Conservation Cover (Monarch Habitat)

S. C. Practice Job Sheet 327

Prepared for: _____

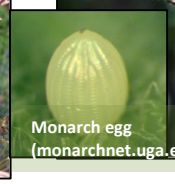
Prepared by: _____

Farm: _____ Tract: _____ Date: _____

Monarch caterpillar on *Asclepias tuberosa* (by Nancy Adamson)

Photo by Judy Stierand

Monarch on *Asclepias incarnata* (by Judy Stierand)


Monarch egg (monarchnet.uga.edu)

Monarch on Ironweed (*Vernonia,* by Judy Stierand)

DEFINITION

Monarchs cannot survive without habitat that includes milkweed (*Asclepias* species, but also milkvine and swallow-wort) on which to lay eggs. Their caterpillars (larval stage of monarch life cycle) primarily eat plants in the Asclepiadaceae family. With shifting land management practices, essential habitat has been lost from the landscape and monarch populations have drastically declined. Stands of other beneficial native wildflowers and grasses provide nectar, pollen, and structure. Native bunch grasses can assist herbaceous wildflowers in staying upright, while providing cover and sites for pupation/metamorphosis. Native woody plants (trees, shrubs, vines) are also important nectar sources for monarchs, especially during spring when they migrate north.

PURPOSE

- Provide nectar and pollen for monarch butterflies throughout the growing season
- Provide host sites (milkweed, milkvine, or swallow-wort) for monarch larvae
- Provide cover (protection from weather and predators) and structure (pupation locations)

WHERE USED

- Odd or converted areas within farmland margins, field borders, old fields with low plant diversity, logging decks, or areas where exotic plants have been removed (including pasture grasses).
- Locations with at least six hours of sunlight.
- Areas where exotic invasive plant infestations will be removed or have previously been removed.
- Where habitat can be protected from pesticides (they can harm caterpillars and adults).

OPERATIONS

Pre-planting: Scout the areas at least one year prior to the planned seeding date. Identify all of the vegetation that will compete with desired planted native species. It is critical to the success of the seeding that the competition from other plants (especially bahia, bermuda, fescue, sericea, Johnson grass, Texas Panicum, and crabgrass) be removed prior to seeding. If areas with beneficial natives or intact natural communities exist, protect those areas and establish new plants in other disturbed areas needing improvement.

Control competition: If chemical treatment is needed for problematic exotic and/or invasive plants, follow the recommendation of the Clemson Weed Guide or Clemson Extension for the correct herbicide treatment (guidance can also be found in the publication: A Management Guide for Invasive Plants in Southern Forests by James H. Miller, Steven T. Manning, and Stephen F. Enloe: http://www.srs.fs.usda.gov/pubs/36915). It is often necessary to apply a chemical treatment in fall before seeding in spring, and/or to apply multiple treatments in the spring and summer before seeding in fall or the following spring. Tillage, if planned, should occur prior to chemical treatment, not after. Delay seeding for the recommended time necessary for selected herbicide.

HABITAT ESTABLISHMENT:

Seed Bed Preparation:

- Good seed to soil contact is extremely important.
- 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. Any planned conventional tillage should happen before chemical weed control starts. Any tillage after weed control will likely bring that weed seed 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. However, 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.

Monarch on *Asclepias tuberosa* (by Billy McCord)

Planting Seed:

- Broadcast seeding is recommended for small plots and diverse seed mixtures (small seeds may not move well through seed drills).
- Fertilizer or other soil amendments are not recommended.
- Never plant seeds deeper than ¼ inch (if soil is too fluffy, seed can be buried too deeply and will not germinate). A firm seed bed is essential.
- Very light rates of annuals can be planted with target plant materials to stabilize the soil, reduce weed growth, and to give an early indication of establishment success if desired. Nurse crop species such as oats, annual rye grain, buckwheat (<20 lbs/ac), and browntop millet (<8 lbs/ac) 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.
- If using a native seed drill, mix seed with a carrier such as pelletized lime or cat litter (clay bentonite) so that small seed are spread evenly. Adding a low rate of an annual nurse crop seed with a carrier can help as well.

