

Monarch Habitat Guidance Document

420 MO-GD Monarch

Natural Resources Conservation Service (NRCS)
July 2020

Missouri Conservation Practice 420

Designing Monarch Butterfly Habitat

PLANTING SPECIFICATIONS:



Timing

Planting a wildflower mix containing milkweeds will provide habitat for larval monarchs as well as adult monarchs during migration. These seedings will be completed in late fall and winter to expose seed to cold, moist soil conditions necessary for seed germination. See the Missouri NRCS Native Forb Guidance Document (420 MO GD Native Forb) for details on planting dates.

Planting Depth and Methods

Proper planting depth for native forbs is approximately 2.5 times the seed thickness using a no-till drill. See the Missouri NRCS Native Forb Guidance Document (420 MO GD Native Forb) for details on planting depths and methods.

Seeding Rate

A minimum of 20 native flowering forb species with at least 3 species in each bloom period (spring, summer, and fall). In Monarch specific plantings, at least 60% of the total pure live seed PLS/ft² of at least 6 species must come from the Preferred Forbs for Monarchs list (Table 1). See the NRCS Missouri Wildlife and Pollinator Plantings Implementation Requirement (420 MO IR Planting) for specifications of the forb and grass mix. A minimum of 3 percent of the total mix by PLS/ft² will be comprised of milkweed seed. Milkweeds are the only larval food source for the monarch butterfly. Two thirds of this milkweed seed should be common milkweed (*Asclepias syriaca*). Common milkweed is native to this region, is readily established, and is one of the most widely available milkweed species. The remaining third of the milkweed seeds should be butterfly milkweed (*Asclepias tuberosa*), Whorled milkweed (*Asclepias verticillate*), or Spider milkweed (*Asclepias viridis*) on well drained upland soils or swamp milkweed (*Asclepias incarnata*) on richer, less well drained soils. Additional forbs and milkweed species may be used from Table 2, depending on availability, site conditions, and necessity to meet the requirements of the plantings listed above.

MANAGEMENT

See the Missouri NRCS Native Forb Guidance Document (420 MO GD Native Forb) for details on management of new plantings and existing monarch habitat. Monarch habitat may be managed by one or a combination of the following methods: *Prescribed Fire*, *Mechanical Disturbance*, or *Herbicide Application*.

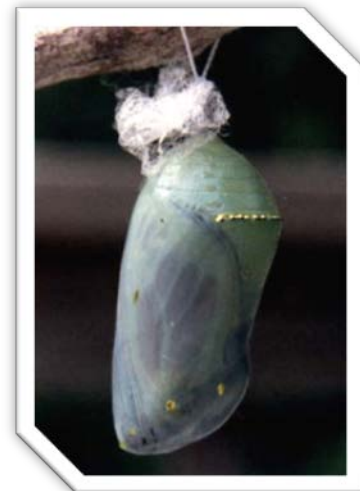
Recommended frequency of management for all methods:

Management actions shall occur prior to arrival of most of the migrating monarchs (*March 15*) or after most adults begin the fall migration (November 1) when most monarchs have departed from the upper Midwest states for their fall migration.

Managing the entire patch at once can severely impact monarchs as this will remove all available habitat for a period of time. Therefore, where feasible, management activities should not occur on more than 1/3 of the monarch habitat each year over a 3 year period.

Prescribed Burning

Monarch habitat may be managed through periodic burning. Prescribed burns can allow germination of seed bearing annuals, increase plant species diversity, control unwanted woody vegetation, and open up the stand for native pollinator nest sites.





Recommended Timing

Spring burns should be avoided after March 15 to minimize disturbance to monarch larvae or eggs present on site. Early or late in the day is preferred. Fall (after November 1) burns favor monarch and pollinator habitat. See NRCS Practice Standard 338 – Prescribed Burning for additional recommendations.

Mechanical Disturbance includes mowing or light disking.

Recommended Timing

Mowing or light disking should occur prior to March 15 or after November 1 when nectaring flowers have died back or are dormant. Disturbance at this time will also minimize disruption to nesting bumble bees and other beneficial insects.

Recommendations applicable to both methods:

- Reduce speed to 8 mph or less to allow wildlife time to escape.
- Use a flushing bar where possible to move wildlife out of the path of machinery.
- Avoid disturbance at night when nesting and roosting birds are less likely to flush.

1. Light Disking/Harrowing

Light disking or harrowing (4 to 6 inches deep) of existing stands can increase the amount of open ground and encourage a diverse plant community of annuals and perennials including common milkweed.

2. Mowing

Mowing should be done in conjunction with another management practice such as burning, disking, or spraying and not as a stand-alone practice.

Use a rotary or flail mower to evenly distribute grass clippings. Do not swath, as the windrows will smother seeding. Clippings should be baled and removed to accommodate forb germination. Mow no lower than 8-12 inches to minimize mortality and leave adequate residual cover.

Herbicide Application

Use approved herbicides as necessary to control noxious weeds and undesirable plants during the establishment period. A grass selective herbicide treatment may be needed to deter encroachment of non-native cool-season grasses. Avoid using broad spectrum herbicides.



MONITORING

Monitor your planting after management actions are completed to determine whether the planting is maximizing benefits for monarchs. The “Monarch Breeding Habitat Assessment Tool” (https://monarchjointventure.org/images/uploads/documents/habitat_assessment_tool_final_test.pdf) developed by the University of Minnesota Monarch Lab in partnership with the Monarch Joint Venture, is an excellent tool for assessing the results of post-establishment management actions.

For additional information go to monarch watch (<https://monarchwatch.org>) and Journey North (<https://journeynorth.org/>). Native milkweed plants are an essential feature of monarch breeding habitat. Estimate the abundance and diversity of milkweeds on site. Five hundred or more milkweed stems per acre (in widely dispersed clumps) comprised of 3 or more species are considered good monarch habitat, however more stems support more monarchs. The planting should also continue to support a variety of nectar plants that bloom throughout the growing season.

