WISCONSIN POLLINATOR HABITAT KIT PROGRAM

Habitat Kit Case Studies: Pathways for Site Prep and Planting

Smothering, tillage, mulching, and many hands contribute to the successful planting of beautiful and important native pollinator habitat.
(Photos [l – r]: Harriet Behar / Sweet Springs Farm, Sarah Mullins / Brooklyn School Garden, Harriet Behar / Sweet Springs Farm.)

The following case studies were produced in collaboration with 2023 Wisconsin Habitat Kit Program awardees – farmers and community members – who graciously shared their site preparation and planting experiences: what worked, what could be improved, and why they chose a particular method. These case studies demonstrate how existing vegetation, site preparation, and weed pressure are interlinked and influence native plant establishment and growth in the first year.

Each case presents a snapshot of a different site preparation method and the materials used to prepare a site for a garden-like, native plug planting: smothering, tillage, herbicide, mulching, a combination of these varying methods, and others[1]. These cases are not intended to describe a "right way" of planting as there are so many. Rather, each case study is a realistic and informative story that describes the different ways kit awardees balanced the unique characteristics of their pollinator habitat project (below) to successfully prepare for, complete, and steward their planting:

- ◊ Site – soils, existing vegetation, weeds, and history.
- ◊ Resources – materials, machinery, and people.
- ◊ Resource budget – time, labor, and availability.
- ◊ Knowledge – familiarity with a method or materials.

While some plantings were more successful than others with first year weed control and native plant establishment, each case study created healthy, permanent pollinator habitat. However, two consistent standards emerged from many of the 2023 habitat kit plantings: 1) Following planting, weeds were less problematic for those projects that used mulch and/or were rigorous in their site preparation and weeding; and 2) Watering the native plant plugs greatly helped their growth.

Case studies in this publication detail the following site preparation methods and include information on each kit partner, rationale for site prep, pre-planting site conditions, weed results, and photo highlights:

[1] The site preparation practices covered in this publication are not comprehensive. There are other methods or combinations of methods that could well work: including the use of cover crops, flame weeding, or animals, amongst others.

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Site Preparation Method: smother, paper barrier, and wood chip mulch

About the farm:

At Rue de Bungaloo, Farmers Justin and Hannah raise pastured hogs, garlic, perennial fruit, and culinary mushrooms using organic and holistic practices. Their goal is to grow high quality, delicious, and ethically raised food while having a positive impact on their farm ecosystem.

Site description:

The habitat kit was prepped and planted in a 250' long by 3' wide strip adjacent to a row of dwarf apple trees. The overall goal was to create pollinator and beneficial insect habitat in close proximity to the apples. Existing vegetation in the alleyway was a mix of clover, grasses and fescues, with an occasional dandelion – very much an orchard floor ground cover.

Why we chose to smother and mulch:

"This is a technique we use a lot on our farm to prep for future fruit tree rows and have all the materials on-hand. It was easy to adapt to the pollinator habitat planting, and we were confident it would smother the existing vegetation. We reuse the landscape fabric!"

Results – low weed pressure:

Weed pressure was minimal. Justin and Hannah completed one thorough hand weeding of the kit planting combined with an occasional spot weeding. Irrigation from the drip lines in a drought year was crucial to planting success.

Basic Instructions:

1. Begin in the fall (Rue de Bungaloo's strategy) or early spring:

   i) Mow the existing vegetation short to ease placement of the landscape fabric.

   ii) Immediately after you mow, lay landscape fabric over the planting area and secure or bury edges to prevent lift. (You can also use silage plastic or another opaque barrier in place of landscape fabric). The longer the smothering barrier is in place, the better.

2. Pull the landscape fabric off a few days before planting (save it to reuse) and roll the paper weed barrier out followed by 1" - 2" of wood chips. (Alternatively, you can use cardboard as a weed barrier, watering it down to speed decomposition). Finally, lay the drip lines out.