Monarch on *Asclepias incarnata* (by Horst Stierand)

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 (for firm, not fluffy seed bed) and then again after seeding to press the seed into the soil.
- Mix seed with a carrier such as pelletized lime, cat litter (clay bentonite), sawdust, sand, soy hulls, or cracked corn in order to facilitate good seed coverage. Use at least 3 times as much carrier as seed. The more the seed is diluted, the better it will be distributed.
- Divide the seed/carrier mixture in half. Broadcast half the mixture in one direction over the area, then broadcast the other half at a right angle to the first pass to insure equal coverage.
- Roll the site with a roller, or drive across it with a truck or tractor tires to firm the seed into the soil (if soil is wet, wait until it dries to roll).

Monarch on Blazing Star (*Liatris sp.*, by Dale Buchner)

Monarch on *Asclepias tuberosa* (by Judy Stierand)

Monarch on aster (*Symphyotrichum* sp., by Dale Buchner)

REQUIREMENTS for application of Conservation Cover (327) Practice in SC, Monarch Habitat:

Species Selection: Seeds or plants may be established. Several seed vendors and nurseries have highly diverse inventories and can create/provide mixtures tailored to the project needs. Lists of species and vendors should be provided to client. *Ask NRCS Biologist for assistance with planting plan if needed.*

Milkweed species: At least 4% of plant materials used must be native milkweeds (*Asclepias spp*.); seeds or plants. Use local ecotype plant materials (originally obtained locally or from the southeast) if available. Generally, milkweed is available commercially while milkvine and swallow-wort are not.

- ***If using plugs or plants, only use those grown without the use of systemic insecticides*** (Because some insecticides persist in the plant tissues for months after the initial application in the greenhouse; caterpillars eating these plant materials may be harmed). *It is important to determine if plants have been treated before purchasing and planting them to benefit monarchs (ask the vendor to be sure).*
- ***Do not use non-native milkweeds***, such as Tropical (or Mexican) Milkweed, also known as Bloodflower (*Asclepias curassavica*), native to South America. Tropical Milkweed can persist into winter causing some monarchs to breed early instead of migrating south, creating non-migratory groups. One cold-snap can wipe out these groups, taking them out of the gene-pool and creating a population sink. Another problem with Tropical Milkweed is that in much of the south the plants do not die back each year. As a result, disease spores on the leaves remain where the next migration of monarchs can feed on them, increasing the percentage of infected butterflies with potentially harmful effects on the entire monarch population.

Native wildflowers: Monarchs and other pollinators will benefit from a diverse mixture of wildflowers. Use locally native species, from southeastern ecotypes. Provide a species mixture that will cover the growing season (at least 3 blooming per season: Spring, Summer, and Fall). Species preferred by monarchs are indicated in the SC NRCS Seed Calculator and in the Monarch Preferred Nectar Sources plant list (EFOTG/Section I/Technical References/Biology/Pollinator Information: http://efotg.sc.egov.usda.gov/treemenuFS.aspx). Examples of seed mixes are provided below.

Grasses: Native/local ecotype grasses should be included for needed structure (as they provide larval host sites for other butterfly species and nesting sites for bumble bees). No more than 20% of the plot should be planted in grasses (seeds or plants); one or more species.

How many species to plant: ***At least 10 species total, but even more is better.*** At least 1 species of milkweed (≤4% of mix- by # of seeds or plants), at least 9 species of wildflowers (including milkweed and/or flowering woody trees/shrubs), and at least 1 species of grass (no more than 20% of mix).

