

BIOLOGY TECHNICAL NOTE

Creating Habitat for Pollinator Insects

Two-thirds of the world's crop species depend on insects for pollination, which accounts for 15 to 30 percent of the food and beverages we consume. Pollinators are key to the function of many terrestrial eco-systems because they enhance native plant reproduction. In turn, native plants provide food and cover for pollinators and numerous other wildlife species and livestock, help stabilize the soil and improve water quality.

In Montana, many species of insects, as well as some birds, provide pollination services. There are 4,000 species of bees alone in North America. The non-native honey bee is the best known of these. Bees are the most efficient and important pollinator group.

Pollinators are threatened worldwide by habitat loss and fragmentation, pesticides, disease, and parasites. This has serious economic implications for humans and for eco-system diversity and stability. Honey bee losses, and resulting rental rates for honey bee pollination services, are on the rise. This makes native bee pollinators all the more important if crop production levels are to be maintained over the long run. Native pollinators are increasingly important as the number and acreage of crops dependent on insect pollination services are steadily growing.

The Natural Resources Conservation Service (NRCS) can help landowners develop and enhance pollinator habitat by encouraging them to establish an array of plants that flower throughout the entire growing season. This provides a source of nectar for adult pollinators and a diversity of herbaceous material for immature pollinator life stages and for nesting.

Herbaceous plantings should include one bunchgrass adapted to the site and at least one **different** forb or shrub species from each of the three flowering categories, early, mid, and late which are listed below in Table 1. Example seed mixtures emphasizing pollinator-friendly plants are on Pages 4-5 and the Conservation Reserve Program (CRP) Guidelines for Pollinators are on Page 6 of this Technical Note.

This Technical Note is intended to be used along with Biology Technical Note No. MT-32, Native Pollinators.

Table 1. Pollinator-friendly plant species and bloom periods

Common Name	Latin Name	Bloom Period ^{1/}	Availability ^{2/}	Relative Cost ^{3/}
Native Forbs				
Black-samson	<i>Echinacea angustifolia</i>	M	E	L
Common yarrow	<i>Achillea millefolium</i>	E-M-L	E	L
Blanket flower	<i>Gaillardia aristata</i>	M-L	E	L
Lewis flax	<i>Linum lewisii</i>	E-M	E	L
Maximilian sunflower	<i>Helianthus maximiliani</i>	M-L	E	L
Prairie coneflower	<i>Ratibida columnifera</i>	M-L	E	L
Purple prairie clover	<i>Dalea purpurea</i>	M-L	E	M
Firecracker penstemon	<i>Penstemon eatonii</i>	E	E-G	M
Fuzzytongue penstemon	<i>Penstemon eriantherus</i>	E	F	M
Scarlet globemallow	<i>Sphaeralcea coccinia</i>	L	G	M-H
Showy milkweed	<i>Asclepias speciosa</i>	M	G	M
Smooth blue aster	<i>Symphotrichum laeve</i>	M-L	G	H
Sulphur-flower buckwheat	<i>Eriogonum umbellatum</i>	M	G	M
White prairie clover	<i>Dalea candida</i>	M	G	M
Beebalm	<i>Monarda fistulosa</i>	M-L	F-G	M-H
Silky lupine	<i>Lupinus sericeus</i>	E-M	F	M-H
Dotted gayfeather	<i>Liatris punctata</i>	L	F	M-H
Goldenrod	<i>Solidago species</i>	E-L	F	M-H
Sticky geranium	<i>Geranium viscosissimum</i>	E	F	H
Silverleaf phacelia	<i>Phacelia hastata</i>	E	L	H
Hairy goldenaster	<i>Heterotheca villosa</i>	M-L	F	M
Evening primrose	<i>Oenothera species</i>	E	?	?
Northern sweetvetch	<i>Hedysarum boreale</i>	E-M	F-G	M
Introduced Forbs				
Alfalfa	<i>Medicago sativa</i>	E-M	E	L
Alsike clover	<i>Trifolium hybridum</i>	E	G	L
Strawberry clover	<i>Trifolium fragarium</i>	E	M	L-M
White clover	<i>Trifolium repens</i>	M	E	L
Sanfoin	<i>Onobrychis viciifolia</i>	E-M-L	E	L
Small burnet	<i>Sanguisorba minor</i>	M	E	L
Cicer milkvetch	<i>Astragalus cicer</i>	L	E	L
Birdsfoot trefoil	<i>Lotus corniculatus</i>	L	E	L
Red clover	<i>Trifolium pratense</i>	E	E	L
Native Shrubs				
American plum	<i>Prunus americana</i>	E	E	L
Chokecherry	<i>Prunus virginiana</i>	E	E	L
Serviceberry	<i>Amelanchier alnifolia</i>	E	E	L
Golden currant	<i>Ribes aureum</i>	E	E	L
Skunkbush sumac	<i>Rhus trilobata</i>	E	E	L-M
Black hawthorn	<i>Crataegus douglasii</i>	E	G	L
Antelope bitterbrush	<i>Purshia tridentata</i>	E	G	M
Douglas spirea	<i>Spiraea douglasii</i>	E	F-G	
Willow	<i>Salix species</i>	E	E	L
Ninebark	<i>Physocarpus malvaceus</i>	E		L
Silver buffaloberry	<i>Shepherdia argentea</i>	E-M	E	L

* Grasses are wind-pollinated but do provide a pollen source for pollinator insects; bunchgrasses provide nesting habitat for Bumble bees and other insects.

