

MSU's Pollinator Protection Plan:

Developing and Maintaining a Pollinator Friendly Campus

Morehead State University (MSU) recognizes the urgent need to protect our native pollinators and domesticated bee populations from their continuing decline due to habitat loss, disease and excessive and inappropriate use of pesticides. Pollinators are part of the intricate web of life that supports biodiversity in natural ecosystems and that help sustain our quality of life. Each of us depends on pollinators to provide us with a wide range of the foods we consume. It has been estimated that animal pollinators are needed for the reproduction of 90% of flowering plants and 1/3 of human crops. (Buchmann and Nabhan, 1996)

The loss of domesticated bee populations due to Colony Collapse Disorder (CCD) has highlighted the need to better understand and protect our pollinators. When pollinators become stressed, from habitat loss, pollution and chemical applications, they can quickly succumb to diseases that can wipe out entire colonies. It is vital that we support the health and proliferation of pollinators through actions such as establishing and restoring habitat, using an integrated pest management plan that minimizes applications of pesticides that may harm pollinators and providing leadership, engagement and education on pollinators to our students, campus community and beyond.

Bee Campus USA

MSU is seeking approval to become the next certified Bee Campus USA. We hope to help raise awareness, provide habitat and protection for pollinators on campus property and throughout our community. The following highlights the beginning steps our University has or will take in 2016 to address the protection of pollinators.

- 1) We established a Bee Campus USA committee in February 2016 composed of faculty, staff, students and community members. The committee will meet at least quarterly to discuss progress, work on pollinator projects and/or propose new ideas.
- 2) MSU will utilize "Selecting Plants for Pollinators: A Regional Guide for Farmers, Land Managers, and Gardeners in the Eastern broadleaf Forest Oceanic Province" published by the Pollinator Partnership and NAPPCC to select native plants for pollinators. We will also utilize native plant lists from the [Kentucky Native Plant Society](#). In addition, we have established a locally native, pollinator friendly plant list for our area with regional sources for obtaining the plants on our website at www.moreheadstate.edu/earthwise.
- 3) We have developed a google map layer of campus native plant gardens that indicates current and planned pollinator habitat restoration sites. We included a map of bee hives on MSU property that are maintained by MSU Farm & Orchard employees and students.

4) The committee has developed an integrated pest management plan and best practices for using pesticides on campus properties.

5) We will host an annual campus events to raise awareness of the importance of pollinators. During 2016, we will combine our Tree Campus USA and Bee Campus USA celebrations with an event on March 30th at the bell tower on campus. We will have a chalk it up event, in which students can write and draw pictures on the sidewalk about the importance of trees and pollinators. We will have informational posters, giveaways and a trivia game too. On April 1st, we will be planting native trees and plants in the new Carbon Pocket Park outdoor classroom behind Normal Hall and adjacent to the Space Science Center. We will also install a new educational sign about protecting pollinators in this area. We will show the movie “Vanishing of the Bees” at our Earth Day Film Festival on April 16th during the Kentucky Proud Expo at the Morehead Convention Center. All events will be published in our school news, website, and social media.

6) MSU’s Center for Environmental Education will sponsor and track annual student service-learning projects to enhance pollinator habitats on and off campus. Service learning projects for 2016 include an all-day field trip for K-12 local schools in partnership with MSU’s Department of Biology and the Forest Service. Activities during the field trip will teach local students about pollinator habitats and protection. Professor Jen O’Keefe will present workshops at the local Beekeeping School on February 27th at Maysville Community and Technical College about her work typing honey by studying pollen spores from the MSU Farm’s honey harvest over the past 3 years. This information can be used to identify the types of pollen the honey bees are preferring so that more of those plants can be planted to support the bees. Holly Niehoff, Sustainability & Safety Specialist will provide a training workshop and information on pollinator protection and habitats at the annual community Town & County event held at the Rowan County High School on March 22nd, 2016. MSU’s Office of Environmental Health and Safety will provide training on proper pesticide use and application for our ground maintenance employees and farm/orchard employees in April 2016 and annually thereafter.