Planting Rate:

- **Seed (milkweeds/wildflowers/grass):** The required seed planting rate for monarch habitat establishment is **40–60 PLS** (**P**ure **L**ive **S**eed) per square foot (upper end of range if broadcasting). The only way to ensure PLS is to purchase seed that has been tested by a registered seed laboratory. **Most native seed vendors sell on a PLS basis (ask for PLS).**
- **Herbaceous wildflower plants:** Live plants (e.g. plugs, sprigs, tublings, bareroot, or containerized material) can be used alone or with seeds. Use spacing of 18"- 24"for plugs or up to 36"- 48'" for larger plants/pots (3 inch or greater). Cluster or plant in rows. If clumping, plant seedlings in groups of 10 to 20, 2-5 feet apart. Clumps can be situated about 25 feet apart with a goal of 1,000 to 2,000 small plugs or 500 to 1,000 larger potted plants per acre. This type of planting may require irrigation.
- **Flowering woody trees, shrubs, and vines** can be included as nectar sources and to provide structure. These can be included as part of the 9 flowering species. Plant trees about 12 to 20 feet apart (depending on size at maturity), shrubs 6 to 12 feet apart in rows or clumps near herbaceous plantings. Tree shelters/ browse protection will aid in establishment.
- If necessary (for sloped areas > 6% with high erosion potential), mulch newly seeded area with 1,000 lbs. per acre of mulch material. Straw mulch shall consist of wheat, barley, oat or rye grain

straw, hay, or grass cut from native grasses. Mulch must not contain noxious or invasive weeds.

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

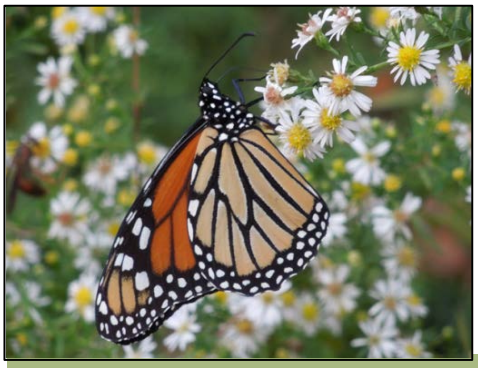
MAINTENANCE:

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.

- During the 1st and 2nd years of establishment, competing exotic plants such as crabgrass, bahia, bermuda, Johnson grass and even some natives like dog fennel and horseweed will compete. If this occurs, mow only the areas with competing vegetation. When plants grow over 12", mow them down to 8" in order to allow more sunlight for desired perennials and to sever weed seed heads before they mature. Mow several times as needed over the growing season if competition continues to be a problem. Mowing once plants are much taller than 12" may smother seedlings.
- Preferably, mowing should be limited to times when plants have died back or are dormant. Mowing at any time (even in the winter) kills insects. In the summer, some insects can't get away from the mower, especially eggs and caterpillars. In the winter insects may be dormant in leaf litter or plant stems. Mowing in patches ensures that pollinators can recolonize the mowed areas.
- Avoid insecticides. Pesticide and herbicide use on or near a habitat plot can have significant negative effects on pollinator populations. Install monarch habitat where chemical drift will not be an issue. Alternative means of addressing pest issues (mowing, haying, burning, etc.) should be used.
- If needed, minimal, well-timed herbicide applications can be applied. If chemicals must be used, choose the least toxic alternative, and apply them early and late in the day when fewer monarchs/pollinators are present. Please note that chemicals, especially insecticides, can kill monarch larvae, if they are present. Herbicides, if required, should be applied with targeted spot treatments instead of a broadcast method. Whenever possible, mechanical removal of shrubs should be used in combination with herbicides to maintain butterfly habitat.
- Control exotic invasive plant species by targeted herbicide or mechanical means.
- Consider adding a sign marking the monarch habitat plots to be sure farm workers or land managers do not accidentally mow, plow, or treat the plots with pesticides.
- Established stands can be maintained by burning in alternating patches. It is important to note that some monarch eggs or larvae may be killed during prescribed burns or other management actions. Therefore, no more than 1/3 - 1/2 of the stand should be mown, hayed, or burned 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.

