



Flowering Bee Lawns for Pollinators



Flowering Lawns: What Are They, and Why?

Definition of a flowering lawn

Lawns are traditionally ornamental or recreational plantings of turfgrass that are mowed and managed to achieve a desired aesthetic. While turfgrasses are used for a variety of functions, such as sports fields and erosion control, lawns are typical of homes and businesses and established for generally aesthetic purposes showing neatness and care. A flowering lawn differs from a traditional lawn in having flowering plants as well as turf grasses. Benefits of a flowering lawn include increased lawn resilience to environmental pressures, natural diversity that benefits insects and other animals, and the beauty of the flowers themselves.

Landscape, biodiversity benefits

One of the main challenges facing bees, and all wildlife, is the loss of habitat. People change the landscape in many ways when converting land to different uses, and most of those changes are detrimental to biodiversity. One excellent example of this is agriculture. Farmers often plant large and uniform stands of crops to increase their management efficiency, and then attempt to exclude crop competitors such as weeds and insects. This system, while efficient at producing food, has resulted in increasingly large areas of low quality habitat for wildlife. One method proposed for offsetting this loss of biodiversity is called reconciliation ecology. Reconciliation ecology is a conservation philosophy that seeks to improve the ability of human landscapes to support biodiversity, while still allowing for human use. This is an important concept, as it acknowledges the human role in conserving biodiversity, and seeks to find new management solutions that do not put human use and biodiversity needs in conflict.

Watch Dr. Marla Spivak, professor at the University of Minnesota, discuss the importance of biodiversity and bees in this TED talk [Why Are Bees Disappearing](#).

Lawns are not entirely different from farms in that they are managed as large single or similar species plantings, with chemical inputs sometimes used to reduce non-grass plants usually viewed as competitors. Lawns are unlike much of agriculture though, in that they are perennial in nature and not managed as a commodity. This subjective and changing use of lawns gives

them potential for modification through reconciliation ecology. If we can preserve the human use of lawns while improving their ability to support biodiversity by incorporating flowering plants, we can create a win-win situation or both people and nature.

Your Current Lawn: Flowers or Weeds?

While lawns are usually managed for uniform stands of only grass, flowering plants, often considered weeds, are common and adapted to lawn conditions. Whether introduced or native, many weeds provide pollen, nectar, or both to foraging bees throughout the year.



Pros and cons

While flowering lawn weeds are often seen as a nuisance, they can actually have benefits to lawns in addition to bees. Weeds may be better adapted than turfgrasses to difficult site conditions such as compacted soil, drought, flooding, shade, and low nutrient availability. For example, white clover has been shown in many studies to increase available nitrogen in the soil, due to the symbiotic soil bacteria that live in nodules on clover roots, which turn atmospheric nitrogen into plant available nitrogen. Flowering plants can fill in for grass species in unfavorable conditions to ensure continuous ground cover, which in turn reduces soil erosion and nutrient run off.



The downside to lawn weeds is that many are aggressive, non-native and prone to being invasive in cultivated and natural areas. Non-native plants are good resources for bees with a broad host range, but are typically not good forage for specialized bee species. Many of the most common weed species, such as dandelion, are also widely reviled by homeowners. This “bad rep” can create social pressures to remove weeds even if the lawn manager is tolerant of diverse lawns and realizes how plant diversity benefits pollinators.

How to Enhance your Lawn to Promote Pollinators

Preparing the Lawn

Enhancing a lawn with flowering species can be done through either a new lawn planting that includes the desired flowers or seeding flowers directly into an existing lawn. Seeding into an existing lawn is more economical but can be challenging to get good establishment, as the new flowers must compete for space with the established grass. Good seed germination is critical for both methods, and requires adequate moisture, good soil to seed contact, and protection from flash rain events that could wash seeds away. The University of Minnesota Extension Service has an excellent guideline on lawn renovation through either over seeding or new plantings of turfgrass seed (<http://www.extension.umn.edu/garden/yard-garden/lawns/lawn-renovation/>). For flowering lawns you need to add flower seed to the above recommendations. If you are interested in seeding flowers directly into your lawn, there are a number of practices that can increase your success.