1 – Bloom period: E-early, M-mid, L-late; 2 – Availability: E-excellent, G-Good, F-fair, L-low; 3 – Relative cost: H-high, M-medium, L-low

Table 1. Pollinator-friendly plant species and bloom periods (continued)

Common Name	Latin Name	Bloom Period ^{1/}	Availability ^{2/}	Relative Cost ^{3/}
Native Shrubs (cont.)				
Red-osier dogwood	<i>Cornus sericea</i>	E-M	E	L
Shrubby cinquefoil	<i>Dasiphora floribunda</i>	E-M	E	L
Wood's rose	<i>Rosa woodsii</i>	E-M	E	L
Common snowberry	<i>Symphoricarpos alba</i>	M	E	L
Western snowberry	<i>S. occidentalis</i>	M	E	L
Elderberry	<i>Sambucus species</i>	M	E	L
Buckwheat	<i>Eriogonum species</i>	M-L		
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	L	E	L
Yellow rabbitbrush	<i>E. viscidiflorus</i>	L		
Introduced Shrubs				
Nanking cherry	<i>Prunus tomentosa</i>	E	E	L
Western sand-cherry	<i>Prunus pumila</i>	E	G	L-M
Crabapple	<i>Malus sylvestris</i>	E	E	M
Russian sage	<i>Perovskia atriplicifolia</i>	E-M		
Siberian peashrub	<i>Caragana arborescens</i>	E-M	E	L
Native Grasses*				
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>		E	L
Green needlegrass	<i>Nassella viridula</i>		E	L
Slender wheatgrass	<i>Elymus trachycaulus</i>		E	L
Basin wildrye	<i>Leymus cinereus</i>		E	L
Little bluestem	<i>Schizachyrium scoparium</i>		E	L
Indian ricegrass	<i>Achnatherum hymenoides</i>		E	L
Introduced Grasses*				
Russian wildrye	<i>Psathrostachys juncea</i>		G	L-M
Tall wheatgrass	<i>Thinopyrum ponticum</i>		E	L

* Grasses are wind-pollinated but do provide a pollen source for pollinator insects; bunchgrasses provide nesting habitat for Bumble bees and other insects. Basin and Russian wildrye and tall wheatgrass can shade out forbs; plant separately or at low rates.

1 – Bloom period: E-early, M-mid, L-late; 2 – Availability: E-excellent, G-Good, F-fair, L-low; 3 – Relative cost: H-high, M-medium, L-low

Pollinator habitat plantings must remain undisturbed until after the bloom period so that flowers are available as a nectar source to adults and succulent herbage can be utilized by larvae. Maintenance treatments, such as grazing, burning, or haying may be required outside of the flowering period or on one-third or less of the site when pollinators are active. Native and introduced species are generally not compatible in the same planting when sown together but may be well-suited to alternate row plantings. Alfalfa, if used with native species, must be limited to no more than five percent of the seed mixture. Other introduced species, such as small burnet and sainfoin, must be used with caution if planted with native species.

**Example Native Species Mixture Emphasizing Pollinator-Friendly Plants
Northern Rockies***

Genus	Species	Common	PLS #/Acre	% Mixture	Total #PLS
<i>Pseudoroegneria</i>	<i>spicata</i>	Bluebunch wheatgrass	6	40	2.4
<i>Elymus</i>	<i>trachycaulus</i>	Slender wheatgrass	6	10	.6
<i>Elymus</i>	<i>lanceolatus</i>	Thickspike wheatgrass	6	20	1.2
<i>Penstemon</i>	<i>eriantherus</i>	Fuzzy-tongue p.	1.5	10	0.2
<i>Linum</i>	<i>lewisii</i>	Lewis flax	3	5	.15
<i>Gaillardia</i>	<i>aristata</i>	Blanketflower	7	10	0.7
<i>Achillea</i>	<i>millefolium</i>	Yarrow (competitive- keep rate low)	.5	5	.025
				TOTAL	5.3

