
Goldenrod, Wrinkle-Leaved *	<i>Solidago rugosa</i>		sum	fall	P	All	FAC	moderate	sun, pt shade	yellow
Grey headed coneflower (mid-west species, not preferred)	<i>Ratibida pinnata</i>	sprg	sum	fall	P	P	na	moderate	full sun	yellow
Illinois Bundleflower (legume)	<i>Desmanthus illinoensis</i>		sum		P	All	FAC	moderate	full sun	white, yellow
Indian Blanket/ Blanketflower, Annual*	<i>Gaillardia pulchella</i>	sprg	sum	fall	A	P, CP	-	low to mod	full sun	red
Indianhemp/Dogbane*	<i>Apocynum cannabinum</i>	sprg	sum		P	All	FACU	moderate	sun, pt shade	white
Iris, Blue Flag	<i>Iris virginica</i>	sprg			P	All	OBL	high	sun to shade	purple
Ironweed, Giant* (FL ecotype)	<i>Vernonia gigantea</i>		sum	fall	P	P, CP	FAC	moderate	sun to shade	purple
Ironweed, New York* (NC ecotype)	<i>Vernonia noveboracensis</i>		sum	fall	P	All	FAC	moderate	sun to shade	purple
Ironweed, Stemless* (SC ecotype)	<i>Vernonia acaulis</i>		sum		P	All	na	low	sun, pt shade	purple
Ironweed, Tall* (SC ecotype)	<i>Vernonia angustifolia</i>		sum	fall	P	P, CP	FACU	moderate	sun, pt shade	purple
Joe Pye Weed, Trumpetweed*	<i>Eupatorium fistulosum</i>		sum	fall	P	All	FAC	moderate	part shade	pink
Lespedeza, Hairy (legume)	<i>Lespedeza hirta</i>		sum	fall	P	All	na	low	full sun	white
Lespedeza, Roundhead* (legume)	<i>Lespedeza capitata</i>		sum	fall	P	All	FACU	low	full sun	yellow
Lespedeza, Slender /Bushclover (legume) VA ecotype	<i>Lespedeza virginica</i>		sum	fall	P	All	na	low	pt sun, shade	pink
Lobelia, Downy (SC ecotype)	<i>Lobelia puberula</i>		sum	fall	P	All	OBL	high	pt sun, shade	Blue
Lobelia, Great Blue	<i>Lobelia silphilitica</i>		sum	fall	p	M, P	FACW	moist, wet	sun to shade	Blue
Meadow Beauty (Virginia, NC ecotype)	<i>Rhexia virginica</i>	sprg	sum	fall	P	All	FACW	high	part shade	pink, purple
Meadow Beauty, Maryland (NC ecotype)	<i>Rhexia mariana</i>		sum	fall	P	All	FACW	mod to high	part shade	pink, white
Milkvetch, Canadian	<i>Astragalus canadensis</i>	sprg	sum		P	All	FAC	moderate	sun, pt shade	white
Milkweed, Butterfly *	<i>Asclepias tuberosa</i>		sum		P	All	na	low	full sun	orange
Milkweed, Common *	<i>Asclepias syriaca</i>		sum		P	All	na	dry to moist	full sun	pink
Milkweed, Eastern Swamp *	<i>Asclepias incarnata</i>			fall	P	All	OBL	high	full sun	pink
Mint, Clustered Mountain*	<i>Pycnanthemum muticum</i>		sum		P	All	FAC	moderate	sun, pt shade	white
Mint, Lemon	<i>Monarda citriodora</i>		sum		A	P, CP	na	low to mod	sun, pt shade	purple
Mint, Ohio / Downy Pagoda (NC ecotype)	<i>Blephilia ciliata</i>	sprg	sum		P	P	na	low	shade, pt sh	blue, purple
Mint, Slender Mountain*	<i>Pycnanthemum tenuifolium</i>		sum	fall	P	All	FACW	dry to moist	sun, pt shade	white