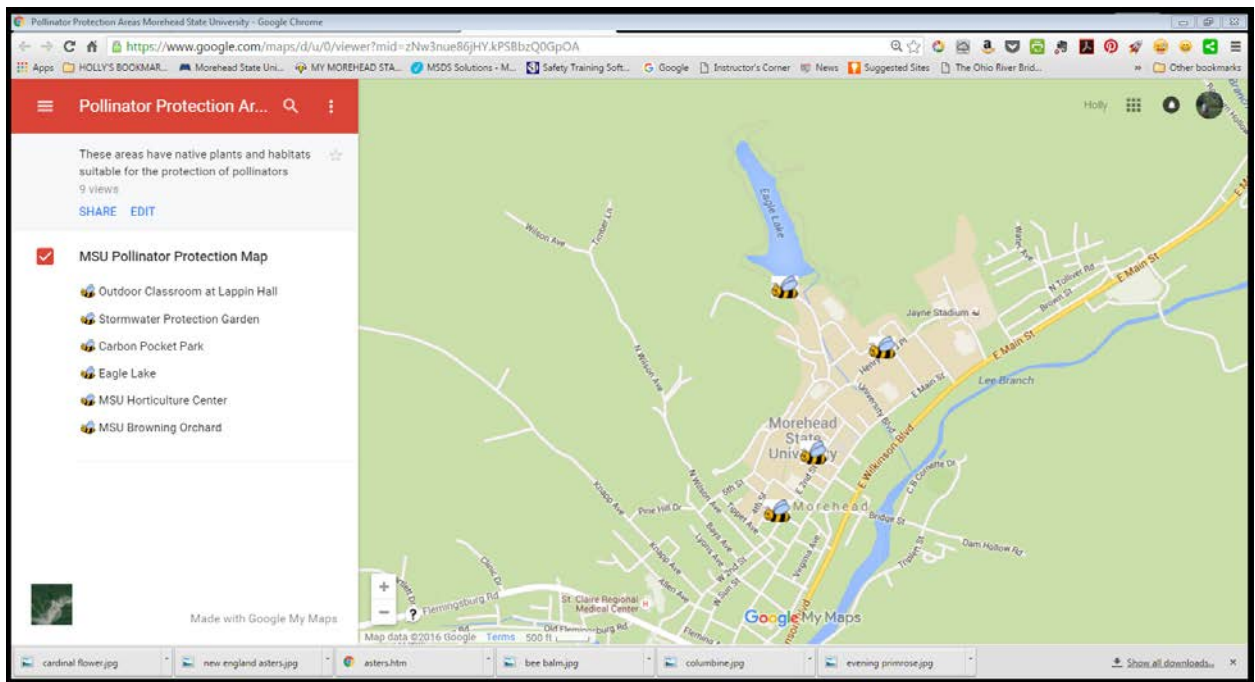
7) In addition to the signage posted on campus, the MSU Earthwise Eagles website will maintain information on our pollinator protection plan and update the site regularly. They will work with various stakeholders on and off campus to promote pollinator habitat creation and protection.

About Us

Morehead State University is nestled in the foothills of the Appalachian Mountains in Morehead, Kentucky. The region is included in #221 of the Bailey’s Ecosystem Provinces and is considered the Appalachian Plateaus topography. It is dominated by deciduous forests in the USDA Hardiness Zone 6.

Several areas on campus already support a diverse population of pollinators and other spots are being developed. The areas we currently have include:








- The [Outdoor Classroom](#) behind Lappin Hall has native plants & trees, a rain garden, composting and rain barrel catchment system.
- A parking lot storm water diversion garden with native plants was installed for Earth Day 2014 in the parking lot behind Howell McDowell.
- The [Governor's Garden](#) is located beside Reed Hall and has a variety of vegetables growing seasonally, produce is donated to local charities for the needy. (This will be relocated to a different area on campus in Spring 2016)
- MSU has a 30 acre lake ([Eagle Lake](#)) on the northern edge of the campus surrounded by roughly 645 acres of conservation forest land owned by the University with wildflowers & plants, wetlands, streams and hiking trails. This area is designated a Certified Wildlife Habitat by the National Wildlife Federation.
- The [Derrickson Agricultural Complex](#) is a 325 acre farm that supports a variety of agriculture crops. It has beehives near the greenhouses that staff and students care for.
- [MSU's Browning Orchard](#) is a 166 acre orchard that has a variety of heirloom apple trees and beehives that staff and students care for.
- In the spring of 2016, MSU Center for Environmental Education will be creating a new outdoor classroom called the Carbon Pocket Park. This area will contain a variety of native plants and pollinator habitat. The Bee Campus Committee will be installing a permanent 24" x 24" outdoor sign in this area with information about pollinators and their protection. They will also install Pesticide Free Zone signs at both outdoor classrooms.
- [Campus Map of Pollinator Friendly Areas](#)