3. Plant plugs through the paper barrier and wood chip mulch in late June or July. If you are using cardboard instead of paper, you will want to delay planting by 30 - 45 days to allow it to sufficiently deteriorate. At that point, you can more easily push a trowel, planting auger, garden knife, or other planting tool through the cardboard to plant your plug. Cardboard should completely decompose after 90+ days.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: In late June and a few days before planting, Hannah and Justin pulled the landscape fabric (set the previous fall), laid out a paper barrier, and piled on an inch or so of wood chips (A). Native plant plugs are planted through the mulch and paper barrier and between the drip lines using a planting auger (B). After one thorough weeding and an occasional weed sweep, both Justin and many pollinators enjoy late September blooms.

Photos by Hannah Frank / Rue de Bungaloo Farm

Site Preparation Method: till and straw mulch

About the farm:

Farmer Molly grows organic vegetables and cut flowers for farmers markets and CSA members around Madison, WI with the help of a small farm crew and two dogs. Molly and team use cover crops and perennial plantings to build soil health and provide habitat for pollinators and other beneficial insects.

Site description:

The habitat kit was planted right next to organic market vegetable and flower beds in two 100' long by 5' wide rows. A water source isn't nearby and keeping the plants well irrigated through the summer was hard work. The existing vegetation in the kit area was an alfalfa cover that was then tilled up. Some of the deeper-rooted alfalfa plants needed to be hand-pulled.

Why we chose to till and mulch:

The short window to complete site prep was insufficient time to successfully smother the alfalfa and grasses. The best option was to deeply till the alfalfa to cut the tap root and then heavily mulch the area with straw.

Results – medium weed pressure:

Despite tilling, a few alfalfa survived and pushed up through the thick straw mulch. Molly and the farm team occasionally hand pulled alfalfa, grass, lambsquarters, and other weeds. The native plants established well and look great!

Basic Instructions:

1. The habitat kit site was cultivated once with a walk-behind tiller in late spring. Tilling multiple times with a few weeks between each tillage may result in less weedy growth and alfalfa regrowth.
2. After tilling the soil give a day or two for the disturbed vegetation and plant roots to dry out. Then, heavily mulch over the planting area with straw. (Other mulching options would work well here, too, including wood chips and/or a paper or cardboard smother barrier.)

    i) Mulching with straw can happen before or after you plant. However, it can be easier to plant through your mulch than to carefully and cautiously walk around your plants to place mulch between the native plants and throughout the planting.
3. Plant plugs through the straw in late June or early July. Make little "squirrel holes" by pushing aside the straw and down to the soil before using a planting auger, garden knife, or trowel to plant the native plug. Lastly, thoroughly water all the plants in and follow-up with an occasional weeding of the more problematic and deep-rooted weeds (lambsquarters, pigweed, alfalfa, thistle, velvet leaf, burdock, and others).

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: The planted and mulched habitat kit on July 7th, note the remaining strips of alfalfa and clover cover just to the right of the planting with vegetable and flower beds on the left (A). Late September purple and yellow native blooms (bergamot, anise hyssop, ox eye sunflower, and more) rise above the weedy growth of alfalfa and foxtail grasses (B). Continued control of the alfalfa will ensure the native plugs will well compete.

Photos by Molly Stentz / Yellow Dog Flowers and Produce

Site Preparation Method: sod cut

About the Family Resource Center:

This organization is a community-based pregnancy, birth, postpartum, and family support center committed to dismantling racial health disparities in maternal and child health. The pollinator habitat kit helps families connect with the natural world who visit the center, participate in Harambee's educational workshops on healthy nutrition, or complete their doula training program.

Site description:

The habitat kit is located at the entrance to the Center where it can be enjoyed by visitors and easily watered using the building's water spigot. The roughly 600 sq ft area lies beneath a hackberry tree and is oriented to minimize shading from both the surrounding trees and building. Existing vegetation was a standard lawn mix of bluegrass and small fescues.

Why we chose to sod cut:

Conscientious to the health concerns of herbicide use and with a short timeline to do site prep, sod cutting was the best and easiest option. In retrospect, mulching with wood chips would have greatly helped with weed control.