Common Name (* preferred by monarchs)	Scientific name	Bloom Season			Growth Type	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs	Flower Color
Mint, Spotted Bee Balm* (SC, NC ecotypes)	<i>Monarda punctata</i>		sum		A	All	FAC	low	full sun	purple
Mint, Wild Bergamot*	<i>Monarda fistulosa</i>		sum		P	M, P	na	high	part sun	pink
Monkey Flower	<i>Mimulus ringens</i>		sum	fall	P	All	OBL	moist-wet	full sun	purple
Nodding Onion *	<i>Allium cernuum</i>	sprg	sum		P	P	FACU	dry-moist	sun, pt shade	white, pink
Partridge Pea-Large Flowered* (legume) NOT Lark or Comanche	<i>Cassia fasciculata</i>		sum	fall	A	All	FACU	low	sun, pt shade	yellow
Partridge Pea-Small Flowered* (legume)	<i>Cassia nictitans</i>		sum	fall	A	All	FACU	low	sun, pt shade	yellow
Passion Flower (vine)	<i>Passiflora incarnata</i>	sprg	sum	fall	P	All	na	low to mod	sun, pt shade	purple
Pickernelweed	<i>Pontederia cordata</i>	sprg			P	All	OBL	high	full sun	purple
Prairie clover, Summer Farwell (FL ecotype)	<i>Dalea pinnata</i>		sum	fall	P	P, CP	na	dry	full sun	white
Prairie clover, White	<i>Dalea candida</i>	sprg	sum	fall	P	All	na	moderate	full sun	white
Primrose, Evening *	<i>Oenothera biennis</i>		sum	fall	P	All	FACU	low to mod	sun, pt shade	yellow
Primrose, Showy *	<i>Oenothera speciosa</i>	sprg	sum		P	All	na	low	full sun	yellow
Rattlesnake Master* - SC, FL ecotype	<i>Eryngium yuccifolium</i>		sum		P	All	FAC	low to mod	sun, pt shade	white
Rattlesnake Master, Marsh* (SC Ecotype)	<i>Eryngium aquaticum</i>	sprg	sum	fall	P	CP	OBL	high	part shade	lavender, white
Rosinweed, Prairie / Prairie Dock*	<i>Silphium terebinthinaceum</i>		sum	fall	P	P	FACU	moist-wet	full sun	yellow
Rosinweed, Starry* - SC, FL ecotypes	<i>Silphium asteriscus</i>		sum	fall	P	All	na	moderate	full sun	yellow
Rosinweed, Whorled*	<i>Silphium trifoliatum</i>		sum	fall	P	P	na	low to mod	part shade	yellow
Seed Box	<i>Ludwigia alternifolia</i>		sum	fall	P	All	FACW	mod to high	full sun	yellow
Senna, Wild/Maryland* (legume)	<i>Cassia marilandica</i>		sum		P	All	FAC	low to high	sun, pt shade	yellow
Sensitive Briar	<i>Mimosa quadrivalvis</i>	sprg	sum		P	All	na	low	full sun	pink
Smartweed, Pennsylvania /Pinkweed	<i>Polygonum pennsylvanicum</i>	sprg			P	All	FACW	high	sun	red, pink
Snakeroot, White	<i>Eupatorium rugosum</i>		sum	fall	P	All	na	moist	shade, pt sh	white
Sneezeweed, Common* - FL, VA, PA ecotypes	<i>Helenium autumnale</i>			fall	P	All	FACW	moderate	full sun	yellow
Spiderwort, Ohio /Bluejacket	<i>Tradescantia ohiensis</i>	sprg	sum		P	P, CP	FAC	low	shade	purple
Spiderwort, Virginia - VA, PA ecotype	<i>Tradescantia virginiana</i>	sprg			P	All	FAC	moderate	part shade	purple
Spiderwort, Zigzag - VA ecotype	<i>Tradescantia subaspera</i>	sprg	sum		P	M, P	na	low	part shade	blue
Sunflower, Ox Eye *	<i>Heliopsis helianthoides</i>	sprg	sum	fall	P	All	na	low to mod	full sun	yellow
Sunflower, Swamp/Narrow - SC, FL, AL, MD ecotypes	<i>Helianthus angustifolius</i>		sum	fall	P	All	FAC	moderate	sun, pt shade	yellow
Sunflower, Thin-Leaf	<i>Helianthus decapetalus</i>		sum	fall	P	M, P	na	high	sun to shade	yellow
Sunflower, Woodland	<i>Helianthus divaricatus</i>		sum		P	All	na	low	sun to shade	yellow