Contact your local Natural Resources Conservation Service or Missouri Department of Conservation office for recommendations on managing or upgrading existing cover.

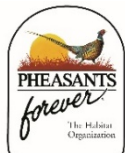




TABLE 1 – APPROVED FORBS FOR MONARCHS - species selection will only be made from appropriate habitat type based on planting site evaluation.

Common Name	Scientific Name	Habitat Type*	Flowering Information**	Monarch Value***
Leadplant	<i>Amorpha canescens</i>	S, DP, MP, G	1,2 – LS – Su, showy	H
Purple Milkweed	<i>Asclepias purpurascens</i>	S, DP, MP, G	1,2 – LS – MSu, showy	H
Sand Milkweed	<i>Asclepias amplexicaulis</i>	DP, MP, G	1,2 – Sp, Su	H
Tall Green Milkweed	<i>Asclepias hirtella</i>	S, DP, MP, WP, G	2 – Su	H
Swamp Milkweed	<i>Asclepias incarnata</i>	WP, MP	3 – F, showy	VH
Showy Milkweed	<i>Asclepias speciosa</i>	DP, WP	1,2,3 – LS - LSu	H
Smooth Milkweed	<i>Asclepias sullivantii</i>	MP, WP	2 - Su	H
Common Milkweed	<i>Asclepias syriaca</i>	S, DP, MP, WP, G	1,2 – LS – LSu	VH
Butterfly Milkweed	<i>Asclepias tuberosa</i>	S, DP, MP, G	1,2 – LS – Su, showy	VH
Whorled Milkweed	<i>Asclepias verticillata</i>	S, DP, MP, WP, G	1,2,3 – LSu – EF	VH
Green Milkweed	<i>Asclepias viridiflora</i>	S, DP, MP, G	2,3 - MSu - F	H
Spider Milkweed	<i>Asclepias viridis</i>	DP, MP, G	1,2 – LS – ESu	VH
Tickseed Sunflower (A/B)	<i>Bidens aristosa</i>	MP, WP	2 – MSu – LSu	VH
Ohio Horsemint	<i>Blephilia ciliata</i>	S, WP	1,2 – LS – LSu	H
Lanceleaf Coreopsis	<i>Coreopsis lanceolata</i>	DP, MP, G	1,2 – LS – MSu, showy	H
Finger Coreopsis	<i>Coreopsis palmata</i>	S, DP, MP, G	1,2 – LS – MSu, showy	H
Tickseed Coreopsis	<i>Coreopsis tripteris</i>	S, DP, MP, WP, G	1,2 – LS – MSu	H
White Prairie Clover	<i>Dalea candida</i>	S, DP, MP, G	1,2 – LS – Su, showy	H
Purple Prairie Clover	<i>Dalea purpurea</i>	S, DP, MP	1,2 – LS – Su, showy	H
Purple Coneflower	<i>Echinacea purpurea</i>	S, MP, WP, G	1,2,3, – LS – F, showy	VH
Pale Purple Coneflower	<i>Echinacea pallida</i>	S, DP, MP, G	1,2 – LS – MSu, showy	H
Rattlesnake Master	<i>Eryngium yuccifolium</i>	S, DP, MP, G	2 – Su	H
Common Boneset	<i>Eupatorium perfoliatum</i>	WP	2,3 – MSu – F	H
Sawtooth Sunflower	<i>Helianthus grosseserratus</i>	MP, WP, G	2,3 – MSu – F, showy	VH
Maximilian Sunflower ¹	<i>Helianthus maximiliani</i>	S, DP, MP, G	2,3 – MSu – MF	H
Ashy Sunflower	<i>Helianthus mollis</i>	DP, MP, G	2,3 – MSu – F, showy	H
Western Sunflower	<i>Helianthus occidentalis</i>	DP, MP, G	2,3 – MSu – F, showy	H
Stiff Sunflower ¹	<i>Helianthus pauciflorus</i>	DP, MP, G	2,3 – LSu – F, showy	H
Paleleaf Woodland Sunflower	<i>Helianthus strumosus</i>	S, MP	2,3 – MSu – F	H
False/Oxeye Sunflower	<i>Heliopsis helianthoides</i>	S, DP, MP, G	1,2,3, – LS – F, showy	VH
Rough Blazing Star	<i>Liatris aspera</i>	S, DP, G	2,3 – MSu – F, showy	VH
Prairie Blazing Star	<i>Liatris pycnostachya</i>	DP, MP, WP, G	2,3 – MSu – F, showy	VH
Eastern Blazing Star	<i>Liatris scariosa</i>	S, DP, MP, G	2,3 – LSu – EF	VH
Cardinal Flower	<i>Lobelia cardinalis</i>	WP	2,3 – MSu – EF, showy	H
Blue Lobelia	<i>Lobelia siphilitica</i>	WP	2,3 – MSu – F, showy	H
Wild Bergamot	<i>Monarda fistulosa</i>	S, DP, MP, WP, G	2,3 – LSu – EF, showy	H
Riddell's Goldenrod	<i>Oligoneuron riddellii</i>	WP	2,3 – LSu – F, showy	H
Obedient Plant	<i>Physostegia virginiana</i>	S, MP, WP, G	2,3 – MSu – EF, showy	H
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>	S, DP, MP, WP, G	1,2 – LS – Su	H
Virginia Mountain Mint	<i>Pycnanthemum virginianum</i>	WP	2 – Su	H
Black-eyed Susan (B)	<i>Rudbeckia hirta</i>	S, DP, MP, G	2,3, – LS – F, showy	H
Sweet Black-eyed Susan	<i>Rudbeckia subtomentosa</i>	MP, WP	2 – Su, showy	H
Brown-eyed Susan (B)	<i>Rudbeckia triloba</i>	S, WP	2,3 – Su – F, showy	H
Pitcher Sage	<i>Salvia azurea</i>	DP, MP, G	2,3 – Su – F, showy	H