Results – medium weed pressure:

Sod cutting was great for removing the lawn. However, the growth of weeds (almost entirely annual crab grass) was concerning and we mowed the site in September. We expect the perennial native plants to well recover and compete amongst the weeds next year.

Basic Instructions:

1. The roughly 3" tall grass lawn was cut with a rented sod cutter a week prior to planting (sod can be cut up to the planting day).

    i) Though not entirely necessary, mowing and watering your site before using a sod cutter can help with cutting ease and overall sod removal. Once on site, 600 sq ft of sod can be cut in 30 minutes.

    ii) Set your sod cutter at a depth that minimizes the amount of soil removed while still cutting the grass roots deep enough for complete removal. This is usually 1" - 2" deep.

2. Roll the sod into piles small enough that they can still be lifted and moved by hand and into a wheelbarrow or other garden cart; or, into larger piles if you have a tractor or skid steer. Have a plan for where all that sod will go: free on the curb, in the compost, or for fill somewhere on the property.
3. Native plugs were planted in early July with a planting auger with four people taking about 2.5 hours to complete the planting. Plants were watered with an oscillating sprinkler through the summer drought.

    i) For increased weed control, immediately layer in 2" - 3" of wood chips after before planting.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: Sod was cut and piled to the side in late June (A) and shortly after planted on July 7th after a recent rain (B). Though the adjacent building and trees do shade the site, the planting area was oriented to get 8 hours of sun throughout the day. The site was mowed low in September to control weeds — particularly low-growing annual crab grass — and by late October there was little regrowth of both weeds and native plants (C).

Photos by Micah Kloppenburg / Xerces Society

Site Preparation Method: herbicide and wood chip mulch

About the farm:

Marie and Matt's 25 acre farm is a place for experimenting and restoration. The Donald Farm is a mixed-species grazing operation with cattle, goats, and wool sheep. They have also planted a 6 acre prairie interplanted with fruit trees – an orchard with a prairie groundcover. In addition, Marie and Matt are restoring their farm's oak savannah using goats and a chainsaw.

Site description:

The habitat kit was planted into a roughly 100' long by 8' wide rectangle on the south and sunny side of a barn. The habitat site is close to a water source, the farm homestead, and within a few hundred feet of a new apple orchard planting. Existing vegetation was entirely a bluegrass-fescue lawn.

Why we chose to herbicide and mulch:

"In the busy-ness of spring, we had a short window and minimal extra time to spend on site preparation. I was confident that two quick herbicide applications would kill the lawn and that a layer of mulch would suppress most new weed growth."

Results – no weed pressure:

Weeds were nearly nonexistent through the first growing season and the thick layer of mulch kept just enough moisture to sustain the plants through a summer of drought with only an occasional watering. The kit required only minimal hand weeding.

Basic Instructions:

1. Spray the grass lawn with a broad-spectrum (i.e. non-selective) and non-persistent herbicide in early May followed by a second herbicide application in early June.

   i) Follow all directives written on the herbicide product label and wear appropriate safety equipment.

   ii) We recommend you select an herbicide that is the least harmful while still providing effective results. These include herbicides that rapidly degrade on or in vegetation, that have no to low biological activity in the soil, that have no or low toxicity on non-target organisms, and that have a low probability of escaping off site in the air or through water run-off. Avoid bee toxic herbicides.

   iii) Delay mulching or planting the project site until the herbicide has taken action, existing vegetation has died back, and it is safe to reenter the site.

2. Once it is safe to reenter the site, place 2" - 4" of wood chips over the desiccated vegetation.
3. Plant plugs through the wood chip mulch in late June or early July. Dig little "squirrel holes" through the chips down to the soil before using a planting auger and cordless drill to quickly bore into any soil type.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: Donald Farm's planting site was prepared with two glyphosate treatments, leaving the stubble of dead grass that was then covered with 6" of wood chip mulch (A). Many hands, planting augers, cordless drills, and well positioned plants make the hard work of planting a breeze (B). The final planting: in mid-September well situated on the south side of the barn, protected from pesticides, and abutting the prairie and orchard (C).