**Example Native Species Mixture Emphasizing Pollinator-Friendly Plants
Eastern Plains***

Genus	Species	Common	PLS #/Acre	% Mixture	Total #PLS
<i>Pascopyrum</i>	<i>smithii</i>	Western wheatgrass	8	30	2.4
<i>Nassella</i>	<i>viridula</i>	Green Needlegrass	5	34	1.7
<i>Elymus</i>	<i>trachycaulus</i>	Slender wheatgrass	6	10	.6
<i>Dalea</i>	<i>candida</i>	White prairie clover	3	10	.3
<i>Linum</i>	<i>lewisii</i>	Lewis flax	3	1	.03
<i>Ratibida</i>	<i>columnifera</i>	Prairie coneflower	1.2	10	.12
<i>Liatris</i>	<i>punctata</i>	Dotted gayfeather	6.4	5	.32
				TOTAL	5.5

**Example Introduced Species Mixture Emphasizing Pollinator-Friendly Plants
Statewide***

Genus	Species	Common	PLS #/Acre	% Mixture	Total #PLS
<i>Thinopyrum</i>	<i>intermedium</i>	Pubescent wheatgrass	10	46	4.6
<i>Onobrychis</i>	<i>viciifolia</i>	Sainfoin	34	18	6.1
<i>Sanguisorba</i>	<i>minor</i>	Small burnet	20	18	3.6
<i>Lotus</i>	<i>corniculatus</i>	Birdsfoot trefoil	3	18	0.5
				TOTAL	14.8

***Note: These seed mixtures are intended for working lands (hay/pasture/range). Such seedings contracted for pollinator conservation must have at least 1/2-acre left undisturbed until after the first frost in the fall. The undisturbed acres may be part of a haying/grazing rotation.**

Example native seed mixture to be established specifically for pollinator habitat – there is no minimum size for these plantings unless contracted for CRP (see CRP Pollinator Guidelines, below). These seedings/plantings must be undisturbed until after the first fall frost.

Genus	Species	Common	PLS #/Acre	% Mixture	Total #PLS
<i>Achillea</i>	<i>millefolium</i>	Western yarrow	0.4	5	0.02
<i>Linum</i>	<i>lewisii</i>	Blue flax	5	3	0.15
<i>Ribes</i>	<i>aureum</i>	Golden current	Hand	Plant	Container ized
<i>Dalea</i>	<i>purpurea</i>	Purple prairie clover	3.8	10	0.38
<i>Gaillardia</i>	<i>aristata</i>	Blanket flower	7.1	10	0.71
<i>Ratibida</i>	<i>columnifera</i>	Prairie coneflower	1.5	10	0.15
<i>Liatris</i>	<i>punctata</i>	Dotted gayfeather	8.0	10	0.8
<i>Dalea</i>	<i>purpurea</i>	Purple prairie clover	3.8	10	0.4
<i>Helianthus</i>	<i>maximilianii</i>	Maximilian sunflower	4.4	7	0.3
<i>Achnatherum</i>	<i>hymenoides</i>	Indian ricegrass	6.0	25	1.5

Note: For small-scale pollinator plantings, an alternative to the seeding mixtures above is to establish containerized plants. This has the advantage of quick establishment for better weed competition and pollinator habitat value. Another advantage is the ability to plant blocks of the same species (i.e., blocks of at least 3 feet in diameter). This greatly increases the efficiency of pollination since bees and other insects will easily move among flowers of the same plant species and facilitates weeding. Bumble bees, in particular, demonstrate flower constancy.

CONSERVATION RESERVE PROGRAM (CRP) POLLINATOR GUIDELINES

The pollinator-friendly plants (at least one different flowering forb or shrub from each of the early-, mid-, and late-flowering groups listed on Page 2-3) can be planted:

1. On an entire field or offered acreage;
2. In one large block in the CRP field (blocks must be at least 1/2-acre) or;
3. Separate blocks of at least 1/2-acre, located throughout the field or offered acreage.

NOTE: Some CRP National Environmental Index Factors (EBI) may add more requirements to a pollinator planting to receive extra points. One example is that 10% of the offered acreage must be planted to a pollinator mix in order to receive the extra points.

Periodic maintenance must be performed to assure that grass litter does not suppress the pollinator-friendly plants.

If the pollinator-friendly plants are present over the entire CRP field, maintenance can be performed according to policy in the CRP Handbook. The optimum scenario is to perform maintenance on one-third or less of the pollinator habitat in any one year.

If the pollinator-friendly plants are established in separate areas from the over-all seeding, maintenance may be performed on the entire pollinator-friendly acreage if done after the first killing frost in the fall and prior to April 1. If maintenance will be performed during the growing season, it may only be done on 50% of the pollinator acreage in any given year.

Pollinator-friendly plants added to an existing grass seeding must be planted into clean, weed-free seedbed according to the NRCS seeding plan.

Useful References:

NRCS. 2008. Using Farm Bill Programs for Pollinator Conservation. National Plant Data Center. Technical Note No. 78.

Xerces Society. 2007. Farming for Bees. Xerces Society for Invertebrate Conservation. Portland, OR.

Oregon State University. 2006. How to Reduce Bee Poisoning from Pesticides. Pacific Northwest Extension Publication, PNW 591.

Xerces Society. 2011. Attracting Native Pollinators. Storey Publishing, North Adams, MA.