

North Dakota Pollinator Plants					
Native Forbs*					
<i>Early Bloom (Er)</i>	<i>Full Seed PLS lb/ac</i>	<i>Middle Bloom (Mi)</i>	<i>Full Seed PLS lb/ac</i>	<i>Late Bloom (L)</i>	<i>Full Seed PLS lb/ac</i>
American vetch (VIAM)	36.0	Black-eyed Susan (RUHI2)	0.8	Blue aster (SYLAL3)	1.5
Black-eyed Susan (RUHI2)	0.8	Blanketflower (GAAR)	7.0	Blue vervain (verbena) (VEHA2)	1.0
Canada anemone (ANCA8)	10.0	Butterfly milkweed (ASTU)	16.2	Butterfly milkweed (ASTU)	16.2
Columbine (AQCA)	3.0	Canada goldenrod (SOCA6)	0.2	Canada goldenrod (SOCA6)	0.2
Evening primrose (OEBI)	0.8	Canada milkvetch (ASCAC6)	4.0	Cup plant (SIFE2)	9.0
Golden Alexander (ZIAU)	6.2	Canada tickclover (DECA7)	12.3	Dotted gayfeather (LIPU)	8.0
Lewis flax (blue) (LILE3)	3.8	Culvers root (VEVI4)	0.1	False boneset (EUPE3)	0.4
Plains coreopsis (COTI3)	0.7	Dotted gayfeather (LIPU)	8.0	Fragrant giant hyssop (ADAST)	0.8
Prairie phlox (PHPI)	4.0	False sunflower (HEHES)	18.0	Grayhead coneflower (RAPI)	1.7
Rocky Mountain Bee Plant (CLSE)	20.0	Heath aster (SYER)	0.4	Hoary Vervain (VEST)	2.4
Shell-leaf penstemon (PEGR7)	4.0	Illinois Bundleflower (DEIL)	18.0	Ironweed (VEFA2)	2.8
Silvery lupine (LUAR3)	8.0	Joe Pye weed (EUMAB)	0.7	Joe Pye weed (EUMAB)	0.7
Spiderwort (TROC)	7.0	Missouri goldenrod (SOMI2)	0.5	Maximilian sunflower (HEMA2)	1.0
Western yarrow (ACMIO)	0.4	Narrow-leaved purple coneflower (ECAN2)	9.0	Missouri goldenrod (SOMI2)	0.5
		Prairie Onion (ALST)	6.2	New England Aster (SYNO2)	0.8
		Purple coneflower (ECPU)	9.0	Purple coneflower (ECPU)	9.0
		Purple meadow rue (THDA)	6.2	Sneezeweed (-HEAU)	0.4
		Purple prairieclover (DAPU5)	3.8	Stiff goldenrod (SORI2)	1.4
		Scarlet globemallow (SPCO)	2.0	Stiff sunflower (HEPAS)	2.5
		Silvery lupine (LUAR3)	8.0	Swamp milkweed (ASIN)	15.0
		Spiderwort (TRBR)	7.0	Thickspike Gayfeather (LIRY)	8.0
		Stiff goldenrod (SORI2)	1.4	Wild bergamot (MOFI)	0.9
		Stiff sunflower (HEPAS)	2.5		
		Swamp milkweed (ASIN)	15.0		
		Thickspike Gayfeather (LIRY)	8.0		
		Western yarrow (ACMIO)	0.4		
		White prairieclover (DAAL)	3.9		
		Wild bergamot (MOFI)	0.9		
		Yellow coneflower (RACO3)	1.5		
Introduced Forbs*					
Alfalfa	6.0				
Sainfoin	35.0				
Shrubs* - bold denotes introduced species					
<i>Early Bloom</i>			<i>Middle Bloom</i>	<i>Late Bloom</i>	
American highbush cranberry	Elderberry	Mongolian cherry	Sandbar willow	Chokeberry	Potentilla
American plum	Golden currant	Nanking cherry	Sandcherry	False indigo	Leadplant
Buffaloberry	Juneberry	Prairie rose	Skunkbush sumac	Potentilla	
Caragana	Lilac	Redosier dogwood	Western snowberry	Silverberry	
Chokecherry	Missouri willow	Russian almond	Woods rose	Smooth sumac	
Trees - bold denotes introduced species					
<i>Early Bloom</i>		<i>Middle Bloom</i>		<i>Late Bloom</i>	
Apricot	Harbin pear	Hawthorn		Basswood/Lincen	
Bebb willow	Peachleaf willow				
Crabapple					