Photos by Micah Kloppenburg / Xerces Society

Site Preparation Method: till

About the farm:

Full Circle Community Farm grows organic vegetables and raises grass-fed and pastured cows and pigs. The farm team strives to grow the highest-quality organic, local food while creating a community-based farming model that supports people, plants, pollinators, and wildlife.

Site description:

The habitat kit is situated between vegetable beds and at the edge of one of the crop fields. The native plugs were planted into two beds about 75' long with three rows each and covering just under 875 sq ft total. Existing vegetation was a mix of weeds common to tilled, organic vegetable fields. Soils are wet in the spring and dry out through the summer.

Why we chose to till:

"We were able to save on labor by planting the kit and weeding them with the same machinery we use for our vegetables. Looking back, we would like to have completed some additional weed management (flame weeder or other) prior to transplanting."

Results – high weed pressure:

Tilling and the water wheel successfully set the soil bed and eased plug planting. However, weed growth was vigorous once we were unable to use the in-row cultivator and hand weeding just wasn't an option for us. Mowing once gave the native plants room to grow.

Basic Instructions:

1. Repeatedly cultivate (shallow till) the habitat kit area every few weeks with a tractor-mounted or walk-behind tiller beginning late spring – as soil moisture allows – and up to the kit planting day.
2. Plant the native plugs into the prepared beds using a water wheel transplanter (the same planter used for veggie transplants). Situate rows within each bed and calibrate the water wheel to create 12" - 16" spacing between plants and between rows.

   i) Some brands of paper mulch rolls may work with your transplanter (i.e. they will not tear) and can provide an additional biodegradable mulch option. Alternatively, a layer of straw or wood chip mulch post-planting may help with some weed control, albeit you will no longer be able to use an in-row cultivator to control weeds.
3. Use an in-row mechanical cultivator to suppress weed seedlings as often as possible and until the native plugs are too tall to accommodate the cultivator. Then, switch to hand weeding particularly vigorous weeds (pigweeds, thistle, and lambsquarters) and, if needed, mow once at ~16" to prevent the weeds from shading out the native plants. While seemingly robust, annual foxtail grasses aren't that problematic.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: The habitat kit was planted into two beds on June 28th using a water wheel transplanter (A). Weeds were controlled using a mechanical in-row cultivator until the native plants grew too tall and prevented its use. A mid-summer mowing at 16" high prevented weeds from overtopping the plants and still allowed for healthy blooms in late September (B). While quite weedy, plants established well and will continue to flourish.

Photos by Scott Rosenberg / Full Circle Community Farm

Site Preparation Method: sod cut and wood chip mulch

About the school garden:

St. John Lutheran School is a small, rural 3K-8th grade school that wanted to create new outdoor learning opportunities for their students. The success of most school gardens fall on volunteers, and having an enthusiastic team of parents and students to help prep, plant, and care for the pollinator habitat kit from the start was vital to the garden's success.

Site description:

320 sq ft of turf was converted to habitat right next to the St. John's School Garden – a perfect spot to connect pollinators and beneficial insects to the garden beds and to enhance outdoor education activities for students. The site was also selected as a water spigot is close by to help with watering work through the summer. Existing vegetation was entirely mowed lawn with sparse clover.

Why we chose to sod cut and mulch:

"We loved the sod removal method followed by mulch. It required no chemicals and site prep could be completed really quickly and well in advance of our planting date (when our volunteer team had time)."

Results – no weed pressure:

Using the sod cutter and then putting down wood chip mulch worked great for weed management. Some hand weeding was done, but it was minimal. Regular watering was key to keeping the transplants healthy through the very dry summer.

Basic Instructions:

1. Sod was cut with a rented sod cutter in May (sod can be cut up to the planting day).

   i) Though not entirely necessary, mowing and watering your site before using a sod cutter can help with cutting ease and overall sod removal. Once on site, 600 sq ft of sod can be cut in 30 minutes.

   ii) Set your sod cutter at a depth that minimizes the amount of soil removed while still cutting the grass roots deep enough for complete removal. This is usually 1" - 2" deep. (St. John cut to 3" and would recommend a shallower depth).

