

Monarch Habitat Management on Grasslands

Natural Resources Conservation Service - Indiana – April 2016 (ver. 1.1)

327 - Seeding for Monarch Habitat Development Project Job Sheet

WHY SEED FORBS & LEGUMES for MONARCHS?

Monarchs face many risks that are resulting in declining populations across their North American range. The recent trend in monarch populations may dictate new and different objectives for herbaceous plantings.

Every monarch that successfully migrates to wintering sites in Mexico or along the California coast begins its life as an egg on a milkweed plant, and depends on nectar sources across miles of migratory flyway.

Seeding native forbs and legumes can provide Monarch habitat if it includes an abundance and diversity of milkweed plants for breeding, and abundant nectar plants for fueling migrations. Other wildlife species such as pollinators, Northern Bobwhite, and others can also benefit from Monarch plantings, especially if the habitat needs of these species are considered.



SPECIFICATIONS

The following are specifications for seeding forbs and legumes for monarchs through the Monarch Habitat Development Project. Where potential plantings are near areas that receive insecticides, Integrated Pest Management strategies that limit exposure of these products to monarchs such as minimizing direct contact, minimizing drift, ensuring an adequate buffer between areas that receive insecticides from the monarch habitat, planting habitat of adequate width, etc. are required.

COMPANION/NURSE CROPS

A companion/nurse crop will be used when erosion control and weed suppression are needed. Companion/nurse crops include Winter Wheat (after the Hessian Fly-free dates in Table 2), Oats, Barley, Cereal Rye or Annual Ryegrass; native Wildryes (i.e. – *Elymus sp.* such as Canada, Riverbank, and Virginia Wildrye) and other species are also effective.

Companion crops will be clipped after jointing, but before seed head pollination unless otherwise directed (control of Wildrye species is not necessary so that they persist as part of native seedings). A second and subsequent clipping is necessary if re-growth provides competition. Clipping height should be above developing seedlings. Where excessive growth has accumulated, the vegetation will be chopped rather than swathed.

LIME AND FERTILIZER

Lime and fertilizer should be based on a current soil test (less than four years old). In areas with existing vegetation that shows signs of nutrient deficiencies, or if the soil test shows phosphorus (P) and potassium (K) are in the low to very low range, apply enough fertilizer (organic or inorganic) to raise N, P and K to a level needed for a 1 ton/ac yield goal. Do not apply any nitrogen (N) for warm season grasses. Use Purdue University recommendations from the *Crop Fertilizer Recommendation Calculator*, or the Indiana NRCS Seeding Tool – [Indiana Fertilizer Calculator](#).

If the pH is 6.0 or less, apply enough lime per acre to bring pH to meet the tolerance range of the planned plant species. Soil amendments will be incorporated during seedbed preparation, or applied before planting if a no-till drill is used.

Apply lime according to *Tri-State Fertilizer Recommendations* - PU AY-9-32, Extension Bulletin E-2567, or Indiana NRCS Seeding Tool – [Indiana Fertilizer Calculator](#).

SITE PREPARATION

It is very important to plant the vegetation into a weed-free seedbed. Use herbicides, Prescribed Burning, and/or other methods to eliminate competing vegetation. Weed control efforts should begin as early as 12 months prior to planting, and may require multiple applications or operations in both the fall and spring prior to planting.

Pay particular attention to sites where noxious and potentially invasive species are likely. Many of these species are perennials that spread through seed and roots, and many have rhizomatous root systems that will persist and negatively impact the planting.

Cool season weeds (i.e. Canada thistle, quack grass) are best controlled in the fall (mid-September to early November) with a translocation herbicide. Plants should be actively growing at the time of application. Avoid herbicide application after 3:00 pm if overnight temperatures are expected to drop below 50 degrees (F).

Warm season weeds (i.e. Johnsongrass) are best controlled prior to flower with a follow-up application prior to first frost. Plants should be actively growing at the time of application. Contact your local Purdue University Cooperative Extension Service for specific herbicides to use. **Apply all herbicides according to the label.**

Use a nurse/companion crop to control potential weed issues and/or a temporary cover for erosion control.

If prescribed burning is used for site preparation, it must be conducted according to IN NRCS FOTG Standard [Prescribed Burning \(338\)](#)

SEEDING DATES

Plant the selected species within the dates specified below.

Seeding Date Criteria

Table 1: SEEDING WINDOWS for PERENNIAL VEGETATIVE COVER IN INDIANA										
Plant Species	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec-Feb.
Cool Season Grasses	■		■ ¹			■		■ ¹		Dormant ²
Forage Legumes	■					■				Dormant ²
Native warm season plants		■		■						Dormant ²
Native Wildryes	■			■		■				Dormant ²

¹ Tall Fescue and/or Perennial Ryegrass only, with a mulch cover, Primarily for Critical Areas.
² Dormant/Frost seeding from December thru February. Increase seeding rates by 25%. Not for Critical Areas or new forage establishment.