Common Name (* preferred by monarchs)	Scientific name	Bloom Season			Growth Type	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs	Flower Color
Susan, Black-Eyed*	<i>Rudbeckia hirta</i>	sprg	sum		P	All	FACU	low to mod	full sun	yellow
Susan, Brown-Eyed*	<i>Rudbeckia triloba</i>	sprg	sum	fall	P	M, P	FACU	moist to dry	sun, pt shade	yellow
Thoroughwort, Lanceleaf or Hyssop-Leaved	<i>Eupatorium hyssopifolium</i>	sprg	sum	fall	P	All	na	moderate	full sun	white
Thoroughwort, Roundleaf	<i>Eupatorium rotundifolium</i>		sum		P	All	FAC	dry to wet	full sun	white
Tick Trefoil/ Beggarweed, Dixie (legume)	<i>Desmodium tortuosum</i>		sum	fall	A	P, CP	na	low	full sun	purple
Tick Trefoil/ Beggarweed, Panicle-leaf (legume)	<i>Desmodium paniculatum</i>		sum		P	All	FACU	low	sun, pt shade	purple
Tick-Trefoil/ Beggarweed, Florida (legume)	<i>Desmodium floridanum</i>		sum	fall	P	CP	na	low to mod	full sun	pink
Virgin's Bower (vine) - PA ecotype	<i>Clematis virginiana</i>		sum	fall	P	All	FAC	moderate	part shade	white
Wild Blue Lupine* (legume)	<i>Lupinus perennis</i>	sprg			P	P, CP	na	low	full sun	blue
Wild Indigo - Catbell * (legume)	<i>Baptisia perfoliata</i>	sprg			P	P, CP	na	low	full sun	yellow
Wild Indigo - Horsefly Weed* (legume)	<i>Baptisia tinctoria</i>		sum		P	All	na	low	full sun	yellow
Wild Indigo, Blue* (legume) -WV ecotype	<i>Baptisia australis</i>	sprg			P	M, P	na	moderate	full sun	purple, blue
Wild Indigo, Spiked* (legume) -NC, SC ecotypes	<i>Baptisia albescens</i>	sprg			P	All	na	low	sun, pt shade	white
Wild Indigo, White* (legume)	<i>Baptisia alba</i>	sprg			P	All	FAC	moderate	full sun	white

Table 3. Beneficial Native Grasses, Sedges, and Rushes (SC Native, available commercially).