Pollinator Mixes				
Restoration and Management Rare and Declining Habitat - 643 - Range Seeding 550				
Tall Grass Prairie				
Example mixes for sites such as loamy (silty), loamy overflow (overflow), sub irrigated, clayey, wet meadow				
	<i>Percentage</i>	<i>PLS/AC</i>	<i>PLS/Mix</i>	<i>Bloom Period</i>
Big bluestem	10%	7.5	0.75	
Indiangrass	5%	7.0	0.35	
Switchgrass	10%	4.5	0.45	
Green needlegrass	10%	7.5	0.75	
Western wheatgrass	5%	10.0	0.50	
Little bluestem	5%	4.5	0.23	
Sideoats grama	5%	7.5	0.38	
Canada wildrye	5%	7.5	0.38	
Blue grama	5%	2.5	0.13	
Maximilian sunflower	3%	1.0	0.03	L
Purple prairieclover	9%	3.8	0.34	Mi
Canada milkvetch	4%	4.0	0.16	Mi
Leadplant	1%	6.0	0.06	L
Purple coneflower	5%	9.0	0.45	Er
Lewis blue flax	8%	3.8	0.30	Er
Western yarrow	4%	0.4	0.02	Er
American vetch	2%	36.0	0.72	Er
Black-eyed Susan	4%	0.8	0.03	Er, Mi
Total	100%			
Mixed Grass Prairie				
Example Mixes for sites such as loam (silty), thin loamy (thin upland), loamy overflow (overflow) clayey				
	<i>Percentage</i>	<i>PLS/Ac</i>	<i>PLS/Mix</i>	<i>Bloom Period</i>
Big bluestem	5%	7.5	0.75	
Green needlegrass	15%	7.5	1.13	
Western wheatgrass	5%	10.0	0.50	
Little bluestem	10%	4.5	0.45	
Sideoats grama	13%	7.5	0.98	
Canada wildrye	5%	7.5	0.38	
Blue grama	5%	2.5	0.13	
Maximilian sunflower	3%	1.0	0.03	L
Purple prairieclover	9%	3.8	0.34	Mi
Yellow coneflower	3%	1.5	0.05	Mi
Black-eyed Susan	6%	0.8	0.05	Er, Mi
Lewis blue flax	10%	3.8	0.38	Er
Western yarrow	4%	0.4	0.02	Er, Mi
American vetch	2%	36.0	0.72	Er
Leadplant	1%	6.0	0.06	L
Purple coneflower	4%	9.0	0.36	L
	100%			