Legend
 Suitable seeding dates for all of Indiana
 Flood plains and ponded soils

SEED PREPARATION

Inoculate legume seed before seeding with the proper rhizobia bacteria specific for the species. Re-inoculate seed if it was pre-inoculated more than 60 days prior to seeding or beyond dates specified on the seed / inoculant tag. Inoculant left in the sun, even for a short period of time can significantly reduce the viability and effectiveness. Pre-inoculated seed will have a coating that changes the pure live seed per pound and thus the bulk seeding rate per acre.

Be aware that blending seed of varying size, shape and weight can make calibration of equipment and seeding uniformity difficult.

Some seeding mixtures contain seed that is extremely small and thus have very low seeding rates. This may make it difficult to set seeding equipment to uniformly seed these low rates. To add enough volume to the mix for proper metering, a **carrier** or coated seed may be desirable. The carrier should be no larger than the largest seed species and have similar shape, density and texture to the majority of seeds in the mix. The carrier can be an inert material (i.e. cracked corn) that does not have abrasive properties that may cause damage to the equipment or the seed. Inexpensive seed (unimproved varieties) that will have no significant negative impact on the purpose of the seeding may also be used.

PLANTING METHODS

No-Till seeding: Use a no-till drill with seven (7) inch or less row spacing. Ensure the drill is designed to handle the type of seed being planted (especially important for native grasses). Set the no-till drill to provide good seed-to-soil contact and a planting depth preferred for the desired species (see table below). Soils that are too wet or too dry can also cause improper seed placement.

Conventional Seeding: Prepare a fine firm seedbed to a depth of three (3) to four (4) inches. Incorporate lime and fertilizer during seedbed preparation. Use a drill with seven (7) inch or less row spacing or a culti-packer seeder designed for the seed to be planted. Seed should be drilled uniformly at a proper seeding depth for the desired species.

Seeding depth guidance

Groups	Seed Size (seeds/lb.)	Optimum (inches)	Max. (in.)
Brassicas, clovers, small seeded legumes, small seeded grasses, native forbs	150,000 – 500,000	¼	½
Vetches, sorghums, wildryes, trefoils, native legumes, radishes	50,000 – 150,000	½	¾
Cereal grains	12,000 – 50,000	¾	1
Beans, peas, corn	1500 – 12,000	1 ½	2

Broadcast Seeding: Seed may be broadcast if completed in a uniform manner. Pre-mix the seed with 200 pounds per acre of pelletized lime if using an airflow applicator. Seedbeds should be worked to a minimum depth of three (3) inches and firmed before seeding. The seedbed should be culti-packed before and after seeding. It is acceptable to see up to one-third (⅓) of the seed on the soil surface. Wind speed should be 15 miles per hour or less when broadcasting.

Inter-seeding:

1. **Legumes/Forbs (frost seeding):** No-till drill or broadcast as above into existing vegetation or residues. Broadcasting relies on freeze/thaw cycles, rain and/or snow to incorporate the seed. This method does not include a seedbed preparation. This is most commonly used during the dormant seeding period.
2. **Cover Crops:** No-till drill or broadcast as above into existing vegetation or residues. Broadcasting relies on freeze/thaw cycles, rain and/or snow to incorporate the seed. Inter-seeding does not include a seedbed preparation. This method can be used to establish cover crop species or combination mixes into relatively light (such as soybean) and weed free crop residues or to establish vegetation into standing crops.
3. **Grasses:** No-till drill into existing covers only if prior-treated with herbicides or tillage, or if existing cover is diminishing (i.e. – older alfalfa plantings).

The Indiana Department of Natural Resources, Division of Fish and Wildlife also has detailed information on seeding native forbs and legumes at <http://www.in.gov/dnr/fishwild/files/warmgrass.pdf>.

WEED CONTROL DURING ESTABLISHMENT

Control competing vegetation by mowing, prescribed burning, or herbicides as needed to control unwanted vegetation until the seeds are established (typically up to 3 years after planting). Mow when competing weeds are taller than the planted vegetation, and at a height above the planted vegetation. Use selective herbicides and/or spot spraying to protect the desired species. Refer to [2013 Weed Control Guide for Ohio and Indiana](#) for herbicide timing and treatment.

OPERATION AND MAINTENANCE

Maintain the planting according to your conservation plan. Maintenance activities are needed to maintain stand health, or to control pests, noxious weeds or any plant species whose presence or overpopulation may jeopardize the cover, or have detrimental effects to the surrounding land.