Common Name	Scientific name	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs
Bentgrass, Upland	<i>Agrostis perennans</i>	All	FACU	mod to high	part shade
Bentgrass, Winter - NC ecotype	<i>Agrostis hyemalis</i>	All	FAC	moist to wet	part shade
Bluestem, Big (grass) - other ecotype not preferred	<i>Andropogon gerardii</i>	All	FAC	moist to dry	full sun
Bluestem, Big (grass) - NC, SC, AL ecotype	<i>Andropogon gerardii</i>	All	FAC	moist to dry	full sun
Bluestem, Bushy (grass)	<i>Andropogon glomeratus</i>	CP	FACW	moist to wet	full sun
Bluestem, Little (grass)	<i>Schizachyrium scoparium</i>	All	FACU	dry to moist	full sun
Bluestem, Little (grass) - NC ecotype	<i>Schizachyrium scoparium</i>	All	FACU	dry to moist	full sun
Bluestem, Splitbeard (grass)	<i>Andropogon ternarius</i>	P, CP	FACU	dry	sun, pt shade
Bulrush, Green	<i>Scirpus atrovirens</i>	M, P	OBL	moist to wet	full sun
Bulrush, Rufous	<i>Scirpus pendulus</i>	P, CP	OBL	moist to wet	full sun
Bulrush, Woolgrass	<i>Scirpus cyperinus</i>	All	OBL	wet	sun, pt shade
Deer Tongue Rosettegrass (grass)	<i>Panicum clandestinum</i>	All	FACW	dry	sun to shade
Dropseed, Pinewoods (grass)	<i>Sporobolus junceus</i>	P, CP	na	dry	part shade
Dropseed, Rough (grass)	<i>Sporobolus clandestinus</i>	P, CP	na	low to mod	sun, pt shade
Eastern Gamagrass (grass)	<i>Tripsacum dactyloides</i>	All	FAC	moist to wet	full sun
Fowl Manna Grass	<i>Glyceria striata</i>	All	OBL	moist	sun to shade
Indiangrass, Lopsided	<i>Sorghastrum secundum</i>	CP	FACU	dry	full sun
Indiangrass, Nodding or Slender - NC ecotype	<i>Sorghastrum elliotii</i>	All	na	low	sun, pt shade
Indiangrass, Yellow - GA ecotype	<i>Sorghastrum nutans</i>	All	FACU	dry to wet	full sun
Indiangrass, Yellow - NC ecotype	<i>Sorghastrum nutans</i>	All	FACU	dry to wet	full sun
Indiangrass, Yellow - PA ecotype	<i>Sorghastrum nutans</i>	All	FACU	dry to wet	full sun
Lovegrass, Purple	<i>Eragrostis spectabilis</i>	All	FACU	dry to wet	full sun
Muhly Grass (Hairawn Muhly) - FL ecotype	<i>Muhlenbergia capillaris</i>	P, CP	FACU	moist to wet	full sun
Nimblewell	<i>Muhlenbergia scheberii</i>	All	FAC	low to mod	shade, pt shade
Panicum, Beaked or Fall (grass) - SC, GA, FL ecot	<i>Panicum anceps</i>	All	FAC	moist to wet	part shade
Panicum, Red Top	<i>Panicum rigidulum</i>	All	FACW	high	full sun
Purple Top (grass)	<i>Tridens flavus</i>	All	FACU	dry	full sun
Purple Top (grass) - NC, VA, AL, FL, GA ecotypes	<i>Tridens flavus</i>	All	FACU	dry	full sun
Rush, Bog	<i>Juncus biflorus</i>	P, CP	FACW	mod to high	shade, pt shade
Rush, Path/Poverty	<i>Juncus tenuis</i>	All	FAC	moderate	sun, pt shade
Rush, Soft/Common	<i>Juncus effusus</i>	All	OBL	mod to high	full sun
Sedge, Blunt Broom	<i>Carex scoparia</i>	M, P	FACW	moist to wet	shade, pt shade
Sedge, Fox	<i>Carex vulpinoidea</i>	All	FACW	moist to wet	shade, pt shade
Sedge, Frank's	<i>Carex frankii</i>	All	OBL	moist to wet	part shade
Sedge, Fringed/Nodding	<i>Carex crinita</i>	All	FACW	moist to wet	shade, pt shade
Sedge, Hop	<i>Carex lupulina</i>	All	OBL	moist to wet	part shade
Sedge, Shallow	<i>Carex lurida</i>	All	OBL	moist to wet	part shade
Sedge, Squarrose	<i>Carex squarrosa</i>	P, CP	FACW	moist to wet	shade, pt shade
Sedge, Yellowfruit	<i>Carex annectens</i>	All	FACW	mod to high	sun, pt shade
Switchgrass - Carthage (NC)	<i>Panicum virgatum</i>	M.P	FAC	moist to dry	full sun
Switchgrass - Nebraska 28 (small stature)	<i>Panicum virgatum</i>	All	FAC	moist to dry	full sun
Switchgrass - Shelter (WV)	<i>Panicum virgatum</i>	M	FAC	moist to dry	full sun
Switchgrass - Southeast ecotype	<i>Panicum virgatum</i>	All	FAC	moist to dry	full sun
Tick Trefoil, Perplexed (legume)	<i>Desmodium perplexum</i>	All	na	low to mod	sun, pt shade
Toothache Grass	<i>Ctenium aromaticum</i>	P, CP	FACW	moist to wet	part shade

Common Name	Scientific name	SC Region	Wetland Indicator Status	Moisture Needs	Sunlight Needs
Wild Rye, Bottlebrush (grass)	<i>Elymus hystrix</i>	P	na	wet to moist	shade
Wild Rye, Canada (grass)	<i>Elymus canadensis</i>	All	FAC	moist to dry	sun to shade
Wild Rye, Riverbank (grass)	<i>Elymus riparius</i>	P, CP	FACW	wet to moist	sun to shade
Wild Rye, Silky/Hairy (grass)	<i>Elymus villosus</i>	ALL	FACU	wet to dry	shade, pt shade
Wild Rye, Virginia (grass)	<i>Elymus virginicus</i>	All	FAC	dry	sun to shade
Wiregrass, Northern, Pineland Threeawn	<i>Aristida stricta</i>	CP	FAC	dry to wet	part shade
Wood Oats, River Oats/Indian (grass) - NC ecotype	<i>Chasmanthium latifolium</i>	All	FAC	moist	sun to shade
Woodoats, Longleaf (grass)	<i>Chasmanthium sessiliflorum</i>	All	FAC	moderate	full sun
Woodoats, Slender (grass)	<i>Chasmanthium laxum</i>	All	FACW	moderate	sun to shade

Grasses shall not comprise more than 50% of the mixture on a seeds per square foot basis.

