

Pollinator Protection Plan for Office of  
Sustainability Practices

By Emily Noordyke, Claire Seekley, and Gracey Mussina

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This document outlines the current pollinator friendly practices being used at Grand Valley State University as well as strategies to improve practices in the future.

## Sustainable Agriculture Project

The Sustainable Agriculture Project (SAP) has a history of pollinator friendly practices. They do not use pesticides and they actively maintain diversity in their crops that can benefit many types of pollinators. In the past, the SAP has had multiple pollinator related projects. In the spring of 2016, the SAP planted seed bombs (a mix of clay, loam, and seeds) with pollinator friendly varieties in the north field behind the bee hives. Most of these varieties were perennials, so are expected to regrow this season as well. This spring, Youssef Darwich plans to plant more seed bombs on the property.

Flowers have been planted each season with the purpose of being cut and sold at the GVSU farmers' market. Youssef emphasizes the importance of these flowers because they benefit pollinators, provide aesthetics at the SAP, and can be sold for profit.

Many trees were also planted at the SAP in the fall of 2016. Most of these trees were picked because of their market value and their benefit to pollinators:

- Apple varieties
- Plum family (American, peach, nectarine, apricot and cherry)
- Chestnut
- Service berries
- Hazelnuts
- Pears

In the future, Youssef also plans to mow fields using methods to increase plant diversity and plant more cover crops such as clover. Clover is a consistent source of nectar and is one of the few plants that produces pollen with the complete suite of amino acids important to honey bee health. Both of these management strategies improve the diversity of the landscape, thus benefitting pollinators.

On the other hand, some practices near the SAP are of concern to pollinator health. The surrounding farmland owned by GVSU that is currently rented by a local farmer contains monocultures of corn and soybean. This decreases the overall diversity of the landscape and also increases the amount of pesticide usage on the property. Pesticide application on this land could be problematic for GVSU bee colonies and other native pollinators because of pesticide drift during or after application. More evidence of the farmer's pesticide regiment should be gathered in the future. Perhaps GVSU could monitor the timing of the pesticide application to minimize pollinator exposure. GVSU could also plan to use this land for more sustainable agriculture methods.

## **Arborist Practices**

Steve Snell, the campus arborist, provided a list of the types of trees on campus as well as their spatial distribution. Trees are crucial sources of early spring pollen for bees. Willows and maples are notable examples of trees that bloom early on campus. When asked about pollinator friendly practices as an arborist, he mentioned that he learned at a conference that fungicides used to treat trees can be gathered by bees in pollen, subsequently getting into their bee bread (the fermented mixture of pollen they pack into their comb to feed brood). He then mentioned that the fungicides kill the yeast in the bee bread, halting its natural fermentation process. Because of this phenomenon, Steve Snell tries his best to time the application of fungicides after the trees bloom so that it does not coincide with pollinator visits. He added that it is still a challenge to time certain fungicides, and that he is working toward solving this issue.

Furthermore, the campus arborist has many pollinator -ocused projects in mind for the future. He hopes to plant milkweed in the rain gardens by Vansteeland to attract monarch butterflies and honey bees, as well as butterfly bushes by Niemeyer Honors College. He also plans to plant dill weed in the land around the radio towers in South campus. Swallowtail butterflies prefer dill weed as their host plant.

A professional arborist and beekeeper named Mike Connor also visited GVSU this spring to show GVSU Beekeepers how to look for pollinator friendly trees. He helped to confirm that we have many trees beneficial to pollinator health on campus. He also mentioned that pollinators prefer trees that bloom on the edges of the ravines and in the middle of campus, rather than trees within the ravines. Some of the notable pollinator friendly trees on campus that Mike Connor listed were willows, red maples, silver maples, tulip trees, hawthornes, basswood, and staghorn sumac.

GVSU Beekeepers, in partnership with Steve Snell and Mike Connor, plan to plant a basswood tree somewhere in south campus. Basswood trees are optimal sources of nectar for bees in the spring. Supposedly, they can provide an entire colony with enough nectar to support them for six months. This is a promising development for pollinators on campus.

## **Facilities Practices**

Facilities have integrated pest management strategies (IPM) in place, but more research is required to assess their effectiveness. Optimally, IPM should reduce the amount of pests visiting plants on campus, which decreases the reliance on pesticides. Youssef Darwich suggested that facilities should plant native species that will attract fewer pests instead of trying to use organic alternatives to neonicotinoids. Though we did not find further detail about GVSU's IPM, it is an important thing to assess in the future.