The presence of annual weeds (such as foxtail, common ragweed, and perennial forbs) is not a concern, as these plants are important sources of food for wildlife, especially bobwhite quail. Maintenance may be needed to control excessive density of these annuals, especially during the establishment years, but is not intended to eliminate this group of plants.

Minimize maintenance activities from **April 1 through August 1** to protect ground-nesting wildlife.

Do not mow native forbs and grasses lower than 8 to 12 inches.

Inspect the vegetation annually and after storm events, and repair any gullies that have formed; remove unevenly deposited sediment and/or crop residues that will disrupt the function or kill desired vegetation; and reseed high mortality and disturbed areas.

D) SPECIES SELECTION

Pollinator Habitat specific to Monarch Butterflies

- When Monarch habitat is the primary purpose, mixes will consist of a minimum of nine (9) forb species with a seeding goal of 30 – 40 seeds/ft²; grasses may be included in addition to the forbs at the seeding rates listed.
- As part of the nine (9) species, include a minimum of 6.5 - 9 oz. of Common Milkweed (*Asclepias syriaca*), plus
 - a. 2.5 - 4 oz. of Swamp Milkweed (*Asclepias incarnata*) or other suitable milkweed for VPD-WD soils, or
 - b. 3 - 4 oz. of Butterfly Milkweed (*Asclepias tuberosa*) or other suitable milkweed for MWD-ED soils.
- **For the remaining 7 (minimum) species**
 - a. Select 1 species from the early-bloom period
 - b. Select 3 different species from the mid-bloom period
 - c. Select 3 different species from the late-bloom period.
 - d. Seed each species the appropriate rate to reach the planned seeds/ft².
 - e. At least 60% of the species will be rated “Very High” (preferred), or “High” for Monarch Habitat from the Monarch Specification Sheets. Following are examples (not inclusive) of suitable forbs.

Native Grasses¹

Species	Soil Moisture Tolerance	Maximum Base Seeding Rate (adjust the base rate if more than 1 grass species is planned).
Little Bluestem (<i>Schizachyrium scoparium</i>)	MWD – ED	0.94 PLS lb/acre
Prairie Dropseed (<i>Sporobolus heterolepis</i>)	PD – ED	1.91 PLS lb/acre
Sideoats Grama (<i>Bouteloua curtipendula</i>)	MWD – ED	0.86 PLS lb/acre
Canada Wild Rye (<i>Elymus</i>)	SPD – ED	1.42 PLS lb/acre
Riverbank Wild Rye (<i>Elymus</i>)	VPD – WD	1.31 PLS lb/acre
Virginia Wild Rye (<i>Elymus</i>)	MWD – ED	2.04 PLS lb/acre

Native Legumes¹

Species	Soil Moisture Tolerance	Pollinator-Friendly	Monarch Value
Lead Plant (<i>Amorpha canescens</i>)	WD – ED	Yes	High
Prairie Clover, Purple (<i>Dalea purpurea</i>)	MWD – ED	Yes	High
Prairie Clover, White (<i>Dalea candida</i>)	MWD – ED	Yes	High