Monarch on New England Aster (by Judy Stierand)

Monarch on Joe Pye Weed (by Judy Stierand)



Monarch on aster (*Symphyotrichum* sp., by Judy Stierand)

Minimum requirements for Monarch habitat establishment (for Conservation Cover 327 Practice)		
Species	**Planting Rate (seeds)**	**Size**
Minimum 10 species: 1 or more milkweed (≥ 4% of mix - by number of seed), 9 or more forbs covering 3 seasons (can include milkweed) + 1 grass (<20% of mix)	40-60 seeds per sq. ft. (***high end of range more beneficial if seed broadcast)***	0.5 to 2.5 acres per project

Plant material requirements and spacing (for live plants- plugs, potted, bareroot, etc.) if only using live plants, 4% or more of the number of plants used must be milkweed)	
Plant form	**Monarch Habitat**
Trees	12 x 12 feet to 20 x 20 feet based on tree size at maturity
Shrubs	6 x 6 feet to 12 x 12 feet based on shrub size at maturity
Herbs: plugs (milkweed or other wildflowers and grasses), tublings, sprigs, bareroot or potted	Use spacing of 18"- 24"for plugs or up to 36"- 48'" for larger plants/pots (>3 inch). Cluster or plant in rows. If clumping, plant seedlings in groups of 10 to 20, 2-5 feet apart. Clumps can be situated about 25 feet apart with a goal of 1,000 to 2,000 small plugs or 500 to 1,000 larger potted plants per acre.

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)		**Carriers: (mix with seed to broadcast or drill – use at least 3 times the amount of seed)**	
Oats, Annual Rye Grain, Buckwheat	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 hulls	cat litter (clay bentonite)

Planting Dates			
Time	**From**	**To**	**Recommended for**
Frost	February 1	March 15	Native grasses, wildflowers
Spring: Spring planting should occur prior to last frost (coastal plain- April 1, piedmont- April 15)	March 15	April 15	Native grasses
Fall: Fall planting should be finished at least 6 weeks before hard-freezing weather occurs (coastal plain- Oct. 20, piedmont- Oct. 10)	September 1	October 20	Wildflowers, live herbs (plugs, pots, etc.)
Dormant: [it is important to wait until the soil temperature has cooled to less than 55 degrees Fahrenheit (Nov.- mid Feb.)]	November 15	freeze	Trees, shrubs, wildflowers, live herbs (plugs, pots, etc.)
Winter	freeze	March 15	Trees, shrubs

List of planned species and rates should be generated with the SC NRCS native seed calculator and provided (species mix examples are also available for various site conditions). This list is a starting point. Work with a seed vendor or nursery to obtain appropriate plant materials, make substitutions as needed based on available plant materials and site conditions. Modified lists of species and rates must be approved by NRCS before practice is installed. Examples of seed mixtures, a list of woody plants preferred by monarchs and native monarch larval host plants are provided below. There are many species mixture possibilities.

Mixture and Planting Rate for **dry sites** with **full sun** (UPL, FACU, FAC , na species) Monarch Habitat example