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Rosinweed	<i>Silphium integrifolium</i>	S, DP, MP, WP, G	2,3 – Su – F, showy	H
Compass Plant	<i>Silphium laciniatum</i>	DP, MP, WP, G	1,2 – LS – Su, showy	H
Cup Plant	<i>Silphium perfoliatum</i>	MP, WP	2,3 – Su – F, showy	H
Prairie Dock	<i>Silphium terebinthinaceum</i>	S, DP, MP, WP, G	2,3 – Su – F	H
Gray Goldenrod	<i>Solidago nemoralis</i>	S, DP, MP, G	2,3 – LSu – F	H
Stiff Goldenrod	<i>Solidago rigidum</i>	S, DP, MP, G	2,3 – LSu – F, showy	VH
Showy Goldenrod	<i>Solidago speciosa</i>	S, DP, MP	2,3 – LSu – EF, showy	VH
Smooth Aster	<i>Symphyotrichum laeve</i>	S	2 – LSu – F, showy	H
New England Aster	<i>Symphyotrichum novae-angliae</i>	MP, WP	2 – LSu – F, showy	VH
Aromatic Aster	<i>Symphyotrichum oblongifolium</i>	DP, MP, G	2 – LSu – F, showy	VH
Skyblue Aster	<i>Symphyotrichum oolentangiense</i>	S, DP, MP	2 – LSu – F, showy	H
Willowleaf Aster	<i>Symphyotrichum praealtum</i>	WP	2,3 – LSu – F	H
Silky Aster	<i>Symphyotrichum sericeum</i>	DP, G	2 – LSu – F, showy	H
Blue Vervain	<i>Verbena hastata</i>	WP	2,3 – ESu – MF	H
Hoary Vervain	<i>Verbena stricta</i>	S, DP, MP, G	1,2,3, – LSu – EF	H
Yellow Ironweed	<i>Verbesina alternifolia</i>	BF, WP	2,3 – LSu – MF	H
Wingstem Sunflower	<i>Verbesina helianthoides</i>	S, DP, MP, G	2,3 – LS – Su	H
White Crownbeard	<i>Verbesina virginica</i>	S, BF	2,3 – LSu – MF	H
Tall Ironweed	<i>Vernonia gigantea</i>	S (wet), MP, WP	2,3 – MSu – EF	H
Missouri Ironweed	<i>Vernonia missurica</i>	MP, WP	2,3 – MSu – F	H
Culver's Root	<i>Veronicastrum virginicum</i>	S, MP, WP	2 – Su, showy	H

* **S = Oak Savanna, DP = Dry Prairie, MP = Mesic Prairie, WP = Wet Prairie, G = Glade B = Biennial**

****Blooming dates: In general, Sp = Spring (1) = April/May; LS = May; Su = Summer (2) = June—August; ESu = June; MSu = July; LSu = August; F = Fall (3) = September—early November; EF = September; MF = October; LF = late October—early November**

*****Monarch Value: H = High Value; VH = Very High Value**

¹**Maximilian sunflower (*Helianthus maximiliani*) and Stiff Sunflower (*Helianthus pauciflorus*) can be used at a rate of less than 0.1 seeds per square foot. Prairie Gold Maximilian sunflower cultivar (*Helianthus maximiliani* Schrad) can also be used at this reduced rate.**



TABLE 2 – AVAILABLE FORBS - species selection will only be made for the appropriate habitat type based on a planting site evaluation.

<u>Common Name</u>	<u>Scientific Name</u>	<u>Habitat Type</u> *	<u>Flower Information</u> **	<u>General Information</u> ***	Conservatism Ranking (c value) (C)	Pretreatment to Germinate seed (E)
Alumroot	<i>Heuchera richardsonii</i>	DP, MP, G	1,2 - Sp - Su	Calyx is mainly green, may have cream colored tips.	6	CM or CD Light
Anemone, Meadow	<i>Anemone canadensis</i>	WP	1 - LS – Su, showy		6	CM
Aster, Aromatic	<i>Symphyotrichum oblongifolium</i>	DP, MP, G	2 - LSu – F, showy	POL, very high value for monarchs, Fragrant, prefers drier sites.	6	CD
Aster, New England	<i>Symphyotrichum novae-angliae</i>	MP, WP	2 - LSu – F, showy	POL, very high value for monarchs, Prefers wetter sites, leaves clasp the stem.	4	CM
Aster, Purple daisy	<i>Symphyotrichum patens</i>	S, DP, MP, G	2 - LSu - F	POL	5	CM
Aster, Silky	<i>Symphyotrichum sericeum</i>	DP, G	2 - LSu – F, showy	POL, high value for monarchs	9	CM
Aster, Skyblue	<i>Symphyotrichum oolentangiense</i>	S, DP MP	2 - LSu – F, showy	POL, high value for monarchs	7	CD
Aster, Smooth	<i>Symphyotrichum laeve</i>	S, DP, MP	2 - LSu – F, showy	POL, high value for monarchs	7	CD
Aster, Southern Swamp	<i>Eurybia hemispherica</i>	DP, S, MP	2,3 – LSu - EF		6	CM
Aster, White upland	<i>Solidago ptarmicoides</i>	S, MP, DP, G	2,3 – LSu - EF			CM
Aster, Willowleaf	<i>Symphyotrichum praealtum</i>	WP	2,3 - LSu – F	POL, high value for monarchs, Pale lavender color, likes moist areas	6	CM
Barbara’s Button	<i>Marshallia caespitosa</i>	DP, MP, WP	1 - LS - ESu	Foliage green through winter.	9	