According to Youssef, facilities prefer to plant native perennial flowers rather than annual flowers. This is encouraging, because native perennials will provide sources of food more tailored to native pollinators' natural diets. Native perennials have many other benefits as well. They require less water and attract fewer pests because they are more adapted to their environment (Isaacs et al., 2009). They also regrow for multiple years, unlike annuals, which saves facilities time and money. Overall, it is encouraging that

facilities emphasize planting native perennials. Further contact with Ed Simon and Ken Stanton would be useful in assessing campus pollinator friendly landscaping.

### **Meadows Golf Course**

After an interview with Ron Dahlan, superintendent of the Meadows golf course, we found that they do not take pollinators or basic sustainability practices into account in their operations. Ron explained that due to a “lack of resources,” they are limited in the changes they are able to make regarding pesticides, fungicides, etc. However, he did mention that they allow wildflowers to grow throughout the growing season and refrain from cutting them until the end of the year. On the other hand, the golf course uses an abundance of pesticides without any plans or regards for how it affects pollinators and the ecosystem in which it resides. A list of the pesticides and fungicides they apply could not be provided at this time. Those who apply pesticides are required to be certified in doing so. The golf course has immense potential to make more sustainable choices. For example, switching to alternative, organic pesticides could be healthier for the pollinators and golfers that frequent the course. A list of alternative pesticides can be found on the Xerces society website at <http://www.xerces.org/wp-content/uploads/2009/12/xerces-organic-approved-pesticides-factsheet.pdf>

### **GVSU Beekeepers’ Practices**

GVSU Beekeepers cultivates a community around pollinator activism. They coordinate events on campus to educate students about pollinator decline and beekeeping practices. Managing the honey bees at the SAP provides both important pollination services and a novel learning experience for volunteers. Not only are the GVSU Beekeepers involved on campus, but they also travel to conferences and other beekeeping clubs to learn the latest beekeeping practices and to share their own research. In 2016, beekeeping club has pursued bee related research to better inform their beekeeping practices and to contribute to the science that encompasses bee decline. More detail about their relevant research is laid out in the following section.

### **GVSU Beekeepers’ Student Research**

In the summer of 2016, Emily Noordyke and Anne Marie Fauvel conducted a nutritional analysis of GVSU honey bee colonies at the SAP in Allendale and at the GVSU Meijer Campus in Holland. The study compared the quality and quantity of pollen and nectar resources for the colonies. They found that the pollen quantity, diversity, and protein content gathered throughout the blooming season was adequate for colony health in both locations. As well, nectar flow was consistent and adequate. This study showed that the forage available to GVSU colonies is good for their health; however, they still see a pattern of colony decline in the late summer months in Allendale. The declines in Allendale may indicate that other factors could be impacting honey bee health. A few of the factors could include: 1) pesticides from surrounding monocultures contaminating food sources, 2) heightened instances of hive-dwelling pests like the Varroa mite (*Varroa destructor*) in Allendale, and 3) lower proximity of forage to the colonies.



The third factor was recently revealed by a GIS survey done by GVSU student Joseph Thick. Though Allendale and Holland have relatively similar amounts of pastureland for bee forage (figure 1), the GIS maps (figures 2 and 3) indicate that the pastureland in Holland is directly surrounding the hives, whereas the pastureland in Allendale is spread out in smaller clumps. The phenomenon in Allendale could force the bees to work harder to find and gather forage. They must fly larger distances more frequently, which causes them to expend more energy. When other problematic factors are already working against bee health in Allendale, this added stressor makes it more difficult for bees to thrive. The information learned from the GIS survey could help construct a plan to improve the landscape in Allendale that lacks pollinator forage.

