



Promote Pollinators in Agricultural Landscapes

Globally, many pollinating insects are in decline. The Minnesota Department of Agriculture (MDA) has developed voluntary Best Management Practices (BMPs) to protect wild and managed insect pollinators by providing habitat for their survival and reproduction.¹ This BMP provides voluntary practices to help REDUCE negative impacts on pollinator habitat resulting from current management practices, IMPROVE existing habitat, and CREATE new habitat near, adjacent to, or in agricultural lands. Using these practices can help make agricultural landscapes more pollinator-friendly and improve insect pollinator health, assist bee keepers, and help farmers produce food.

Insects surround us. A few insects can be pests. However, most insects are harmless, and many are beneficial, acting as pollinators, predators, and recyclers. A loss of beneficial insects means losing important agricultural services such as crop pollination and pest control.

What are Pollinators?



Photo Credit: Heather Holm

Pollinating insects in Minnesota include butterflies, flower flies, and most importantly, bees (both managed honey bees as well as hundreds of wild bee species). Beneficial pollinating insects depend on flowering plants for their food and need undisturbed ground and vegetation for shelter. Management practices that preserve or provide food and shelter will reduce the threat to our beneficial insects including pollinators.



Pollinator Benefits

One-third of our food production requires pollinators. Many of our nutritious foods, such as apples, almonds, and blueberries, are pollinated by honey bees that spend summer in Minnesota foraging in agricultural landscapes, producing honey, and growing larger, stronger colonies.

Livestock forage depends on insect pollinators, as do most wild plants that produce seeds. Minnesota's agricultural landscapes are important habitat for insect pollinators, supporting countless wild pollinators as well as managed honey bees.

¹In accordance with 2013 Pollinator Legislation Ch. 114-H.F. 976

REDUCE Negative Impacts to Pollinators

Ways to avoid disturbing pollinator habitat in non-tilled areas:

- Determine areas near, adjacent to, or in your agricultural fields that can be left undisturbed for nesting and foraging habitat.
- Leave existing fencerows and grass waterways to provide erosion control and pollinator corridors.
- Wait to mow abandoned or non-tilled areas until after vegetation flowers to increase forage for pollinators and potentially reduce your workload (See Mowing Box). Be sure to control noxious weeds in their early stages.
- Preserve existing ground nesting sites by:
 - preventing soil disturbance and compaction; and
 - leaving small patches of bare ground for ground nesting bees and leaf litter for other insect pollinators.
- Leave, where safe, standing dead trees, downed logs, and flower stems for cavity nesting bees.

Know the difference between ground-nesting bees and yellowjacket wasps.

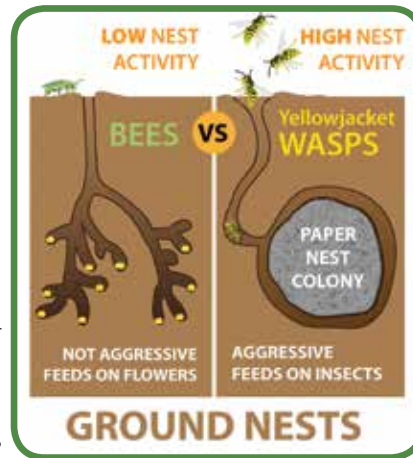


Illustration Credit: Elaine Evans, Heather Holm

ADJUSTING MOWING PRACTICES CAN IMPROVE POLLINATOR HABITAT

- Mowing or prescribed burning of grasses and noxious weeds in the spring can promote prairie flowers (Check with your local resource professional for ideal timing).
- Spot mowing noxious weeds can leave areas of refuge for pollinators.
- Limiting the mowing of field edges, waterways, pastures and ditches promotes pollinator habitat.
- Raising mower heights may remove weed seedheads while maintaining pollinator habitat in old plant stems.



Photo Credit: Heather Holm

Pollinator-Friendly Pest Control



Insecticides economically control many insect pests. When using pesticides, especially insecticides, be aware of the potential impact on pollinators and other beneficial insects. Communicate with local bee keepers to stay in touch with where their hives are located.

Integrated Pest Management (IPM) helps build beneficial insect populations that may be negatively impacted by pesticide use. After crop scouting and monitoring of pest populations determines that some control is warranted, sustainable pest management integrates the use of biological, cultural, physical, mechanical, and chemical practices to prevent significant economic loss. University scouting manuals² can provide information on scouting methods and economic thresholds that will assist with making IPM decisions including those that require smart use of a pesticide.



The new bee icon helps signal the pesticide's potential hazard to bees.