Bean, Slickseed Wild	<i>Strophostyles leiosperma</i>	DP, MP, S	2,3 – ESu - MF		2	IN
Beardtongue, Foxglove	<i>Penstemon digitalis</i>	DP, MP, WP, G	1 - LS – MSu, showy	POL	3	CM -30 days
Beardtongue, Prairie	<i>Penstemon tubaeiflorus</i>	S, DP, MP	1 - LS – MSu, showy	POL	6	CM -30 days
Beardtongue, Purple	<i>Penstemon cobaea</i>	S, DP, G	1,2 - LS – ESu, showy	POL	10	CM -30 days
Beggar's Lice	<i>Desmodium canescens</i>	S, DP, MP, G	1,2 - LS – Su, showy	Legume, food	5	CD, SC, IN
Beggartick (A)	<i>Bidens frondosa</i>	WP	2 - Su, showy	Food,	2	CM
Bergamot, Savanna	<i>Monarda bradburiana</i>	S, DP, G	2,3 - LS – EF, showy	POL, mint	5	CD
Bergamot, Wild	<i>Monarda fistulosa</i>	S, DP, MP, WP, G	2,3 - LS – EF, showy	POL, high value for monarchs, mint	4	CD
Black-eyed Susan (B)	<i>Rudbeckia hirta</i>	S, DP, MP, G	2,3 - LS – F, showy	POL, high value for monarchs, Food	1	CM or CD
Black-eyed Susan, Missouri	<i>Rudbeckia missouriensis</i>	DP, G	2,3 - ESu – F, showy	Food, blooms for a long period.	6	CM or CD
Black-eyed Susan, Sweet	<i>Rudbeckia subtomentosa</i>	MP, WP	2 - Su, showy	POL, high value for monarchs, Food	5	CM or CD
Blazing Star, Eastern	<i>Liatris scariosa</i>	S, DP, MP, G	2,3 LSu-EF	POL, very high value for monarchs, blooms during monarch migration.	9	CM
Blazing Star, Glade	<i>Liatris mucronata</i>	S, DP, G	2,3 - MSu – F, showy	POL, blooms during monarch migration.	10	CM
Blazing Star, Prairie	<i>Liatris pycnostachya</i>	DP, MP, WP, G	2,3 - MSu – F, showy	POL, very high value for monarchs, blooms during monarch migration.	6	CM
Blazing Star, Rough	<i>Liatris aspera</i>	S, DP, G	2,3 - MSu – F, showy	POL, very high value for monarchs, blooms during monarch migration.	6	CM
Blazing Star, Scaly	<i>Liatris squarrosa</i>	S, DP	2,3 - MSu – EF, showy	POL, blooms during monarch migration.	6	CM



Blazingstar, Squarrulosa	<i>Liatris squarrulosa</i>	S, DP, MP, G	2,3 MSu – EF, showy	POL, blooms during monarch migration.	8	CM
Blue Lobelia	<i>Lobelia siphilitica</i>	WP	2,3 MSu – F, showy	POL, high value for monarchs	4	CM Light
Boneset, Common	<i>Eupatorium perfoliatum</i>	WP	2,3 - MSu - F	POL, high value for monarchs	3	CM, CD- Light
Brown-eyed Susan (B)	<i>Rudbeckia triloba</i>	S, WP	2,3 - Su – F, showy	POL, high value for monarchs, Food	3	CM or CD
Bunchflower, Virginia	<i>Melanthium virginicum</i>	MP, WP, S (Wet)	2 – ESu - LSu		9	CM
Cardinal Flower	<i>Lobelia cardinalis</i>	WP	2,3 - MSu – EF, vivid red, showy	POL, high value for monarchs	6	CM Light
Catchfly, Royal	<i>Silene regia</i>	S, DP, MP	1,2,3 - LS – F, showy	Blooms for a long period. Flowers 2 nd year.	9	CM
Clover, Purple Prairie	<i>Dalea purpurea</i>	S, DP, MP, G	1,2 - LS – Su, showy	POL, high value for monarchs, legume	8	SC, CD, IN
Clover, White Prairie	<i>Dalea candida</i>	S, DP, MP, G	1,2 - LS – Su, showy	POL, high value for monarchs, legume	8	SC, CD, IN
Compass Plant	<i>Silphium laciniatum</i>	DP, MP, WP, G	1,2 - LS – Su, showy	POL, high value for monarchs, food	6	CM
Coneflower, Glade Purple	<i>Echinacea simulata</i>	S, DP, MP, G	1,2 - LS – MSu, showy	POL	7	CM
Coneflower, Gray-headed	<i>Ratibida pinnata</i>	S, DP, MP, G	1,2,3 - LS – F, showy	POL, food, robust perennial. Extensive root system reduces erosion.	4	CM or CD
Coneflower, Pale Purple	<i>Echinacea pallida</i>	S, DP, MP, G	1,2 - LS – MSu, showy	POL, high value for monarchs	7	CM, Light



Coneflower, Purple	<i>Echinacea purpurea</i>	S, MP, WP,	1,2,3 - LS – F, showy	POL, very high value for monarchs, prolific bloomer, flowers over a long period.	5	CM, CD, Light
Coneflower, Upright Prairie	<i>Ratibida columnifera</i>	DP, MP, G	1,2,3 - LS – EF, showy	Ray flowers sometimes marked with dark red. Weak perennial on good soil.		CM or CD
Coneflower, Yellow	<i>Echinacea paradoxa</i>	S, DP, G	1,2 - LS – ESu, showy	POL	9	CM
Coreopsis, Finger	<i>Coreopsis palmata</i>	S, DP, MP, G	1,2 - LS – MSu, showy	POL, high value for monarchs, Food	7	CM
Coreopsis, Lanceleaf	<i>Coreopsis lanceolata</i>	DP, MP, G	1,2 - LS – MSu, showy	POL, high value for monarchs, food	5	CM
Coreopsis, Plains (A)	<i>Coreopsis tinctoria</i>	DP, G	1,2 - Sp – ESu, showy	Food	1	CM
Coreopsis, Tickseed	<i>Coreopsis tripteris</i>	S, DP, MP, WP, G	1,2 - LS – MSu	POL, high value for monarchs, Food	6	CM
Coreopsis, Bigflower	<i>Coreopsis grandiflora</i>	DP, MP	1,2 - LS – MSu, showy	Food	6	CM
Culver's Root	<i>Veronicastrum virginicum</i>	S, MP, WP	2 - Su, showy	POL, high value for monarchs, Whorled leaves.	7	CD and Light
Cup Plant	<i>Silphium perfoliatum</i>	MP, WP	2,3 - Su – F, showy	POL, high value for monarchs	3	CM
Flag, Blue	<i>Iris virginica shrevei</i>	WP	1,2 - LS – MSu, showy	Forms large colonies	6	CM
Flag, Copper	<i>Iris fulva</i>	MP, WP	1 - Sp, showy		9	
Flax, Stiff Yellow	<i>Linum medium</i>	DP, MP	1,2 – LS - LSu		5	CM
Foxglove, Beach False	<i>Agalinis fasciculata</i>	DP, MP	2,3 – MSu - EF		7	CM, Light
Germander, American	<i>Teucrium canadense</i>	S, DP, MP, WP	2,3 - ESu – EF		2	CM
Goat's rue	<i>Tephrosia virginiana</i>	S, DP, MP, G	1,2 - LS – MSu, showy	Legume, may have pink/cream flowers.	5	SC, CM, IN -10 days