Table 4. Beneficial Native Woody Species (SC Native, available commercially).

Common Name	Scientific Name	Form	Bloom Months	Bloom Season
Coral Bean (legume)	<i>Erythrina herbacea</i>	shrub	Mar-Nov	Spr-Fall
Dwarf Pawpaw	<i>Asimina parviflora</i>	shrub	April	Spring
Hawthornes	<i>Crataegus spp.</i>	shrub	Mar-May	Spring
Huckleberries	<i>Gaylussacia spp. (frondosa, dumosa)</i>	shrub	Apr-June	Spring
Virginia Willow	<i>Itea virginica</i>	shrub	April-June	Spring
Fetterbush	<i>Lyonia lucida</i>	shrub	Mar-May	Spring
Wax Myrtle	<i>Morella cerifera (= Myrica cerifera)</i>	shrub	Mar-April	Spring
Mock-orange	<i>Philadelphus hirsutus or pubescens</i>	shrub	Apr-June	Spring
Wild/American Plum	<i>Prunus americana</i>	shrub	Mar-Apr	Spring
Chickasaw Plum	<i>Prunus angustifolia</i>	shrub	Feb-May	Spring
Hog Plum	<i>Prunus umbellata</i>	shrub	Mar-Apr	Spring
Choke cherry	<i>Prunus virginiana</i>	shrub	Apr-June	Spring
<u>Native</u> Azalea species	<i>Rhododendron spp. (arborescens, atlanticum, calendulaceum, canescens, carolinianum, catawbiense, cumberlandense, minus, viscosum)</i>	shrub	Mar-June	Spring
Swamp Rose	<i>Rosa palustris</i>	shrub	May-June	Spring
Raspberry, Blackberry	<i>Rubus spp.</i>	shrub	Apr-June	Spring
Elderberry	<i>Sambucus canadensis</i>	shrub	May-June	Spring
Blueberries	<i>Vaccinium spp.</i>	shrub	Apr-June	Spring
Viburnums (native species)	<i>Viburnum spp.</i>	shrub	Apr-June	Spring
Groundsel	<i>Baccharis halmifolia</i>	shrub	Aug-Oct	Sum-Fall
False Indigobush/Leadplant	<i>Amorpha spp.</i>	shrub	June-July	Summer
Beauty Berry	<i>Callicarpa americana</i>	shrub	June-July	Summer
New Jersey tea	<i>Ceanothus spp.</i>	shrub	June-July	Summer
Buttonbush	<i>Cephalanthus occidentalis</i>	shrub	June-Aug	Summer
Sweet Pepperbush	<i>Clethra alnifolia</i>	shrub	June-July	Summer
Oak-leaf Hydrangea	<i>Hydrangea quercifolia</i>	shrub	June-July	Summer
Ninebark	<i>Physocarpus opulifolius</i>	shrub	May-June	Spring
<u>Native</u> Holly species (American, Yaupon, Dahoon, Gallberry, Winterberry, Possumhaw)	<i>Ilex spp. (opaca, vomitoria, cassine, glabra, verticillata, decidua,</i>	shrub	Mar-June	Spring
Cross Vine	<i>Bignonia capreolata</i>	vine	Apr-May	Spring
Coral Honeysuckle	<i>Lonicera sempervirena</i>	vine	Mar-July	Spr-Sum
Trumpet Creeper	<i>Campsis radicans</i>	vine	June-July	Summer
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	vine	May-July	Summer

Table 5. Summary of Minimum Requirements for native species in Wildlife Habitat Planting projects.