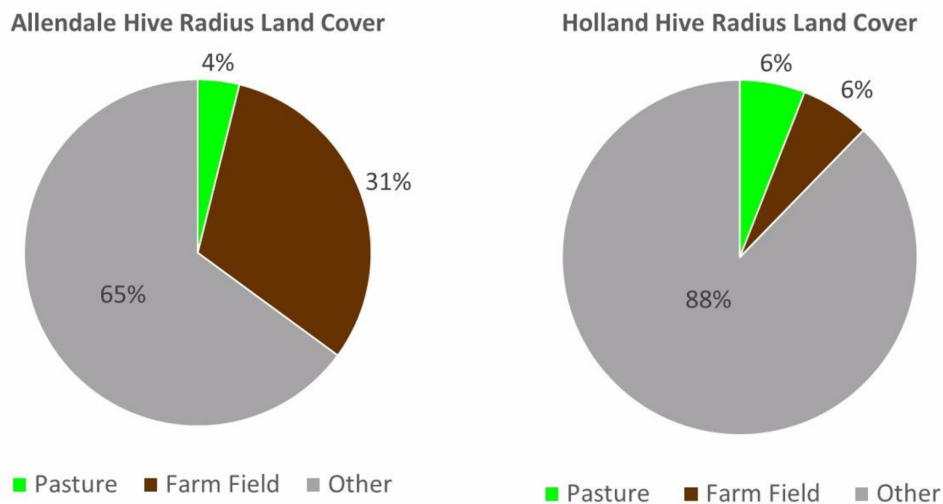


Figure 1. Comparison between Allendale hive radius land cover and Holland hive radius land cover.

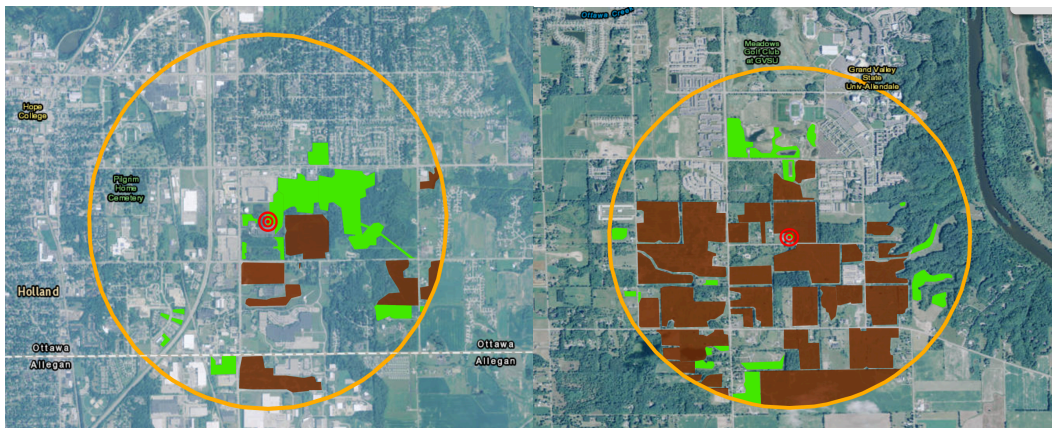


Figure 2 and 3. GIS maps of the type of land cover surrounding GVSU hives in Holland (2) and Allendale (3). The orange circles indicate the three mile radius around hives in which bees typically forage and the central target shows the location of our apiaries. Brown indicates areas of farm field, while green indicates areas of pasture in which bees tend to forage most.

Here is a link to more details from Joseph Thick's project:

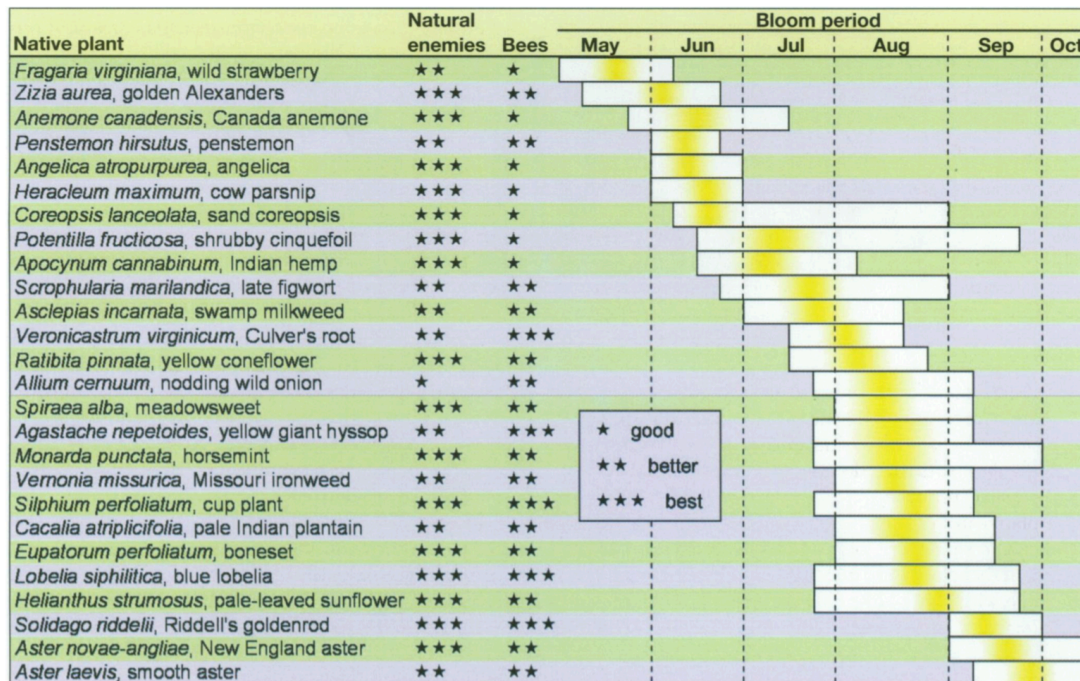
<http://www.arcgis.com/apps/MapSeries/index.html?appid=bfa873e973fa4f479b393e41736df5ad>