- 1.) It is critical to **pick the right flower species** for your site. Consider where the lawn is: Is it in a depression where water pools? Is it in full sun or shade? Also consider the type of soil, which dictates the species that can thrive in your site.
- 2.) Any seeds sown into an established lawn will need to compete with the grass. The first step is providing enough seed to ensure the plants can become established. In our preliminary trials at the University of Minnesota, 200 seeds/ft.² has worked well for a seeding rate of Dutch white clover (*Trifolium repens*) lanceleaf self-heal (*Prunella vulgaris* ssp. *Lanceolata*) and creeping thyme (*Thymus serpyllum*). If you have a very dense lawn, give the flowers a competitive edge by disrupting the lawn directly before seeding. In our research trials, mowing the lawn very short (1.5 in.) prior to seeding, known as scalping, had the best effects on establishment. Scalping allows more sunlight to hit the soil surface aiding the germinating seeds, and helps to slow the competition of the established grass. This practice is stressful for the lawn grasses, but they should recover barring any extreme stresses such as drought.
- 3.) After planting, it is important that the seeds get enough moisture to germinate. Seeding in spring is recommended, however it may be necessary to **provide supplemental irrigation** for the first week or two until the flowers have germinated. Irrigation practices should be determined by the weather, but typically watering twice a day for 15-20 minutes in the early morning and early afternoon, allowing the foliage to dry before nightfall, will keep the soil moist.

Starting over with a new lawn is much more involved, but allows more flexibility in the final lawn plant community. In this case, follow protocols for preparing your site as outlined in the lawn renovation link provided above, including flower species as a part of the seeding mix. Our research on flower establishment in different grasses found that for new plantings, Kentucky bluegrass (*Poa pratensis*) and hard fescue (*Festuca trachyphylla*) allowed the best establishment of Kura clover (*Trifolium ambiguum*). In our trial we used kura clover as a model species because it is slow to establish, making it similar to establishing native flowers.

As an example, we used ‘Beacon’ hard fescue in our trials to establish a large flowering lawn composed of a number of flowering species. We broadcast seeded grass seed at a rate of 4 lb/1000 ft² in late fall (mid November) in what is known as a [dormant seeding](#). We then seeded individual flower species over the hard fescue seed at a rate of about 39 seeds/ft². After all seed was applied, we laid germination mats over our planting to protect the seed from extreme rain events that could wash away the seeding. Our trials established naturally without need of supplemental irrigation, as the cool wet spring provided ideal germination conditions. However, if rainfall is not sufficient, irrigation should be provided until the plants have germinated in the spring.

To see a Flowering Bee Lawn, the [Minnesota Landscape Arboretum](#) has a

Helping Pollinators: Bee Lawns

Green Carpet OR Carpet with Flowers?

Flowers are the only "grocery store" for bees and other pollinators, yet their sources of nectar and pollen have dwindled. What if we add flowers to some of Minnesota's many square miles of turf? Parks, golf course roughs and less-used parts of your lawn could support pollinators.

Bee Lawn Research and Demonstration

This trial compares five methods of adding three low-growing flower species into grass. Do some plots show more blooms than others today? Can you find any pollinators foraging?

1	2	3	4	5
Flowers seeded into existing grass	Cut grass to 1", seed flowers	Seed flowers and fine fescue grass into bare soil	Cut grass to 1", mow, seed flowers and fine fescue grass	Mow grass, seed flowers and fine fescue grass

This demonstration is funded by:

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public demonstration site that can be visited any time the Arboretum is open. More information on how the Arboretum planted their demonstration site is [available here](#).

Enhancing with Native Flowers

What we know

Native flowers are very important to native bees, especially those that specialize on a small group of related plants. Through our trials at the University of Minnesota, we have learned that the best native plants for lawns share some common traits. They tend to have high germination rates, grow quickly, and are adapted to the soil in which they are sown. Low growth stature to avoid mowing is helpful, but is not a prerequisite if the plant grows quickly. Here are some native species that seem to have potential from our trials.

Ground plum (*Astragalus crassicarpus*)

Ground plum is a low growing species in the pea family. It is native and common to the prairies of Minnesota where soils are well drained. Ground plum has a higher germination rate than many native plants, but is still low compared to cultivated plants. This slow growth rate makes it a better candidate for new lawn planting sites that are well drained. The early bloom of ground plum happens before mowing season is in full swing, and the flowers are visited by long tongued bees such as bumble bees and mason bees.



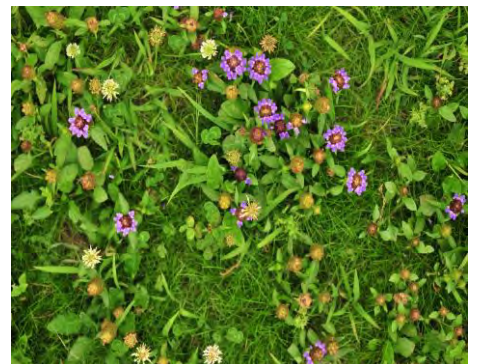
Lanceleaf coreopsis (*Coreopsis lanceolata*)

Lanceleaf coreopsis is a late spring bloomer in the aster family. Its size can vary dramatically, but typically ranges from between 0.5-2 ft. tall. The vegetative parts of the plant will survive mowing as low as 3 in., but the flowering portions typically shoot above this height. This plant could have potential in lawns, but special mowing practices may need to be observed during bloom as well as some tolerance for their unique appearance. The blooms of lanceleaf coreopsis are attractive to many short and long tongued bees. This plant is highly visited by long-horned bees (*Melissodes*) for pollen.