Native Forbs¹

Species	Soil Moisture Tolerance	Pollinator-Friendly	Monarch Value
Aster, New England (<i>Aster novae-angliae</i>)	VPD – WD	Yes	Very High
Aster, Sky Blue (<i>Aster azureus</i>)	MWD – ED	Yes	High
Bee Balm, Spotted (<i>Monarda punctata</i>)	MWD – ED	Yes	High
Bellflower, Tall (<i>Campanula Americana</i>)	SPD – WD	Yes	High
Bergamot, Wild (a.k.a. Bee Balm) (<i>Monarda fistulosa</i>)	SPD – WD	Yes	Very High
Black-eyed Susan (<i>Rudbeckia hirta</i>)	MWD – ED	Yes	High
Black-eyed Susan, Sweet (<i>Rudbeckia subtomentosa</i>)	VPD – MWD	Yes	High
Blazing Star, Button (<i>Liatris aspera</i>)	MWD – ED	Yes	Very High
Blazing Star, Dwarf (<i>Liatris cylindracea</i>)	MWD – ED	Yes	Very High
Blazing Star, Marsh (a.k.a. Gayfeather) (<i>Liatris spicata</i>)	VPD - WD	Yes	High
Blazing Star, Prairie (<i>Liatris pycnostachya</i>)	PD – MWD	Yes	High
Blazing Star, Savanna (<i>Liatris scariosa nieuwlantii</i>)	SPD – WD	Yes	High
Compass Plant (<i>Silphium laciniatum</i>)	SPD – WD	Yes	High
Coneflower, Pale Purple (<i>Echinacea pallida</i>)	MWD – ED	Yes	High
Coneflower, Purple (<i>Echinacea purpurea</i>)	MWD – ED	Yes	Very High
Coreopsis, Prairie (<i>Coreopsis palmata</i>)	MWD – ED	Yes	High
Coreopsis, Tall (<i>Coreopsis tripteris</i>)	SPD – ED	Yes	High
Culver's Root (<i>Veronicastrum virginicum</i>)	SPD – WD	Yes	High
Cup Plant (<i>Silphium perfoliatum</i>)	VPD – MWD	Yes	High
Dock, Prairie (<i>Silphium terebinthinaceum</i>)	SPD – ED	Yes	High
Goldenrod, Riddell's (<i>Solidago riddelli</i>)	VPD – ED	Yes	High
Goldenrod, Stiff (<i>Solidago rigida</i>)	SPD – ED	Yes	Very High
Goldenrod, Showy (<i>Solidago speciosa</i>)	MWD – ED	Yes	Very High
Hyssop, Yellow Giant (<i>Agastache nepetoides</i>)	SPD – WD	Yes	High
Ironweed, Smooth (<i>Vernonia fasciculata</i>)	PD – MWD	Yes	High
Joe Pye Weed, Spotted (<i>Eupatorium maculatum</i>)	VPD – SPD	Yes	Very High
Joe Pye Weed, Sweet (<i>Eupatorium purpureum</i>)	SPD – WD	Yes	High
Lobelia, Great Blue (<i>Lobelia siphilitica</i>)	VPD – MWD	Yes	High
Milkweed, Butterfly (a.k.a. Butterfly Weed) (<i>Asclepias tuberosa</i>)	MWD – ED	Yes	Very High
Milkweed, Common (<i>Asclepias syriaca</i>)	SPD – ED	Yes	Very High
Milkweed, Prairie (<i>Asclepias sullivantii</i>)	SPD – MWD	Yes	High
Milkweed, Purple (<i>Asclepias purpurascens</i>)	MWD – WD	Yes	High
Milkweed, Swamp (<i>Asclepias incarnata</i>)	VPD – SPD	Yes	Very High
Milkweed, Whorled (<i>Asclepias verticillata</i>)	MWD – ED	Yes	Very High
Obedient Plant (<i>Physostegia virginiana</i>)	PD – SPD	Yes	High
Rattlesnake Master (<i>Eryngium yuccifolium</i>)	MWD – ED	Yes	High
Rosinweed, Entire-Leaf (<i>Silphium integrifolium</i>)	SPD – ED	Yes	High
Sunflower, False (<i>Heliopsis helianthoides</i>)	SPD – ED	Yes	High
Sunflower, Sawtooth (<i>Helianthus grosseserratus</i>)	VPD – WD	Yes	Very High
Vervain, Blue (<i>Verbena hastata</i>)	VPD – SPD	Yes	High
Vervain, Hoary (<i>Verbena stricta</i>)	WD – ED	Yes	High

¹Additional species can be found using the [IN Natural Resources Conservation Service \(NRCS\) Seeding Tool](#).

(-) = not rated

327 SEEDING SPECIFICATIONS SHEET

Landowner:			County:		
Farm:	Tract:	Field(s):	Acres:	Date:	

SPECIES AND SEEDING RATES

All rates are in Pure Live Seed (PLS)

	Native Grasses	Rate lb/acre	Total = (Rate X Acres)		Native Grasses	Rate Lb./acre	Total = (Rate X Acres)	
<input type="checkbox"/>			Lb.	<input type="checkbox"/>			Lb.	
			Lb.				Lb.	
			Lb.				Lb.	
	Forbs & Legumes	Rate oz./acre	Total = (Rate X Acres)			Forbs & Legumes	Rate oz./acre	Total = (Rate X Acres)
	MILKWEED, COMMON		oz.					oz.
			oz.					oz.
			oz.					oz.
			oz.					oz.
			oz.					oz.
			oz.					oz.

NOTES:

SITE PREPARATION - BEFORE PLANTING IN YEAR:

<input type="checkbox"/> Herbicide (per label):	Dates:
<input type="checkbox"/> Herbicide (per label):	Dates:
<input type="checkbox"/> Herbicide (per label):	Dates:
<input type="checkbox"/> Tillage:	
<input type="checkbox"/> Prescribed Burning:	
<input type="checkbox"/> Temporary Seeding:	
<input type="checkbox"/> Other:	

NOTES:

PLANTING YEAR:

<input type="checkbox"/> Planting Method:	Date:
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If unforeseen circumstances prohibit planting by this date, please contact the local NRCS office as soon as possible.

ADDITIONAL INFORMATION

Wildlife species benefited: Monarch Butterfly;

Integrated Pest Management Strategies to be Implemented:

Helping People Help the Land.



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