	Purpose	Species Number	Rate PLS/sq ft	Planting Area Size	Notes
Specialized Habitat Requirements	Pollinator, monarch, ecological restoration using native seed mixes and/or plugs	15+ Native Species (<i>even ratios with no species over 20% of mix, for pollinators/monarch 3 species of forbs* blooming during each of 3 seasons</i>) Monarch habitat plantings must include a minimum of 4% native Asclepias (milkweed) seed	50+	>1/2 ac, 1-2 acres per 25 acres of land	low grass content <20% for pollinator goal (<i>but can be up to 50% grasses if for specific ecological restoration goal</i>)
High Species Diversity	Diverse pollinator or wildlife mixes	10+ Native Species (<i>even ratios with no species over 20% of mix, for pollinator species of forbs* blooming during each of 3 seasons</i>)	40+	>1/2 ac, 1-2 acres per 25 acres of land	low grass content <20% for pollinator goal (<i>but can be up to 50% grasses if for specific wildlife goal</i>)
Low Species Diversity	Wildlife habitat mixes	3+ Native Grass and/or Forb Species (<i>even ratios with no species over 40% of mix</i>)	30+	>1/2 ac. (> 33 ft. wide strip recommended if for nesting birds)	

*"Forbs" include flowering shrubs known to support pollinators and wildlife

Table 6. Summary Plant Material Spacing Recommendations for native species in Wildlife Habitat Planting projects.

Plant Form	Wildlife Habitat	Pollinator Habitat	Local Ecotype Plant Materials
<u>Shrubs</u>	6 x 6 feet to 12 x 12 feet based on shrub size at maturity	6 x 6 feet to 12 x 12 feet based on shrub size at maturity	Project dependent
<u>Herbs</u> : plugs (wiregrass or other grasses/wildflowers), tublings, sprigs, bareroot or container	1200-1500 per acre in clumps of 10-20 plants at 2-5 foot spacing, clumps about 25 feet apart	1500-2000 per acre in clumps of 10-20 plants at 2-5 foot spacing, clumps about 25 feet apart	1200-2000 per acre in clumps of 10-20 plants at 2-5 foot spacing, clumps about 25 feet apart

Table 7. Summary Planting Dates for native species in Wildlife Habitat Planting projects.

Seeding Time	From	To	Recommended for
Frost	1-Feb	15-Mar	Native grasses, wildflowers
Spring	15-Mar	1-Jun	Native grasses
Fall	1-Sep	20-Oct	Wildflowers, live herbs
Dormant	15-Nov	freeze	Shrubs, wildflowers, live herbs
Winter	freeze	15-Mar	Shrubs

Table 8. Nurse Crop Rates (nurse crop NOT required but may be beneficial on sites prone to erosion), only use light rates (high rates will compete with and possibly smother desired plants)

Species	Planting Rate	Carriers: (mix with seed to broadcast or drill – use at least 3 times the amount of seed)	
Oats, Annual Rye <u>Grain</u> , Buckwheat, Barley	Less than 20 lbs. per acre	sawdust	cracked corn
Brown-top millet	Less than 8 lbs. per acre	sand	pelletized lime
Do not use: winter wheat, winter rye, perennial rye, or introduced clovers		soy/rice hulls	cat litter (clay bentonite)

Table 9.

		Cropland with Foregone Income	Cropland with <u>NO</u> Foregone Income
Scenarios	Purpose	Included Practices	Included Practices
Specialized Habitat Requirements	Specialized Native Perennial Grasses, Legumes and/or Forbs Mix for Targeted Wildlife/Pollinator Habitat or Ecological Restoration (<i>limited species availability</i>)	1 Herbicide Site Prep, 1 Mechanical Site Prep (<i>light disking</i>)	1 Mechanical Site Prep (<i>light disking if needed</i>)
High Species Diversity	Native Perennial Grasses, Legumes and/or Forb Mix for Targeted Wildlife/Pollinator Habitat or Ecological Restoration (<i>moderate commercial availability</i>)	1 Herbicide Site Prep, 1 Mechanical Site Prep (<i>light disking</i>)	1 Mechanical Site Prep (<i>light disking if needed</i>)
Low Species Diversity	Native Perennial Grasses, Legumes and/or Forbs (<i>Low Density</i>)	1 Herbicide Site Prep, 1 Mechanical Site Prep (<i>light disking</i>)	1 Mechanical Site Prep (<i>light disking if needed</i>)