Golden Alexanders	<i>Zizia aurea</i>	S, DP, MP, WP, G	1,2 - LS - ESu	Blooms for a long period in the spring.	5	CM-120 days
Goldenrod, Gray	<i>Solidago nemoralis</i>	S, DP, MP, G	2,3 - LSu - F	POL, high value for monarchs	2	CM, Light
Goldenrod, Riddell's	<i>Oligoneuron riddellii</i>	WP	2,3 - LSu - F, showy	POL, high value for monarchs	10	CM, Light
Goldenrod, Savanna	<i>Solidago petiolaris</i>	S, DP, G	2,3 - LSu - F, showy	POL, likes partial shade	8	CM
Goldenrod, Showy	<i>Solidago speciosa</i>	S, DP, MP	2,3 - LSu - EF, showy	POL, very high value for monarchs	7	CM, Light
Goldenrod, Stiff	<i>Oligoneuron rigidum, Solidago rigida</i>	S, DP, MP, G	2,3 - LSu - F, showy	POL, very high value for monarchs	5	CM
Hyacinth, Prairie	<i>Camassia angusta</i>	MP, WP	1,2 - Sp - ESu, showy	Plant dormant by early summer.	10	CM
Hyacinth, Wild	<i>Camassia scilloides</i>	S, DP, MP, G	1,2 - Sp - ESu		6	CM
Illinois Bundleflower	<i>Desmanthus illinoensis</i>	MP, WP, G	1,2 - LS - MSu	Legume	3	CD, SC, IN
Indian paintbrush (A)	<i>Castilleja coccinea</i>	DP, MP, WP, G	1,2 - Sp - Su, showy	Can be summer seeding on poor sites with established grass	7	CM
Indigo, Blue Wild	<i>Baptisia australis</i>	S, DP, MP, WP, G	1,2 - Sp - ESu, showy	POL, legume	8	SC, IN, CM
Indigo, Cream Wild	<i>Baptisia bracteata</i>	S, DP, MP, G	1 - Sp - LS, showy	POL, legume	7	SC, IN, CM
Indigo, White Wild	<i>Baptisia alba</i>	S, DP, MP, WP, G	1,2 - LS - MSu, showy	POL, legume	6	SC, IN, CM
Ironweed, Missouri	<i>Vernonia missurica</i>	MP, WP	2,3 - MSu - F	POL, high value for monarchs	5	CM, or CD
Ironweed, Tall	<i>Vernonia gigantea</i>	S (Wet), MP, WP	2,3 - MSu - EF	POL, high value for monarchs	6	CM, or CD
Ironweed, Yellow	<i>Verbesina alternifolia</i>	BF, WP	2,3 - LSu - MF	POL, high value for monarchs	4	CM
Leadplant	<i>Amorpha canescens</i>	S, DP, MP, G	1,2 - LS - Su, showy	POL, legume, somewhat woody, high value for monarchs	8	CM, IN



Lespedeza, Hairy	<i>Lespedeza hirta</i>	S, DP, MP, G	2,3 - LSu - F	Legume, food	7	SC, IN, CM
Lespedeza, Roundhead	<i>Lespedeza capitata</i>	S, DP, MP, G	2,3 - MSu - F	Legume, food, bloom may be greenish/cream colored	6	SC, IN, CM
Lespedeza, Slender	<i>Lespedeza virginica</i>	S, DP, MP, G	1,2,3 - LS - EF	Legume, food	5	SC, IN, CM
Lespedeza, Trailing	<i>Lespedeza procumbens</i>	DP, G	2,3 - LSu - MF		4	SC, IN, CM
Lespedeza, Violet	<i>Lespedeza violacea</i>	S	2,3 - MSu - MF		6	SC, IN, CM
Longflower Beeblossom (A/B)	<i>Gaura longiflora, Oenothera filiformis</i>	DP, MP, WP, S	2,3 - MSu - EF		1	CM
Lousewort / Wood Betony	<i>Pedicularis canadensis</i>	S, DP, MP, G	1 - LS		5	CM- 30 days
Milkvetch, Canada	<i>Astragalus Canadensis</i>	MP	1, 2 - LS - Lsu		6	CM - 10 days
Milkweed, Butterfly	<i>Asclepias tuberosa</i>	S, DP, MP, G	1,2 - LS - Su, showy	POL, very high value for monarchs	5	CM, CD
Milkweed, Common	<i>Asclepias syriaca</i>	S, DP, MP, WP, G	1,2 - LS - LSu	POL, milky sap, very high value for Monarchs.	0	CM
Milkweed, Green	<i>Asclepias viridiflora</i>	S, DP, MP, G	2,3 - MS - F	POL, high value for monarchs	7	CM
Milkweed, Purple	<i>Asclepias purpurascens</i>	S, DP, MP, G	1,2 - LS -MSu, showy	POL, milky sap, high importance for monarchs	6	CM, CD
Milkweed, Sand	<i>Asclepias amplexicaulis</i>	DP, MP, G	1, 2 - S - Su	POL, high value for monarchs	7	CM
Milkweed, Showy	<i>Asclepias speciose</i>	DP, MP	1, 2, 3 - LS - LSu	POL, high value for monarchs		
Milkweed, Smooth	<i>Asclepias sullivantii</i>	MP, WP	2 - Su	POL, high value for monarchs	8	CM, CD
Milkweed, Spider	<i>Asclepias viridis</i>	DP, MP, G	1,2 - LS - ESu	POL, very high importance for monarchs	5	CM