Common Name	Scientific Name	Seeding Rate (lb/A)	% of Mix	Flowering Period			Growth Habit
Aster, Eastern Showy (NC ecotype)*	*Aster spectabilis / Eurybia spectabilis (NC)*	0.18	12%		sum	fall	P
False Indigo, Clusterspike* (NC ecotype)	*Amorpha herbacea (NC)*	0.7	7%	sprg	sum		P
Wild Blue Lupine* (legume)	*Lupinus perennis*	6	5%	sprg			P
Nodding Onion *	*Allium cernuum*	0.5	3%	sprg	sum		P
Blazing Star, Grass-leaf* (NC ecotype)	*Liatris graminifolia / L. pilosa (NC)*	0.6	6%		sum		P
Aster, Calico*	*Aster laterifolius/ Symphyotrichum lateriflorum*	0.2	9%		sum	fall	P
Goldenrod, Erect*	*Solidago erecta*	0.15	11%		sum	fall	P
Sunflower, Ox Eye *	*Heliopsis helianthoides*	1	9%	sprg	sum	fall	P
Milkweed, Common *	*Asclepias syriaca*	0.5	3%		sum		P
Muhly Grass (Hairawn Muhly) - FL ecotype	*Muhlenbergia capillaris (FL)*	0.1	8%				P
Wild Rye, Canada (grass)	*Elymus canadensis*	1.5	7%				P
Bluestem, Little (grass) -NC ecotype	*Schizachyrium scoparium (Andropogon scoparius)*	0.5	7%				P
Milkweed, Butterfly *	*Asclepias tuberosa*	0.5	2%		sum		P
Blazing Star, Elegant* (GA ecotype)	*Liatris elegans (GA)*	0.1	1%			fall	P
Rattlesnake Master* (SC, FL ecotypes)	*Eryngium yuccifolium (SC, FL)*	0.3	2%		sum		P
Primrose, Showy *	*Oenothera speciosa*	0.15	8%	sprg	sum		P
	Total lb seed/acre:	13.0					
	Seed/sq foot	40.9					

PLS = Pure Live Seed (Pure Live Seed rates Required), *Preferred by Monarchs

Southeastern regional ecotype seed should be used if available, ask seed vendors

Monarch on Goldenrod (*Solidago*, by Dale Buchner)

Monarch caterpillar feeding on milkweed (by Dale Buchner)

Mixture and Planting Rate for **moist to wet sites** with **part shade to shade** (OBL, FACW, FAC species) **Monarch Habitat example**

Common Name	Scientific Name	Seeding Rate (lb/A) PLS	% of Mix	Flowering Period			Growth Habit
Smartweed, Pennsylvania /Pinkweed	*Polygonum pensylvanicum (Persicaria pensylvanica)*	1	7%	sprg			P
Aster, Health / Hairy White Oldfield*	*Aster pilosus / Symphyotrichum pilosum*	0.2	8%		sum	fall	P
Beggarsticks, Bearded/Showy Tickseed* (NC, SC ecotypes)	*Bidens aristosa (SC, NC)*	1	7%		sum	fall	A
Cardinal Flower	*Lobelia cardinalis*	0.02	11%		sum	fall	P
False Indigo / River Locust *	*Amorpha fruticosa*	0.6	3%	sprg	sum		P
Boneset* (FL ecotype)	*Eupatorium perfoliatum (FL ecotype)*	0.08	9%			fall	P
Goldenrod, Showy* (GA, WV ecotypes)	*Solidago speciosa (GA, WV)*	0.1	9%		sum	fall	P
Mint, Slender Mountain*	*Pycnanthemum tenuifolium*	0.03	10%		sum	fall	P
Milkweed, Eastern Swamp *	*Asclepias incarnata*	1	4%			fall	P
Wild Indigo, White* (legume)	*Baptisia alba*	3	5%	sprg			P
Wild Rye, Riverbank (grass)	*Elymus riparius*	1	7%				P
Fowl Manna Grass	*Glyceria striata*	0.05	4%				P
Sedge, Fox	*Carex vulpinoidea*	0.07	5%				P
Beard Tongue, Appalachian* (SC ecotype)	*Penstemon laevigatus (SC)*	0.05	8%	sprg	sum		P
Sneezeweed, Common* (FL, VA, PA ecotypes)	*Helenium autumnale (FL, VA, PA)*	0.05	6%			fall	P
Spiderwort, Virginia (VA, PA ecotype)	*Tradescantia virginiana (PA, VA)*	0.05	0%	sprg			P
	Total lb seed/acre:	8.3					
	Seed/sq foot	42.4					

PLS = Pure Live Seed (Pure Live Seed rates Required), *Preferred by Monarchs

Sweat bee on Swamp Milkweed (by Nancy Adamson)