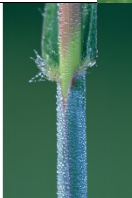










MSU's Sustainability Committee developed a [Sustainability Strategic Plan](#) for 2015 - 2020. Several aspects of the plan work together to protect our natural resources and wildlife, including pollinators. These include:

- Utilize native plant species in landscaping and eliminate the use of invasive plant species.
- Expand naturalized habitat to decrease the amount of managed turf grass, reducing the amount of maintenance and improving storm water runoff.
- Reduce fertilizer, herbicide and pesticide usage.
- Decrease erosion and storm water pollution.
- Utilize compost to increase soil nutrients and health.
- Develop nature programs that incorporate outdoor connections and knowledge.

Campus Native Wildflower List

| <u>Locations</u> | <u>Common Name</u> | <u>Genus, Species</u> | <u>Photo</u> |
|-------------------------------------|---|------------------------------------|---|
| Lappin Hall Outdoor Classroom | Common Milkweed | <i>Asclepias syriaca</i> |  |
| | Purple Coneflower | <i>Echinacea purpurea</i> |  |
| | Swamp Milkweed | <i>Asclepias incarnate</i> |  |
| | Hoary Mountain Mint | <i>Pycnanthemum incanum</i> |  |
| | Tennessee Coneflower | <i>Echinacea Tennesseensis</i> |  |
| | Goldenrod (Kentucky State Flower) | <i>Solidago sp.</i> |  |
| | Evening Primrose | <i>Oenothera biennis</i> |  |

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|---|--------------------|-------------------------------|---|
| | Columbine | <i>Aquilegia Canadensis</i> |  |
| | Bee Balm | <i>Monarda didyma</i> |  |
| | Asters | <i>Aster sp.</i> | |
| | New England Asters | <i>Aster</i> |  |
| | Cardinal Flower | <i>Lobelia cardinalis</i> |  |
| | Big Bluestem | <i>Andropogon gerardii</i> |  |
| Storm water diversion garden in parking lot behind Howell McDowell | Boneset | <i>Eupatorium perfoliatum</i> |  |
| | Purple Coneflower | <i>Echinacea purpurea</i> |  |
| | Swamp Milkweed | <i>Asclepias incarnate</i> |  |
| | Blazing Star | <i>Liatris sp.</i> |  |
| | Cardinal Flower | <i>Lobelia cardinalis</i> |  |

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|--|-----------------|--------------------------------|---|
| | Orange Milkweed | <i>Asclepias tuberosa</i> |  |
| | Bee Balm | <i>Monarda didyma</i> |  |
| | Sedge sp. | <i>Sedge sp.</i> | |
| | Little Bluestem | <i>Schizachyrium scoparium</i> |  |

*Note: There are more native plants in the Eagle Lake forest and wetland areas. In addition, there will be more plants added to the Carbon Pocket Park in spring 2016.