Milkweed, Swamp	<i>Asclepias incarnata</i>	MP, WP	3 - F, showy	POL, milky sap, very high value for monarchs	4	CM
Milkweed, Tall Green	<i>Asclepias hirtella</i>	S, DP, MP, WP, G	2 - Su	POL, high value for monarchs	4	CM, CD
Milkweed, Whorled	<i>Asclepias verticillata</i>	S, DP, MP, WP, G	1,2,3 - LS - EF	POL, very high value for monarchs	2	CM, CD
Mint, Ohio Horse	<i>Blephilia ciliata</i>	S, WP	1,2 - LS - LSu	POL, high value for monarchs	6	CM, Light
Mountain Mint, Hairy	<i>Pycnanthemum pilosum</i>	S, DP, MP, WP, G	MSu-F	POL, mint	5	CM
Mountain Mint, Slender	<i>Pycnanthemum tenuifolium</i>	S, DP, MP, WP, G	1,2 - LS - Su	POL, high value for monarchs, Mint, spreads slowly	4	CD, Light
Mountain Mint, Virginia	<i>Pycnanthemum virginianum</i>	WP	2 - Su	POL, high value for monarchs, mint	6	CD, Light
New Jersey Tea	<i>Ceanothus americanus</i>	S, DP, MP, G	1,2,3 - LS - F, showy	POL, Somewhat woody.	7	SC, CM
Obedient Plant	<i>Physostegia virginiana</i>	S, MP, WP, G	2,3 - MSu - EF, showy	POL, high value for monarchs, Mint, spreads slowly	7	CM
Obedient Plant, Early	<i>Physostegia angustifolia</i>	S, DP, MP	2,3 - LSu - EF		6	
Pea, Partridge (A)	<i>Chamaecrista fasciculata</i>	S, DP, MP, G	2,3 - Su - F, showy	POL, legume, food	2	SC, IN, CM
Pea, Sensitive (A)	<i>Chamaecrista nictitans</i>	S	2,3 - MSu - EF		2	SC, IN, CM
Petunia, Wild	<i>Ruellia humilis</i>	DP, MP, G	1,2,3 - LS - EF	Short		CM
Poppymallow, Fringed	<i>Callirhoe digitata</i>	DP, MP	1,2 - MS - LSu, showy	Spindly plant, slender, leafless stems.	4	CM
Poppymallow, Purple	<i>Callirhoe involucrata</i>	DP, G	1,2 - MS - MSu, showy		5	CM
Prairie Blue-eyed Grass	<i>Sisyrinchium campestre</i>	DP	1,2 - LS - ESu	Resembles grass	5	CM
Prairie Cinquefoil	<i>Drymocallis arguta</i>	DP, MP, G	1,2 - LS - Su		10	CM



Prairie Dock	<i>Silphium terebinthinaceum</i>	S, DP, MP, WP, G	2,3 - Su - F	POL, high value for monarchs	5	CM
Prairie Parsley	<i>Polytaenia nuttallii</i>	DP, MP, WP	1,2 - LS - ESu		10	CM
Primrose, Common Evening (B)	<i>Oenothera biennis</i>	MP	2,3 - ESu - MF		0	Light
Primrose, Missouri Evening	<i>Oenothera missouriensis</i>	DP, G	1,2 - LS - MSu, showy	POL	7	CD
Quinine, Wild	<i>Parthenium integrifolium</i>	S, DP, MP, G	1,2 - LS - Su		6	CM
Rattlebox (A)	<i>Crotalaria sagittalis</i>	DP, G	1,2,3 - LS - EF		5	CD, IN
Rattlesnake Master	<i>Eryngium yuccifolium</i>	S, DP, MP, G	2 - Su	POL, high value for monarchs, unique plant	8	CM
Rose, Pasture	<i>Rosa carolina</i>	DP, MP, S	1 - LS		4	SC/CM
Rose, Prairie	<i>Rosa setigera</i>	MP	1 - Sp, showy	POL, food	4	SC/CM
Rosinweed	<i>Silphium integrifolium</i>	S, DP, MP, WP, G	2,3 - Su - F, showy	POL, high value for monarchs, food	4	CM
Sage, Pitcher	<i>Salvia azurea</i>	DP, MP, G	2,3 - Su - F, showy	POL, high value for monarchs	4	CD
Scurf Pea, Gray	<i>Pedimelum tenuiflorum</i>	DP, MP, WP, G	1,2 - LS - MSu	Legume, food	8	SC/CM 10 days
Seedbox	<i>Ludwigia alternifolia</i>	WP	2 - ESu - LSu		4	CM
Senna, Maryland	<i>Senna marilandica</i>	S, MP, WP	2 - MSu - LSu	POL, legume, food	4	SC, IN, CM
Sensitive Brier	<i>Mimosa quadrivalvis var nuttalli</i>	S, DP, MP, G	1,2 - LS - Su, showy	Legume	6	CM-30 days, SC, IN
Shooting Star	<i>Primula meadia</i>	S, DP, G	1 - LS, showy	Plant goes dormant by July 1 st .	7	CM 30 days, Light
Skullcap, Downy	<i>Scutellaria incana</i>	S (S. MO), MP	2,3 - MSu - EF		5	CM
Snakeroot, Sampson's	<i>Orbexilum pedunculatum</i>	S, MP, WP	1,2 - LS - MSu	Legume	6	CM-10 days, SC, IN
Spanish Needles (A)	<i>Palafoxia callosa</i>	S, DP, G	2,3 - LSu - F, showy	Tolerates mowing/pruning.	5	CD, Light