Read the Label

The Environmental Protection Agency (EPA) now includes a Bee Advisory Box on some insecticide labels for foliar applications. In addition, look for pollinator language under the 'Directions for Use' section of the pesticide label. Pesticide applications, in Minnesota, that cause an acute pesticide poisoning of bees may result in a compensation to the bee keeper.³

²University of Wisconsin - IPM Field Crop Scouting Manual 2013; and Minnesota Department of Agriculture, IPM Publications and Manuals for Minnesota Orchards and Strawberries 2007.

³MDA www.mda.state.mn.us/chemicals/pesticides/complaints.aspx

SMART PESTICIDE PRACTICES⁴

Pesticide use is a reality of agricultural production, but application practices do not need to have a negative impact on pollinators. Consider that foliar insecticides and dust, when using vacuum planters with graphite or talc lubricants for treated seed flow purposes, may cause harm to pollinators. Smart pesticide selection, application, and disposal as well as planting decisions can protect pollinators and other beneficial organisms.

- Scout and monitor pest populations.
- Use IPM and apply conventional and organic pesticides only when necessary.
- Choose, when possible, pesticides and pesticide formulations with low toxicity to bees and other pollinators.
- Read and follow all label directions and application restrictions carefully.
- Prevent drift when applying pesticides.
- Limit pesticides by using spot spraying to control pests including noxious weeds.
- Minimize dust when planting treated seed by following planter manufacturers' recommendations for using seed lubricants to minimize abrasion. When possible use deflector equipment to direct exhaust towards the ground.
- Adopt new technologies and recommendations for the responsible use of insecticide treated seed. Key Stewardship Principles for Farmers can be found at www.seed-treatment-guide.com.
- Build a network with local bee keepers to stay in touch with where their hives are located. Local Extension may be able to help. Keep abreast of changes in Minnesota laws regarding apiary programs and registration.³
- Notify, when possible, known bee keepers within 2 to 3 miles of the treated area at least the evening before the pesticide application.

If a foliar or soil ground or aerial pesticide application must be used, bee deaths can be greatly reduced if application is made when bees are less active (early morning or evening, or when air temperatures are below 55°F).

IMPROVE Existing Habitat in Non-production Areas⁵

Photo Credit: The Xerces Society

- Recognize the various habitat patches on your property that can support pollinators.
- Increase plant diversity in existing areas such as riparian buffers along water bodies, fallow fields, set-aside acres, grassed waterways, field and road borders, ditches, existing CRP land, woodlands, wetlands, and areas near out-buildings.
- Use practices such as inter-seeding to increase species diversity in non-production areas by introducing pollinator-friendly plant species into existing stands of grasses.
- Vary the flowering species planted so that at least three are in bloom each season (spring, summer, and fall). Group individual flowers together to make them easier for pollinators to find and to make foraging more efficient.
- Choose seed mixes for prairie plantings that have a high percentage (40% or more) of flowering plants.
- Provide essential native bee nesting habitat using agroforestry practices (See illustration, *Where Do Native Bees Nest?*).

Adding plant diversity can be accomplished by spreading flower seed mixes after a prescribed burn or after an herbicide application and/or tilling of grass stands to aid establishment. Mowing growth afterwards to around 5-8 inches is beneficial until the native plants are tall enough to compete with weeds. Plants can also be added from containers to speed establishment. Many shrubs such as viburnum, juneberries, plums, cherries, blueberries, New Jersey tea, dogwood, and wild rose can be important early season sources of food and housing for pollinators, plus edible fruits can be collected from some species.



Photo Credit: Prairie Restorations Inc.

⁴Protecting Honey Bees from Pesticides, Oklahoma Department of Agriculture, Food, and Forestry. 2006;

Krupke, Hunt, and Foster. Protecting Honey Bees from Pesticides, Purdue Extension E-53-W, April 2012; and Bauer et al. Bee Aware: Protecting Pollinators from Pesticides. University of Nebraska Extension. EC301. 2013.

⁵Minnesota Board of Water & Soil Resources. Guidelines for Inter-seeding to Restore or Enhance Native Species Diversity. 2012.

USDA. Natural Resources Conservation Service (NRCS)- Minnesota. Forb and Legume Inter-seeding for Wildlife (645), Biology Job Sheet #13. August 2004; and NRCS. 2013. Pollinator Biology and Habitat. Wisconsin Biology Technical Note 8.