Campus Tree List

COMMON NAME

SCIENTIFIC NAME

Eastern Redbud

Cercis canadensis

White Flowering American Dogwood

Cornus florida

Pink Flowering American Dogwood

Cornus florida var. *rubra*

Saucer Magnolia

Magnolia x soulangiana

Southern Catalpa

Catalpa bignonioides

Thornless Honeylocust

Gleditsia triacanthos var. *inermis*

Smoke Tree

Cotinus coggygria

Ginko, Maidenhair Tree

Ginko biloba

Silver Maple

Acer saccharinum

Red Maple

Acer rubrum

White Oak

Quercus alba

Pin Oak

Quercus palustris

| | |
|---------------------------------------|--|
| Red Oak | <i>Quercus rubra</i> |
| Green Ash | <i>Fraxinus pennsylvanica</i> |
| White Ash | <i>Fraxinus americana</i> |
| American Beech | <i>Fagus grandifolia</i> |
| Yellowwood | <i>Cladrastis kentukea</i> |
| Southern Magnolia | <i>Magnolia grandiflora</i> |
| Eastern White Pine | <i>Pinus strobus</i> |
| Canadian Hemlock | <i>Tsuga canadensis</i> |
| Norway Spruce | <i>Picea abies</i> |
| American Holly | <i>Ilex opaca</i> |
| Foster Holly | <i>Ilex × attenuata</i> 'Fosteri' |
| *Bloodgood Japanese Maple | <i>Acer palmatum</i> 'Bloodgood' |
| *Threadleaf or Cutleaf Japanese Maple | <i>Acer palmatum</i> var. <i>dissectum</i> 'Atropurpureum' |

Kentucky Invasive Species List

Although some non-native plant species display colorful flowers and are popular as garden ornamentals, they can be highly invasive and destructive to a natural environment. Many introduced, or "exotic" plants were planted to decorate homes and gardens. Over the years, they have escaped cultivation and have infested natural areas. Because they are growing in an environment that lacks natural controls (diseases, predation), they have an advantage over native species and can easily out compete them for habitat. This causes an imbalance in the ecosystem and threatens the biodiversity of the area.

The Kentucky Exotic Pest Plant Council, Kentucky affiliate of the Southeast Exotic Pest Plant Council, has the responsibility of keeping a list of the most severely invasive plant threats to Kentucky. Their current list can be seen at <http://www.se-eppc.org/ky/list.htm>.

Although there are many invasive species threats, the following are considered the top ten worst plant threats in Kentucky:

Bush Honeysuckle rapidly invade and overtake a site, altering habitats by decreasing light availability, depleting soil moisture and nutrients, and possibly by releasing toxic chemicals that prevent other plant species from growing in the vicinity.

Chinese Silvergrass forms extensive infestations by escaping from older ornamental plantings to roadsides, forest margins, and adjacent disturbed sites, especially after burning.

Garlic Mustard invades a forest through a disturbance such as tree fall or trail construction. Prolific seed production and lack of natural predators allow it to quickly dominate the ground cover.

Japanese Knotweed spreads quickly to form dense thickets that exclude native species and are of little value to wildlife, leading to it being described as an environmental weed.

Japanese Stiltgrass, also known as Nepalese browntop is especially well adapted to low light conditions. It threatens native plants and natural habitats in open to shady, and moist to dry locations.

Kudzu smothers, it does not strangle competition, but simply blankets trees with a dense canopy, through which little light can penetrate.

Multi-Flora Rose has invaded a large number of habitats, from hillside pastures, fence rows, rights of way, and roadsides to forest edges and the margins of swamps and marshes.

Oriental Bittersweet is a serious threat to plant communities due to its high reproductive rate, long range dispersal, ability to root sucker and rapid growth rate.

Purple Loosestrife alters the biogeochemical and hydrological processes in wetlands.

Winged Burningbush seeds are eaten and dispersed by birds and other animals, and this has contributed to its spread. Now widely naturalized and invading natural habitats, Winged Burningbush is considered a noxious weed.

MSU Integrated Pest Management Plan

Best Practices for Pest Control on Campus Grounds

Definition

Integrated pest management (IPM) is a sustainable approach to managing pests that combines biological, cultural, mechanical, physical and chemical tools in a way that minimizes economic, health and environmental risks. IPM creates a safer and healthier learning environment by effectively managing pests and reducing unnecessary exposures to pesticides.

Applicators

Only MSU employees or contractors with a current valid Kentucky State Pesticide License may apply chemical fertilizers and/or pesticides on MSU property. These state licensed applicators must first pass a written exam and attend approved annual training to obtain and maintain their license. All pesticide applicators must wear and/or use the proper protective equipment, strictly follow the product label instructions for use, and comply with all local, state and federal regulations. All Material Safety Data Sheets must be on the MSU Environmental Health and Safety website's MSDS Online system and available for review. For more information on Kentucky Pesticide Operator's and laws refer to the Kentucky Department of Agriculture's website at <http://www.kyagr.com/consumer/agricultural-branch.html>

Preventive Measures

MSU landscaping professionals, contractors, designers and staff shall only select plants varieties for campus landscaping and grounds that are either native to our region and/or proven not to introduce disease, insect problems or become invasive. Plants should be selected based on the specific environmental conditions for the site. This includes naturally available light, water, nutrients and protection. Soil health should be evaluated before establishing new planting areas. Soil amendments should include the use of natural materials whenever possible, including application of compost, manure and organic fertilizers. Maintaining healthy crops through proper sanitation and removal of diseased plantings is important to prevent the spread of plant disease.