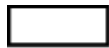
Spiderwort, Ohio	<i>Tradescantia ohiensis</i>	S, DP, MP, WP	1,2,3 - LS - F, showy	POL	3	CM
Spiny-toothed Gumweed (B)	<i>Grindelia lanceolata</i>	S, DP, MP, G	2,3 - Su - F		3	CM, Light
Spurge, Flowering	<i>Euphorbia corollata</i>	S, DP, MP, G	1,2,3 - LS - F	Milky sap	3	CM
Sunflower, Ashy	<i>Helianthus mollis</i>	DP, MP, G	2,3 - MSu - F, showy	POL, high value for monarchs, food	6	CM, CD
Sunflower, False	<i>Heliopsis helianthoides</i>	S, DP, MP, G	1,2,3 - LS - F, showy	POL, very high value for monarchs, Food, blooms over a long period.	5	CM or CD
Sunflower, Maximillian ¹	<i>Helianthus maximiliani</i>	S, DP, MP, G	2,3 - MSu - MF	POL, high value for monarchs, food	5	CM, CD
Sunflower, Paleleaf Woodland	<i>Helianthus strumosus</i>	S, MP	2,3 - MSu - F	POL, high value for monarchs, food	7	CM
Sunflower, Sawtooth	<i>Helianthus grosseserratus</i>	, MP, WP, G	2,3 - MSu - F, showy	POL, very high value for monarchs, food	4	CM, CD
Sunflower, Stiff ¹	<i>Helianthus pauciflorus</i>	DP, MP, G	2,3 - LSu - F	POL, high value for monarchs, food	5	
Sunflower, Tickseed (A/B)	<i>Bidens aristosa</i>	MP, WP	2 - MSu - LSu	POL, very high value for monarchs	1	CM, Light
Sunflower, Western	<i>Helianthus occidentalis</i>	DP, MP, G	2,3 - MSu - F, showy	POL, high value for monarchs, food, good wildlife structure.	5	CM, CD
Sunflower, Willow-leaved	<i>Helianthus salicifolius</i>	WP, MP, DP	3 - EF - MF		8	CD
Sunflower, Wingstem	<i>Verbesina helianthoides</i>	S, DP, MP, G	2,3 - LS - Su	POL, high value for monarchs	5	CM, CD
Ticktrefoil, Showy	<i>Desmodium canadense</i>	S, DP, MP, WP, G	2 - MSu - LSu, showy	Legume, food	4	CD, SC, IN
Verbena, Rose	<i>Glandularia canadensis</i>	S, DP, G	1,2 - LS - LSu		5	CM or CD
Vervain, Blue	<i>Verbena hastata</i>	WP	2,3 - ESu - MF	POL, high value for monarchs	4	CM, CD, Light

Vervain, Hoary	<i>Verbena stricta</i>	S, DP, MP, G	1,2,3 – LS - EF	POL, high value for monarchs	2	CM, CD, Light
White Crownbeard	<i>Verbesina virginica</i>	S, BF	2,3 – LSU - MF	POL, high value for monarchs	5	CM
Yarrow	<i>Achillea millefolium</i>	DP, MP	1,2,3 – LS – F		1	Light

Under the "Common Name" column, A= Annual B= Biennial, otherwise the plant is perennial.

*S = Oak Savanna, DP= Dry Prairie, MP= Mesic Prairie, WP= Wet Prairie, G= Glade, BF= Bottomland Forest

**Blooming dates: In general, SP= Spring (1)= April/May; LS= May; Su=Summer(2) = June-August; ESu = June; MSu=July; LSU= August, F= Fall (3)=September-early November; EF= September; MF= October; LF=late October-early November



White Flowers

blue/purple flowers

green flowers

red/orange flowers

yellow flowers

pink/violet flowers

***POL - Important pollinators, native for food = important for wildlife

¹Maximilian sunflower (*Helianthus maximiliani*) and Stiff Sunflower (*Helianthus pauciflorus*) can be used at a rate of less than 0.1 seeds per square foot. Prairie Gold Maximilian sunflower cultivar (*Helianthus maximiliani* Schrad) can also be used at this reduced rate.

Conservation Ranking (C value)²: A conservatism ranking (C value) is an integer between 0 and 10 reflecting the degree of obligate dependence of a taxon on intact natural habitats with direct composition, site conditions, and process regime linkage to the immediate pre-Euro settlement period. For each taxon, coefficients are assigned based on observed ecological performance, derived from collective extended field experience and observations in the contemporary landscape. Factors influencing C value include disturbance tolerance, habitat affinities, and degree of dependence on intact native vegetation assemblages and their associated site conditions and process regimes. Conservatism embodies 2 interrelated tenants: (1) organisms differ in their tolerance of the response to disturbance, and (2) organisms display varying degrees of fidelity to intact habitats, process regimes, and site continuity. **It is very important to select species with varied C values for a mixture, especially depending on the length of the site’s conservation practice planned.**

0-3: These native plants are adapted to disturbance and the post-Euro settlement environment. Early successional plants are an important component to their community displaying high opportunistic potential for occupancy of disturbed sites as they will readily establish a new site as they will readily establish a new site and will compete with early invader exotic plants.



4-6: These mid-successional plants are typically matrix species in intact habitats with some limited ability to disturbance and repopulate areas from which they have been removed.

7-10: Conservative plants are late-successional, occurring in mature native plant communities with high fidelity to intact habitats that reflect our state's pre-Euro settlement conditions.