## Future Strategies

Overall, pollinators could benefit from an increase in native perennial wildflowers and trees on campus, and a decrease in pesticide use and proper timing of pesticide applications. In the future, a joint meeting about pollinator friendly practices between Ken Stanton and Ed Simon (the heads of facilities), Steve Snell (the campus arborist), Ron Dahlan (the head of Meadows golf course), Anne Marie Fauvel (the advisor to GVSU Beekeepers), and the members of the Office of Sustainability Practices would be powerful in moving forward with a Pollinator Protection Plan. This meeting could strengthen sustainable pesticide regimens and integrated pest management strategies, increase plant diversity on campus, and raise pollinator awareness among major stakeholders.

## Useful Resources

- In a study conducted at Michigan State University, Isaacs et al. (2009) determined a list of native perennial wildflowers specific to West Michigan (see below) that could help inform planting choices at GVSU. They also indicate which types of insects each plant benefits, to what extent they are beneficial, and when they bloom. Having a diverse series of plants is important in providing a source of food for pollinators throughout the entire blooming season.



**Figure 2.** Relative bloom phenology of the 26 native Midwest prairie plants most frequented by beneficial insects in a replicated study, ordered by bloom timing in 2005. White and yellow bars represent the bloom period for each species, with yellow indicating peak bloom. The number of stars after each plant indicates the frequency of visits by insect natural enemies (predators and parasitoids) and bees (pollinators), based on how many insects were collected per square meter in a 30-second sample. One star = fewer than 2 insects; two stars = 2 to 10 insects; three stars = more than 10 insects.

- The Michigan Pollinator Initiative has resources for beekeepers, growers, land managers, policy makers, and students at <https://pollinators.msu.edu/>
- The Michigan Pollinator Protection Plan aims to help pollinator populations statewide. This could provide GVSU with its own Pollinator Protection Plan. Their policies are not yet implemented, but their outline is available for public viewing at <https://pollinators.msu.edu/protection-plan/the-protection-plan-for-managed-pollinators-in-michigan/>
- The Friends of the Earth and Responsible Purchasing Network have created a buyers' guide for organizations to protect pollinators. It overviews how organizations (or Universities like GVSU) can make pollinator friendly purchases, connect with local vendors, compile a list of alternative pesticides, create pollinator habitat, and maintain their plan over time. It cites neonicotinoids as the major pesticides to avoid. It also provides a list of neonicotinoid prices alongside the prices of their alternatives and the savings one would make by switching. Lastly, there are many successful case studies and links to their pollinator protection plans. It can be accessed at [http://webiva-downton.s3.amazonaws.com/877/d6/0/9646/FOE\\_RPNbeeBuyerGuide\\_7.compressed.pdf](http://webiva-downton.s3.amazonaws.com/877/d6/0/9646/FOE_RPNbeeBuyerGuide_7.compressed.pdf)
- The Xerces Society for Invertebrate Conservation provides a list of more organic forms of pesticides at <http://www.xerces.org/wp-content/uploads/2009/12/xerces-organic-approved-pesticides-factsheet.pdf>

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