2. Roll the sod into piles small enough that they can still be lifted and moved by hand and into a wheelbarrow or other garden cart; or, into larger piles if you have a tractor or skid steer. Have a plan for where all that sod will go: free on the curb, in the compost, or for fill somewhere on the property.
3. As soon as the sod is removed, immediately layer in 2" - 3" of wood chips. (While not necessary, you can add an additional paper or cardboard mulch barrier before putting wood chips down).
4. Native plugs were planted in late June, both young and old helping out. Make a small "squirrel hole" in the mulch with your hands down to bare soil before using a planting auger or garden knife to plant your plug.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: A volunteer works the sod cutting machine, running parallel strips through the recently mowed turf in May (A). Rolls of sod are piled up for removal by hand and garden cart and immediately layered with a few inches of wood chip mulch (B). Planting your native plugs can happen day-of sod removal or weeks after. At St. John's, many hands (and planting augers) make quick work of the planting in late June (C).

Photos by Thelma Heidel-Baker / St. John School Garden

Site Preparation Method: herbicide and straw mulch

About the orchard:

This organic apple orchard grows a wealth of apples, plums, and other fruits, as well as a selection of vegetables for their local farmer's market, on-farm store, and CSA members. The farm team also works hard to restore native prairie and woodlands surrounding the orchard. Their holistic management of the farmscape creates space for pollinators, birds, bats, and more.

Site description:

The kit was planted into approximately 1000 sq ft of grassy old-field – brome, orchard grass, reed canary, clover, and a few other assorted weeds. The rich, silt loam soil is piled over a rocky knoll that is just too steep to mow. A large, old oak tree lies just to southwest of the new pollinator habitat, with organically managed orchard just over 100' away.

Why we chose to herbicide and mulch:

Steep, grassy old-fields can be the most challenging sites to transition to native habitat in a short amount of time. In this case, the grower confirmed the use of glyphosate with their certifier and used an appropriate distance from certified land with attention to drift.

Results – low weed pressure:

Weed pressure was quite low, with few of the grasses regrowing through the thick mulch. A single, quick hand weed of the broadleaf species let the native plugs establish well. Nettle, rue, and a few other volunteer native plants were welcome additions to the kit planting.

Basic Instructions:

1. Spray the grassy old-field with a broad-spectrum (i.e. non-selective) and non-persistent herbicide in early May. (An additional application in early June can help maximize control of the robust, weedy grasses).

   i) Follow all directives written on the herbicide product level and wear appropriate safety equipment.

   ii) We recommend you select an herbicide that is the least harmful while still providing effective results. These include herbicides that rapidly degrade on or in vegetation, that have no to low biological activity in the soil, that have no or low toxicity on non-target organisms, and that have a low probability of escaping off site in the air or through water run-off. Avoid bee toxic herbicides.

   Ii) Delay mulching or planting the project site until the herbicide has taken action, existing vegetation has died back, and it is safe to reenter the site.

2. Once it is safe to reenter the site, heavily mulch over the desiccated vegetation with straw.
3. Plant plugs through the straw late in June or early July. Make little "squirrel holes" through the straw down to the soil before using a planting auger and cordless drill to quickly bore into any soil type.

For more detail on site preparation methods see Xerces' *Upper Midwest Habitat Installation Guide* and *Organic Site Prep for Wildflower Establishment*.

Photos: The habitat kit area was sprayed out with a glyphosate-based herbicide in the spring leaving dead stubble and then heavily mulched with straw after it was safe to reenter the site. Plug planting was completed in one day on June 15 with the help of two planting augers, two pairs of hands, and about 4 - 5 hrs of work (A). Irrigation through the 2023 drought year ensured awesome growth in just 3 short months – September 30 (B).

Photos by Micah Kloppenburg / Xerces Society

A bounty of Xerces' habitat kits ready for pick up by farm and community partners at Donald Farm in southern Wisconsin. (Photo: Micah Kloppenburg / Xerces Society.)

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