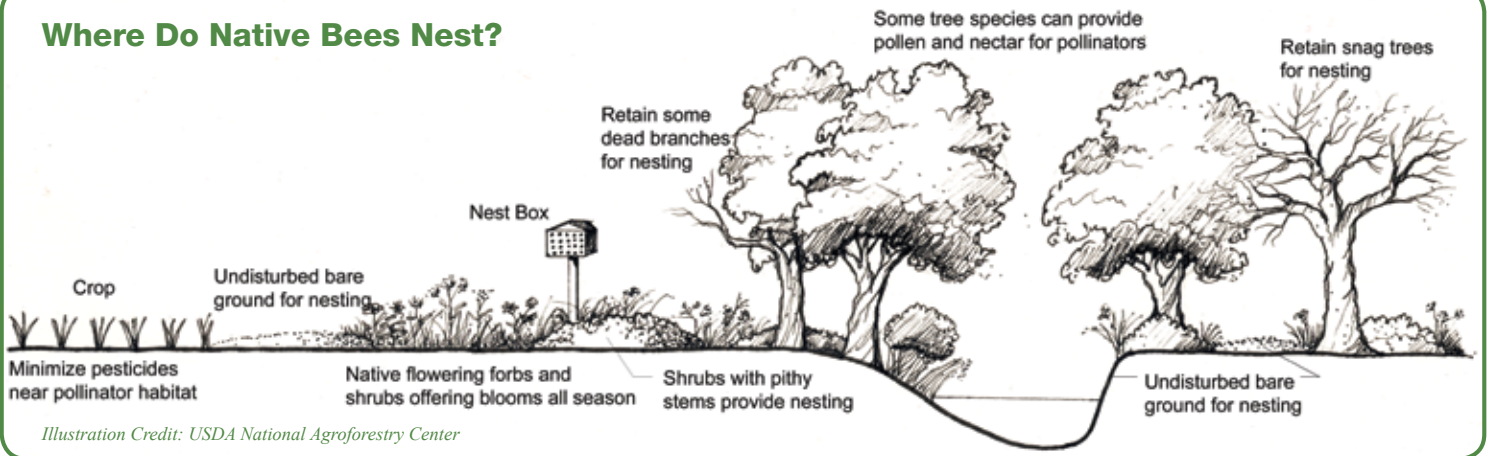
IMPROVE Plant Diversity in Production Areas

Increasing plant diversity to support healthy and diverse insect pollinator populations has numerous potential benefits that may include landscape improvements such as decreasing soil erosion and improving water quality, fertility, and soil health as well as supporting other wildlife populations.

- Attract beneficial insects with a diversity of plants to help control agricultural pests.
- Add flowering plants as cover crops, prairie strips, or by strip cropping to provide forage for pollinators or livestock.
- Use practices such as inter-seeding or inter-cropping legumes with corn or soybean. Extension Research at North Dakota State University found that legumes such as hairy vetch, alfalfa, and red clover could be interseeded into corn or sunflower, without reducing yield, to produce livestock forage high in crude protein and digestibility.⁶ Visit the electronic version of this BMP for more research links.
- Obtain more information regarding these and other conservation practices at the MDA website.⁷

Increasing plant diversity in habitats near, adjacent to, or in your agricultural fields will require good management to prevent unintended negative impacts on the environment and agriculture such as invasion by noxious weeds and invasive species.

Where Do Native Bees Nest?



WHAT ARE THE COMPONENTS OF AN 'IDEAL' LANDSCAPE FOR POLLINATORS?

- Abundant, diverse, and appealing floral resources from flowering plants, shrubs, and trees that bloom throughout the growing season, and that do not cause economic or environmental harm
- Sources of clean water and floral corridors connecting habitat patches
- Plentiful and diverse habitat that includes bare and undisturbed ground, leaf litter, hollow stems, native grasses, and dead wood
- Ample and diverse food plants for immature stages of butterflies, moths, and other insect pollinators
- Abundant overwintering sites for protection from harsh environments
- Protection from fragmentation, mowing, and pesticides

HELP POLLINATORS BY ENCOURAGING NATIVE PLANTS

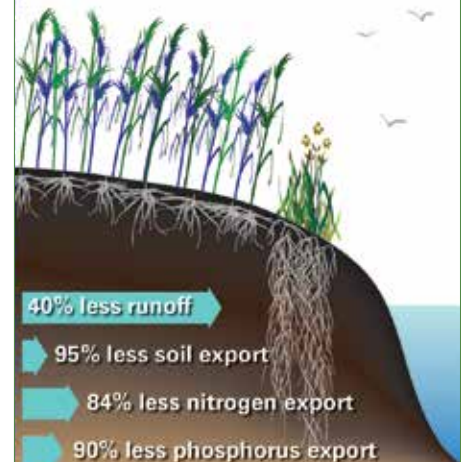
Benefits of Native Plants

- Lower maintenance and fertility requirements
- Adapted to local conditions
- Deep rooted to anchor soil and reduce erosion
- Drought tolerant
- Better quality pollen and nectar than common garden flowers bred for extra petals and novel color