Monitoring

Plants should be periodically inspected for disease, lack of nutrients, lack of moisture and pests. If plants are found to have a pest infestation, the pest should be properly identified to ensure that it is not a beneficial insect, or that it may in fact, not harm the plant or be a threat to people.

Mechanical & Cultural Control

Practices such as planting pest resistant crops, crop rotation, removing crop residue at the end of season, using trap crops, companion planting, tilling, and creating on farm habitat for predator and parasitoid insects that suppress pest species are important steps to reduce the use of pesticides and should be some of the first options considered when planning yearly crops at the MSU Farm and landscaping areas on campus. Other measures include control by hand picking, hand weeding, bug vacuuming, special types of mulch, protective screening, row cover, and pheromone traps and lures.

Biological Control

Biological controls include promoting beneficial insects that eat or parasitize target pests. Beneficial insects do not harm people, plants or pets. For maximum effectiveness, they should be released when pest densities are low to medium. Beneficial insects are not a miracle cure. Just as it takes a long time for pest problems to evolve, it also takes time before beneficial's can resolve them. Some nematode applications are also beneficial. The internet has plenty of information on beneficial insects and links to suppliers. We provided a link to a few sites in our sources below. This is in no way an endorsement of any particular website or business organization.

Pesticides

Pesticide applications should be the last resort. Routine spraying and preemptive treatments are contrary to the philosophy of IPM. Selection of pesticide products should only be made after other controls have failed. Any selection of pesticide should first consider the safest and least toxic products available to humans and the environment. Any product that is labeled toxic to bees and other pollinators should **not** be used unless there is no other product available. Not all products that are harmful to pollinators are labeled as such, so due diligence in selecting the best pesticide is important. (See Neonicotinoid ban below.)

Pesticide application should be made in the early morning hours or late evening hours when bees and other pollinators are less likely to come in contact with it. Plants that are budding and flowering should not have pesticide applied to them until after the blooms have withered and dropped to the ground. Applicators should minimize drift by utilizing a protective cover for other plants and surfaces in the area during the application. All label instructions must be followed, the label is the law.

Proper notice should be made when applying pesticides on campus grounds, including crop fields at the farm and orchard. Signs should be posted in the area that detail the date and time of application, the product applied, and how long citizens should be expected to stay out of the area.

Some areas of campus may be declared pesticide free zones, including the Outdoor Classroom behind Lappin Hall and the Carbon Pocket Park behind Normal Hall. No pesticides should be used in these areas. In addition, any areas treated should not be in the path of direct runoff to any campus streams or lake. Any application of pesticides adjacent to water ways must follow proper procedure as outlined on the manufacturer's label with respect to water ways. Applicators must consider the forecast of rain potential to minimize pesticide runoff.

Campus Neonicotinoid Ban

Recent studies ([Hopwood, et.al., 2012](#)) have shown a strong correlation between neonicotinoid pesticides and increased susceptibility to parasites and pathogens that can lead to colony collapse disorder in domesticated bees. Native bees are also on the decline, as well as many species of butterflies, moths and other pollinators. Neonicotinoids have a negative effect on insect nervous systems, by blocking nerve impulses. Neonicotinoids are systemic chemicals; they are absorbed by the plant and are transferred through the vascular system, making the plant itself toxic to insects. These residues are found in pollen and nectar and are consumed by flower-visiting insects. The long-lasting presence of neonicotinoids in plants (months to years) makes it possible for these chemicals to harm pollinators, even when the initial application is made outside of the bloom period, to the seed, or directly to the ground.