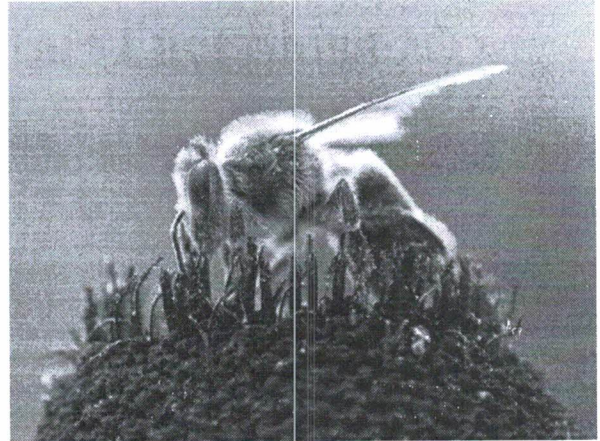
Mixed Grass Prairie				
Example mixes for sites such as saline lowland, claypan and thin claypan and closed depression				
	Percentage	PLS/Ac	PLS/Mix	Bloom Period
Slender wheatgrass	15%	5.5	0.83	
Western wheatgrass	13%	10.0	1.30	
Beardless wildrye	8%	8.5	0.68	
Switchgrass	8%	4.5	0.36	
Prairie cordgrass	5%	7.0	0.35	
Little bluestem	5%	4.5	0.23	
Big bluestem	5%	7.5	0.38	
Green needlegrass	5%	7.5	0.38	
Maximilian sunflower	3%	1.0	0.03	L
Western yarrow	2%	0.4	0.01	Er, Mi
Blue aster	3%	1.5	0.05	L
Four-winged saltbush	4%	6.0	0.24	Mi
Blanketflower	4%	7.0	0.28	Mi
Lewis blue flax	5%	3.8	0.19	Er
Black-eyed Susan	5%	0.8	0.04	Er, Mi
Yellow coneflower	5%	1.5	0.08	Mi
Canada goldenrod	5%	0.2	0.01	Mi, L
	100%			
Mixed Grass Prairie				
Example mixes for sites such as sands, sandy, shallow-to-gravel, and shallow.				
	Percentage	PLS/Ac	PLS/Mix	Bloom Period
Blue grama	10%	2.5	0.25	
Canada wildrye	10%	7.5	0.75	
Little bluestem	10%	4.5	0.45	
Prairie sandreed	5%	5.0	0.25	
Sand bluestem	5%	12.0	0.60	
Sideoats grama	13%	7.5	1.0	
Western wheatgrass	5%	10.0	0.50	
Green needlegrass	10%	7.5	0.75	
Dotted gayfeather	2%	8.0	0.16	Mi, L
False boneset	5%	0.4	0.02	L
Yellow coneflower	2%	1.5	0.03	Mi
Purple coneflower	3%	9.0	0.27	Mi, L
Purple prairieclover	8%	3.8	0.30	Mi
Shell-leaf penstemon	2%	4.0	0.08	Er
Stiff sunflower	2%	2.5	0.05	Mi, L
Lewis blue flax	5%	3.8	0.19	Er
Western yarrow	3%	0.4	0.01	Er, Mi
	100%			

Example for Pollinator Only Species Plantings – 643 – Restoration and Management of Rare and Declining Habitats				
	<i>Percentage</i>	<i>PLS/Ac</i>	<i>PLS/Mix</i>	<i>Bloom Period</i>
Blue flax	15%	3.8	0.57	Er
American vetch	5%	36.0	1.80	Er
Western yarrow	5%	0.4	0.02	Er, Mi
Black-eyed Susan	15%	0.8	0.12	Er, Mi
Purple prairie clover	20%	3.8	0.76	Mi
False sunflower	10%	18.0	1.80	Mi
Maximilian sunflower	5%	1.0	0.05	L
Purple coneflower	15%	9.0	1.35	Mi, L
Blue aster	10%	1.5	0.15	L
	100%			

WHAT ARE POLLINATORS AND WHY SHOULD YOU CARE?

The majority of pollinators in North Dakota are insects such as native bees, honey bees, beetles, flies, moths, and butterflies. Through the process of foraging, both native and non-native pollinators provide pollinating services to many native flowering plants.

Perennial plants such as flowering shrubs, legumes, forbs, and wildflowers provide consistent foraging habitat during the spring, summer, and fall. *Annual* plants, such as certain commodity and produce crops, provide foraging opportunities. Of animal pollinators, bees are considered to be the most important group. Pollen, usually moistened with nectar or floral oil, is used to feed larvae, and nectar is used to fuel the flight of adults. Many bees are active above ground as adults for only a few weeks or months. Bees require a reliable protein source (pollen) during their active period, generally late April through early October, to carry the adult and offspring through the winter to the next blooming period.



Most native bees nest underground as solitary individuals. Relatively undisturbed conditions with suitable ground and/or nest structure provide nesting sites. Nesting sites are important because the further the bees must travel the more energy the pollinator uses. If bees travel long distances to a "poor" food source and become stressed, the bees may be more susceptible to environmental factors such as parasites and disease resulting in possible starvation or possible reproductive decline. The average foraging distance for native bees ranges from approximately 50 feet to one-half mile while non-native pollinators, such as the European honey bee, range up to several miles from the colony.