Iowa State University Trials of Row-crops Integrated with Prairie Strips (STRIPS)

What 10% in prairie strips can do:

Four-fold increase in plant species
Twice the bird species,
three times the abundance



⁶Kandel, H. 2008. Using Hairy Vetch in the Cropping System. Plant Science, NDSU Extension. Issue 7.

⁷MDA www.mda.state.mn.us/protecting/conservation/practices.aspx

Infographic Credit: Geetha Lyer, courtesy of the Leopold Center for Sustainable Agriculture and the Iowa State University STRIPS research team.

Utilize Conservation Grazing Practices

Pastures and other areas grazed by livestock can be important pollinator habitat depending on the amount of flowering plants the pasture provides over time. Flowering plants are an important component in the diet of some grazing livestock and they are essential to pollinators.

Ways to provide diverse mixtures of flowers in pasture systems:

- Rotationally graze pastures using a paddock system⁸ to lessen site compaction for ground nesting bees.
- Leave enough regrowth time (rest period) between grazing periods for plants to recover and bloom.
- Have some pastures with flowering plants throughout the growing season.
- Allow livestock to rotate between pastures/paddocks following the flowering plants.
- Over-seed with a high-diversity native forb or native or domestic legume mixtures.
- Reconsider the need for using herbicides and mowing as 'improvement' activities that remove flowering plants to favor grass production.
- Plan carefully when using flowering plants as part of a pasture renovation; consider economics, animal preferences, toxicity, palatability, and soil and site conditions.

CREATE New Habitat

Creating new or expanding existing pollinator habitat may be easier than expected. As a first step, identify features and areas that can be recreated in your farm landscape. Available financial assistance may require compliance with incentive program rules for pollinator habitat (See FUNDING SOURCES box).

- Seed odd corners and edges impractical for big machinery with flowering cover crops or perennial cover
- Plant or seed riparian and wetland areas with perennial cover
- Plant a living snow fence