² Ladd, D. and J.R. Thomas. 2015. *Ecological checklist of the Missouri Flora for Floristic Quality Assessment*. *Phytoneuron*. 12: 1-274.

Seed Pretreatment: Many species need a pretreatment process applied to their seed prior to sowing in order to stimulate plant germination. Pretreatments vary, but many mimic natural seasonal conditions, such as cold stratification or exposure to light that a seed must undergo in order to emerge in the spring. A dormant seeding will complete cold moist stratification as a pre-treatment. Leguminous plants often require scarification of their hard seed coat in order to allow water and gasses to pass through which assists the seed in imbibing; additionally, applying an inoculant to a leguminous seed increases the success rate of those plants forming beneficial symbiotic relationships with microbes in the soil.

CM: Cold moist stratification (minimum of 60 days; can be achieved by dormant planting)

CD: Cold dry stratification (over-winter storage)

SC: Scarify seedcoat (weaken seedcoat by scratching or rubbing it)

IN: Incolutate seedcoat (add correct microbe)

Light: Requires sunlight to germinate; plant seed on surface



Table 3. Options for controlling competing vegetation during forb establishment.

Option	Current Cover	Timing	Method(s)
Single herbicide application	Cropland OR Sparse Grassland	Fall	<p>(This option should not be used when tall fescue or brome is the dominant cover. Two herbicide applications are needed to adequately control these species. Heavy stands of red or ladino clover will also require 2 treatments)</p> <ol style="list-style-type: none"> For sparse grassland, remove excess vegetation prior to spraying, preferably in late summer or fall (Aug./Sept.) to allow regrowth. Mowing/haying or prescribed burning are the preferred options. Apply herbicide (follow all label instructions) on new growth when it is 4-6 inches in height and actively growing. <ul style="list-style-type: none"> Apply a broad-spectrum contact herbicide, such as glyphosate, at label rates. Glyphosate may be tank-mixed with imazapic, but be sure that forbs to be planted are tolerant according to the product label. Spray while undesirable vegetation is actively growing. For cropland, spray winter annuals prior to March 15th in south Missouri, April 1st in north Missouri, but prior to native forb seedling emergence.
Two herbicide applications	Non-desirable grassland	Fall and Spring	<ol style="list-style-type: none"> Remove excess vegetation in early spring (March). Apply herbicide on new growth when it is 4-6 inches in height and actively growing. <ul style="list-style-type: none"> Apply a broad-spectrum contact herbicide, such as glyphosate. Follow all label instructions. <p>AND</p> <ol style="list-style-type: none"> Apply herbicide in fall (Sept.—Oct.) when grass is actively growing. <ul style="list-style-type: none"> Apply a broad-spectrum contact herbicide, such as glyphosate. Follow all label instructions. Subsequent applications of a broad-spectrum contact herbicide, such as glyphosate or a grass-specific herbicide may be necessary in future years to knock back invading undesirable cool-season grasses, see footnotes below for more information. Dormant seeding of native forbs and grasses is strongly recommended. <p>OR</p> <ul style="list-style-type: none"> Dormant seed native forbs after a fall application a broad-spectrum contact herbicide (at label rates), such as glyphosate. Follow all label instructions, and then use a grass-specific herbicide the following spring to eliminate undesirable grasses. Follow-up with a dormant native grass planting the following winter. <p>OR</p> <ul style="list-style-type: none"> Consider glyphosate-tolerant soybeans or forage sorghum for a year or 2 to eliminate undesirable vegetation, then dormant seed native forbs and grasses.
Mow or burn	Desirable native grass	Late Summer or Fall	<ol style="list-style-type: none"> Mow/hay or burn in September—October to suppress existing grass. If there is an abundance of litter present, either burn, bale the residue, or lightly disk to expose bare ground prior to seeding. If there is an abundance of undesirable cool-season grass present (such as fescue), wait until the native grass has gone dormant (usually after the first killing frost) and then spray as outlined above for Cropland or Sparse Grassland. Burning is the preferred option, and forbs may be broadcast during the dormant season by seeding directly onto the remaining ash.
Mow and/or burn	Rank stands of native grass	Late Summer	<ol style="list-style-type: none"> Mow or hay in August, then spray regrowth with a broad-spectrum contact herbicide, such as glyphosate (follow all label instructions), in September prior to native grasses going dormant, OR Conduct a prescribed burn mid-July to early August. Apply a broad-spectrum contact herbicide, such as glyphosate (follow all label instructions), when grass reaches a height of 4-6 inches and is actively growing in early September. Continue frequent mowing throughout the 1st growing season following the forb seeding.



Contact your local University of Missouri Extension office, or local herbicide dealer for recommendations on type of herbicide and rates for your specific situation and follow all label instructions. NRCS does not endorse any particular herbicide product. Be sure and follow all label directions. Take note that the timing of the use of a contact herbicide, such as a glyphosate, occurs after desirable plants are dormant in the fall, or prior to their beginning growth in the spring. Remember that native cool season grasses (such as wildrye) and some forbs (such as beardtongue) may not go dormant. In general, spraying to control undesirable cool-season grasses should take place before October 31.

Note that an adequate seedbed for native forb establishment will have at least 50 percent bare ground. Prescribed burning is the preferred method for seedbed preparation when establishing forbs into an existing grass stand.

Mowing for weed control during the establishment year is important, especially for forbs established into existing grass. Research has shown repeated mowing in the establishment year results in better forb establishment and persistence in existing native grass.

When using an herbicide, such as glyphosate or grass-specific herbicides (sethoxydim, quizalofop p-ethyl, or clethodim), timing is critical. Glyphosate is a contact killer and its use may harm or kill desirable forbs. Timing should be late fall/early winter after natives have gone dormant. Spray during warm days (50-60 degrees) with low label rates. Use of grass-specific herbicides should be timed in early spring prior to native grass breaking dormancy.

For additional information on native forbs, contact your local USDA Service Center or Missouri Department of Conservation office.

Photos courtesy of the Missouri Department of Conservation.

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