Monarch on Swamp/Narrow-leaved Sunflower (*Helianthus angustifolius*, by Judy Stierand)

Woody plants preferred by monarchs for nectar

Common Name	*Scientific name*	bloom	bloom	bloom	region	moisture needs	sunlight needs
Blueberry, Highbush	*Vaccinium corymbosum*	sprg			All	low to high	sun to shade
Buttonbush	*Cephalanthus occidentalis*		sum		All	moderate to high	part shade, shade
Devil's-walking-stick	*Arailia spinosa*		sum		All	low to moderate	sun to part shade
Dogwood, Flowering	*Cornus florida*	sprg	sum		All	low	part shade, shade
Elder, Marsh / Jesuit's bark	*Iva frutescens*			fall	CP	high	sun
Groundsel Tree	*Baccharis halimifolia*			fall	All	high	part shade
Hercules's Club	*Zanthoxylum clava-herculis*	sprg			CP	low to moderate	sun
New Jersey Tea	*Ceanothus americanus*		sum		All	low	sun to part shade
Ninebark	*Physocarpus opulifolius*	sprg			All	low	sun to shade
Redbud (legume)	*Cercis canadensis*	sprg			All	low to moderate	sun to shade
Serviceberry	*Amelanchier arborea*	sprg			All	moderate	sun to shade
Spicebush	*Lindera benzoin*	sprg			All	moderate	sun to shade
Sumac, Fragrant	*Rhus aromatica*	sprg	sum		P	low	sun to part shade
Sumac, Smooth	*Rhus glabra*	sprg	sum		P, M	low	sun to shade
Sumac, Staghorn	*Rhus typhina*		sum		P, M	low	sun to shade
Sumac, Winged	*Rhus copallinum*		sum		All	low	sun
Sweet Pepperbush	*Clethra alnifolia*		sum		CP, P	high	sun to part shade
Virginia Creeper	*Parthenocissus quinquefolia*		sum		All	low	sun to shade
Willow, Black	*Salix nigra*	sprg			All	high	sun to shade
Willow, Carolina	*Salix caroliniana*	sprg			CP, P	high	part shade
Willow, Silky	*Salix sericea*	sprg			All	high	sun to shade
Witchhazel	*Hamamelis virginiana*			fall	All	moderate	part shade, shade

Monarchs nectaring on Groundsel Tree (*Baccharis halimifolia*) during fall migration (by Billy McCord)

Monarch butterflies require host plants in the botanical Family Asclepiadaceae		
Native Milkweeds (Monarch larval host plant) in South Carolina		
Common name of Milkweed	**Genus, species**	**Region**
Clasping	*Asclepias amplexicaulis*	statewide
Carolina	*Asclepias cinerea*	south coastal plain
Large-flower	*Asclepias connivens*	south coastal plain
Poke	*Asclepias exaltata*	piedmont, mountains
Pinewoods	*Asclepias humistrata*	coastal plain
Swamp	*Asclepias incarnata*	statewide
Few-flower	*Asclepias lanceolata*	coastal plain
Long-leaf	*Asclepias longifolia*	coastal plain
Michaux's	*Asclepias michauxii*	coastal plain
Pinelands	*Asclepias obovata*	south coastal plain
Savanna	*Asclepias pedicellata*	outer coastal plain
Aquatic	*Asclepias perennis*	coastal plain
Four-leaf	*Asclepias quadrifolia*	piedmont, mountains
Red	*Asclepias rubra*	coastal plain
Common	*Asclepias syriaca*	statewide
Tuba	*Asclepias tomentosa*	inner coastal plain, lower piedmont
Butterfly	*Asclepias tuberosa*	statewide
Red-ring	*Asclepias variegata*	statewide
Whorled	*Asclepias verticillata*	statewide
Green comet	*Asclepias viridiflora*	statewide