WHERE DO YOU START?

The Natural Resources Conservation Service (NRCS), in cooperation with its partners, has developed two publications to assist landowners. These publications are titled "Farming for Pollinators" and "Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms." These publications are available at your local United States Department of Agriculture Service Center NRCS office or download at www.xerces.org.

The publication recommends three initial landowner actions:

- Recognize the pollinators and pollinator habitats that are already on your property.
- Adapt existing production and land management practices to avoid causing undue harm to the pollinators already present.
- Provide habitat for native pollinators on and around the farm.

WHAT CAN YOU DO?

Methods are available for providing or protecting nest site habitats for bees in the agricultural landscape; many of them do not interfere with farming. They range from simple, low-cost measures to more complex and expensive methods:

- Provide undisturbed habitat by focusing on areas that are not farmed, including:
 - Unused land around fields, buildings, and service yards.
 - Areas more difficult to farm, such as edges of ditches, ponds and riparian areas, on hills, or around utility poles.
- Management of irrigation to preserve ground-nesting pollinators. By using drip or spray irrigation instead of flooding, producers can avoid drowning ground-nesting pollinators and larvae. Irrigating can also be performed at night to minimize interference with bee activity.

- Minimize tillage to protect existing pollinator nests. By tilling shallow or using no-till agriculture, disturbance of nest sites can be avoided. For example, producers found three times more pollinators on squash and pumpkin farms that practice no-till agriculture than that of tilled farms.
- Active land management to provide nesting sites for pollinators, including:
 - Creating patches of bare ground within perennial plantings (a range of native plants blooming at different times during the spring, summer, and fall).
 - Leaving dead wood and standing snags, drilling holes in dead wood, and putting out trap nests for twig nesting pollinators.
 - Providing a sand-loam mix for ground-nesting pollinators.
 - Putting out bumble bee nest boxes buried or above ground.

HOW DO PESTICIDES AFFECT POLLINATORS?

Insecticides are differentially toxic to non-target species, depending on the active ingredients, the strength and composition of the formulation (dust, powder, liquid), and the behavioral and physiological response of the target insect. Some pollinator species might not be killed outright by pesticide applications, but they could suffer sublethal effects, including reduced foraging ability that ultimately hampers their productivity.

Short of eliminating insecticide use altogether, producers can reduce risks to pollinators from pesticides in several ways:

- Choose appropriate pesticides. Some insecticides have active ingredients that are less likely to cause mortality or sublethal effects in pollinators (for example, granular powders are less noxious than dust), and break down more rapidly. Microencapsulated formulations should be avoided because they become trapped in a bee's transporting hairs and carried back to the nest.
- Apply pesticides selectively. Producers may be able to avoid using insecticides during a crop's bloom period - or apply them at night while pollinators are in nests, and apply them on the ground rather than in aerial spray.
- Convert some or all fields to organic production.
- Keep in mind that some organic insecticides can be harmful to pollinators.

PLANTINGS FOR POLLINATORS

Native plantings are preferred. Native grasses along with planting blocks of flowering forb species can provide foraging sites for native pollinators and honeybees. When designing a planting to benefit pollinators, season-long blooming plants should be your goal. For herbaceous plantings, select at least three forb species from each bloom period. The plantings can be entirely forbs, or forbs can be seeded with grasses for grazing to enhance nest habitat for pollinator species. The following table lists bloom times for native and introduced forb and shrub and tree species adapted for North Dakota. Only two woody species have a late bloom period. For woody plantings, a middle bloom period may be used instead of a third late bloom period species.

Seeding dates for pollinator mixes (forbs only).

North Zone	Spring - Prior to May 20 th
South Zone	Spring - Prior to May 10 th
Statewide	Late Fall (Dormant)

Seeding may occur once soil temperatures drop to 40 degrees (F) for a minimum of 5 consecutive days (usually November 1st) based on NDAWN or actual field measurements at a 2 inch depth.

Seeding dates for pollinator mixes with grasses.

Follow seeding date guidance in the Herbaceous Vegetation Establishment Guide for the cool, warm or mixed grass species in the planned mix.