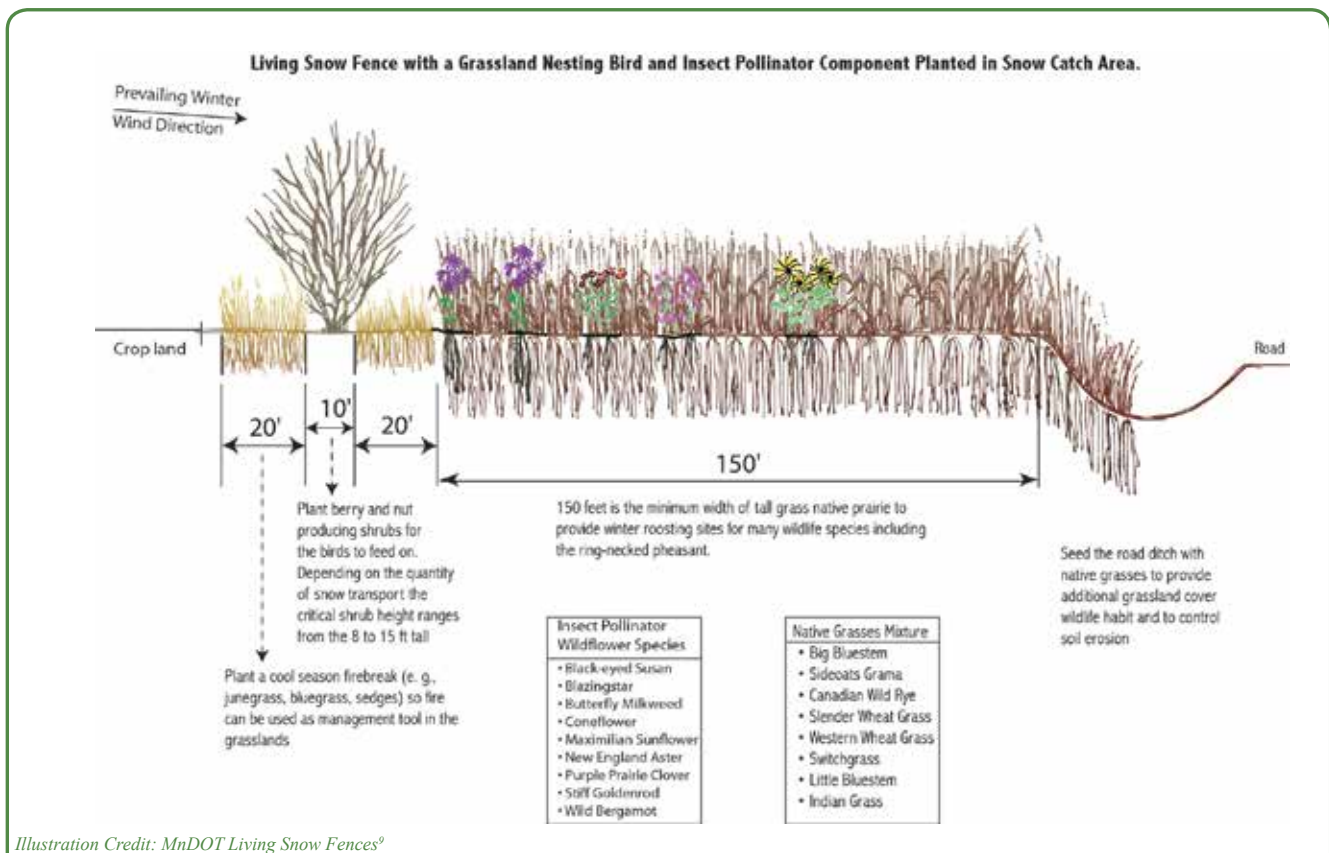


Illustration Credit: MnDOT Living Snow Fences⁹

⁸Blanchet, K. et al. 2003. Grazing Systems Planning Guide. University of Minnesota Extension and USDA-NRCS, Publication BU-07606-S.

⁹MnDOT. Living snow fences. Available at: www.dot.state.mn.us/environment/livingsnowfence/



CREATE NEW HABITAT

- Utilize small and large spaces to create habitat in the farm landscape
- Coordinate with other landowners to create a continuous corridor along a fencerow, riparian area, etc.
- Use diverse annual and perennial seed mixes and plants
- Select plants and planting times best adapted to local climate

Local Extension, Natural Resources Conservation Service (NRCS), Soil and Water Conservation District (SWCD), and Farm Service Agency staff can provide guidance about what programs, practices¹⁰, and funding sources may fit best for your farm and provide the greatest pollinator habitat.

FUNDING SOURCES

A list of federal and state conservation programs that include incentives for pollinator habitat can be found at: www.bwsr.state.mn.us/native_vegetation/Incorporating_Pollinator_Habitat.pdf

Use MDA's website to search for Minnesota Conservation Practices and Payments www.mda.state.mn.us/protecting/conservation.aspx

Additional Resources

For additional information and web links for all resources cited in this BMP, visit MDA's Pollinator Webpage at: www.mda.state.mn.us/pollinators

1. Anonymous. The Guide to Seed Treatment Stewardship. Available at: www.seed-treatment-guide.com
2. Iowa State University, Results of Science-based Trials of Row-crops Integrated with Prairie Strips (STRIPS). Available at: www.prairiestrips.org.
3. Isaacs, R. and Tuell, J. 2007. Conserving Native Bees on Farmland. Michigan State University Extension Bulletin E-2985.
4. Sauter, J. et al. 2004. North Dakota Pollinator Plan. A North Dakota Department of Agriculture Publication.
5. USDA-Agroforestry Note-34, General 8. Enhancing Nest Sites for Native Bee Crop Pollinators, 2007.

The Minnesota Department of Agriculture collaborated with the following partners in preparing these Best Management Practices:

Holm Design and Consulting
Merryweather Farm
Minnesota Agricultural Aircraft Association
Minnesota Association of County Agricultural Inspectors-
Carver County
Minnesota Board of Water and Soil Resources
Minnesota Corn Growers Association
Minnesota Farm Bureau

Minnesota Nursery & Landscape Association
Minnesota Pesticide Information and Education
Minnesota Zoo
The Nature Conservancy
Pheasants Forever
Prairie Restorations, Inc.
Redwood Soil & Water Conservation District
University of Minnesota, Bee Lab

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¹⁰USDA, 2013. Farm Service Agency, CP42-Pollinator Habitat practice and CRP Job Sheets; NRCS-MN and Xerces Society. Native Habitat Development for Pollinators. Biology Jobsheet #16; and NRCS-MN and Xerces Society. Pollinator Habitat Management. Biology Jobsheet #17.