Other Native Wildflowers and Vines (Monarch larval host plants) in South Carolina		
Common name	***Genus, species***	**Region**
Honeyvine, Sandvine, Bluevine milkweed, or Smooth Swallow-wort	*Cynanchum laeve*	statewide
Gulf Coast Swallow-wort, Gulf Coast Milkvine	*Cynanchum angustifolium, Cynanchum palustre, Seutera angustifolium*	outer coastal plain
Leafless Swallow-wort	*Cynanchum scoparium*	outer south coastal plain
Maroon Carolina moonvine	*Matelea carolinensis*	statewide
Oldfield milkvine	*Matelea decipiens*	statewide
Angularfruit milkvine	*Matelea gonocarpos, Matelea suberosa*	piedmont, coastal plain
Yellow Carolina milkvine	*Matelea flavidula*	coastal plain

Exotic plants that attract monarch egg laying but that DO NOT SUPPORT larvae <u>or</u> may be harmful to monarch populations (DO NOT encourage these, eradicate/replace with natives if possible)		
Common name	***Genus species***	**Region**
Black Swallow-wort, Louise's Swallow-wort	*Cynanchum louiseae or Vincetoxicum nigrum*	Northeast, upper midwest, west; not documented in SC
Pale Swallow-wort, European Swallow-wort	*Cynanchum rossicum or Vincetoxicum rossicum*	Northeast, not documented in SC
Tropical or Mexican milkweed	*Asclepias curassavica*	Widely planted in garden settings

References and Resources:

Create Habitat for Monarchs: http://monarchjointventure.org/get-involved/create-habitat-for-monarchs

Xerces' Milkweed Seed Finder: http://www.xerces.org/milkweed-seed-finder/

Monarch Watch Milkweed Market: http://monarchwatch.org/milkweed/market/

Milkweed: A Conservation Practitioner's Guide (Xerces): http://www.xerces.org/milkweeds-a-conservation-practitioners-guide/

Native milkweed fact sheet (Monarch Joint Venture) (*examples of native milkweed by region): http://monarchjointventure.org/images/uploads/documents/MilkweedFactSheetFINAL.pdf

Tropical milkweed fact sheet (Monarch Joint Venture): http://monarchjointventure.org/images/uploads/documents/Oe_fact_sheet.pdf

Q&A about research related to tropical milkweed and monarch parasites http://monarchjointventure.org/news-events/news/qa-about-research-related-to-tropical-milkweed-and-monarch-parasites

Monarch Health and the Monarch Parasites Webpage: http://www.monarchparasites.org/

Invasive Species Alert: Black swallow-wort (*Cynanchum louisea*) and pale swallow-wort (*Cynanchum rossicum*) http://monarchjointventure.org/images/uploads/documents/Swallow-wort_flyer.pdf

Monarchs (*Danaus plexippus*) and milkweeds (*Asclepias* species): THE CURRENT SITUATION AND METHODS FOR PROPAGATING MILKWEEDS (**NATIVE**PLANTS | **14** | **1** | SPRING 2013, by Tara Luna and R Kasten Dumroese) http://www.fs.fed.us/rm/pubs_other/rmrs_2013_luna_t001.pdf

Status review funded by USFS and conducted by Xerces and Natureserve: http://www.natureserve.org/news-events/news/monarchs-north-america-found-be-vulnerable-extinction

SC NRCS tools and documents on the SC EFOTG (Electronic Field Office Technical Guide):

SC Native Seed Calculator and Specification Sheet and Example species mixes: http://efotg.sc.egov.usda.gov/treemenuFS.aspx
→Section I/Technical References/Biology Technical Information

Monarch Preferred Nectar Sources: http://efotg.sc.egov.usda.gov/treemenuFS.aspx,
→Section I/Technical References/Biology Technical Information/Pollinator Information

Native milkweed species available commercially: http://efotg.sc.egov.usda.gov/treemenuFS.aspx
→Section I/Technical References/Biology Technical Information/Pollinator Information