Unfortunately, current regulations have not addressed these concerns and our regulators are slow to act on such important developments. In light of the preliminary research that has been done, we must conclude that neonicotinoid products are harmful to pollinators and take steps to reduce the impact on pollinators. MSU will follow best practices by banning the use of neonicotinoid pesticides on plants and ground surfaces that may come in contact with pollinators. This includes the six insecticides with any of the following ingredient names; ***acetamiprid, clothianidin, imidacloprid, dinotefuran, thiacloprid, and thiamethoxam***. Since neonicotinoids can be applied as seed coatings, soil drenches or granules, foliar sprays, direct injection into tree trunks, or by introduction of the insecticide to irrigation water, persons responsible with the selection of pesticides must keep in mind the variety of products that may contain neonicotinoids and ensure that they are not purchasing these for use on campus property. Plant and seed selection should not have any neonicotinoid compound coatings or systemic presence in the plant. Those who purchase seed and plants should check with the seed manufacturer and/or supply nursery to verify that no seed treatment, coating or application of neonicotinoids has occurred before purchasing.

If future research indicates that neonicotinoids are not responsible for a decline in pollinators, we will revisit the need for the ban and consider reversing it.

Tree & Native Plant Links

Selecting Plants for Pollinators: A Regional Guide for Farmers, Land Managers, and Gardeners in the Eastern Broadleaf Forest Oceanic Province.

<http://pollinator.org/PDFs/Guides/EasternBroadleafOceanicrx20FINAL.pdf>

List of invasive species in Kentucky from Kentucky Exotic Pest Council - <http://www.se-eppc.org/ky/list.htm>

[Kentucky Division of Forestry](#)

[USDA Forests and Forestry Information](#)

[The Kentucky Native Plant Society](#)

[Native Plant Lists](#)

[Ladybird Johnson Wildflower List for Kentucky](#)

[US Forest Service – Invasive Species Information](#)

Pollinator links

[Pollinator Partnership](#)

[Pollinator Protection – Pesticide Environmental Stewardship](#)

[Friends of the Earth: Bee Action Campaign](#)

[Pollinator Live – A Distance Learning Adventure](#)

[Bee City & Bee Campus USA](#)

[Kentucky Bee Keepers Association](#)

[Kentucky Department of Agriculture – Honey Bees](#)

[Keeping Backyard Bees](#)

Integrated Pest Management & Pesticide Information

Kentucky Master Gardner – Integrated Pest Management:

<http://www2.ca.uky.edu/agc/pubs/ent/ent69/ent69.pdf>

Kentucky Insect ID database:

<http://www.insectidentification.org/insects-by-state.asp?thisState=Kentucky>

Information on beneficial insects:

Vendors of beneficial insects: <http://www2.ca.uky.edu/entomology/entfacts/ef125.asp>

Lists of beneficial insects:

<http://www.uky.edu/Ag/IPM/teachers/outdoorclassrm/beneficialinsects.html>

Lists of beneficial insects: <http://www.planetnatural.com/pest-problem-solver/>

Kentucky – Manual for Tree Pest Control and Invasive Species Control

<http://pest.ca.uky.edu/PSEP/Manuals/cat%202%20manual.pdf>

[Beyond Pesticides](#)

[Friends of the Earth: Pesticides to Avoid](#)

Sources for Native plants in Kentucky

[Kentucky Division of Forestry Nurseries](#) Kentucky Division of Forestry | 627 Comanche Trail | Frankfort, KY 40601. 502-564-4496/502-564-2860 (Telephone) | 502-564-6553 (Fax)

[Plant Native](#) – Online directory of sources by state.

[National Pollinator Friendly Seed & Nursery Directory](#)

References

Buchmann, S.L. and Nabhan, G.P. (1996) *The Forgotten Pollinators*. Island Press: Washington DC.

Hopwood, Jennifer; Vaughn, Mace; Shepherd, Matthew; Biddinger, David, Mader, Eric; Black, Scott Huffman; and Mazzacano, Celeste. (2012) “*Are Neonicotinoids Killing Bees? A Review of Research into the Effects of Neonicotinoid Insecticides on Bees, with Recommendations for Action.*” The Xerces Society for Invertebrate Conservation. Electronically sourced from:

<http://www.xerces.org/neonicotinoids-and-bees/>

Kentucky Department of Agriculture. Website information on Pesticide Applicator license:

<http://www.kyagr.com/consumer/agricultural-branch.html>