Lanceleaf self-heal (*Prunella vulgaris* ssp. *lanceolata*)

Self-heal is a member of the mint family, and is distributed widely in the US and Europe. There are three self-heal subspecies, with ssp. *vulgaris* being native to Europe, and ssp. *lanceolata* being native to Minnesota and the U.S. This species prefers rich soils with plenty of water and its quick germination and low growth habit make it ideal for overseeding into mature lawns or as a component of a new lawn planting. We found flowers of self-heal to be negatively impacted by mowing heights of 2.5 in., so we recommend at least a 3.5 in. mowing height. The bloom lasts 2-3 weeks in early to midsummer.



Common bee pollinators visiting flowers on the observation plots in Minnesota include bumble bees, sweat bees, and miner bees.

Calico aster (*Symphotrichum lateriflorum*)

Calico aster is a late blooming flower in the aster family that typically grows around 3 ft. tall. However when mowed, calico aster will form small dense rosettes and will bloom below a 3.5 in. cutting height. A high germination rate and rapid growth make it a prime candidate for future lawn trials, and for people to experiment with in their own lawns. The flowers of calico aster attract short tongued bees such as sweat bees, and the pollen is also useful to many bees that specialize on flowers in the aster family.



Challenges for Flowering Lawns

One of the inherent challenges of working with native plants is that they are not domesticated, and do not respond to cultivation the same way domesticated species do. A primary example of this is that germination of native plant species can be very low. Seeds often need a special signal that the time is right to germinate. For example, native plant seeds often need a cold stratification period (like winter) before they will break dormancy. All these conditions make native plants more challenging to work with.

Another major challenge of establishing flowering lawns with native plants is the availability of seed. Many promising species are not actively cultivated by local seed producers, and thus are not viable options for trials at this time. Many species are only available in root-stock that is directly buried in the soil, a much more expensive planting method. Interest in providing pollinator foraging resources in lawns will hopefully encourage seed producers to identify and test plant material for larger scale production.

Enhancing with Non-Invasive, Non-Native Flowers

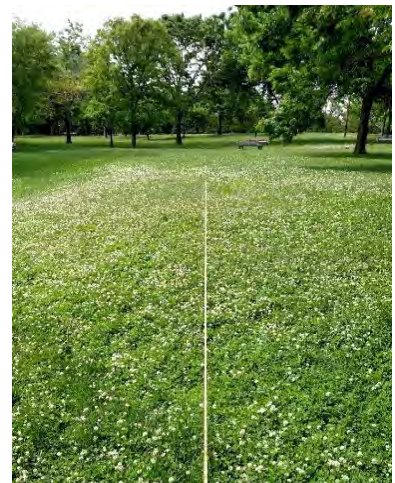
What we know

While non-native plants have some downsides, they can still be very useful in flowering lawns. Lawns by their very nature are challenging environments, but many non-native flowers are ideally suited to lawns. For our research we avoided all of the most common lawn weeds and focused primarily on two species.

Dutch white clover (*Trifolium repens*)

White clover is a ubiquitous lawn flower in the pea family found throughout North America. It is originally from Europe, and was probably introduced by some of the first American settlers.

White clover is widely cultivated for grazing pasture due to its high leaf nitrogen. The flowers of white clover are also highly attractive to a number of bee species, with an especially high value to bumble bees and honey bees. White clover thrives in lawns and other areas under cutting management, and used to be a standard components of



lawn seed mixes. A high germination rate, rapid growth, and tolerance for a broad range of conditions make this species ideal for overseeding into lawns or in new lawn plantings.

Creeping Thyme (*Thymus serpyllum*)

Creeping thyme is a flower in the mint family from Europe that is cultivated as an ornamental in the United States. As its name suggests, it has a spicy herbal aroma like the culinary herb. Similar to its culinary cousin, this species has a slow and prostrate growing habit that makes it uniquely suited to lawns. Due to a high germination rate, overseeding into established lawns and new lawn plantings is possible, but its slow growth habit greatly reduces the time to full establishment; in fact, it may not establish for several years. Creeping thyme is best suited to sites that are well drained, and blooms best with mowing heights above 3.5 in.



What we need to know/ challenges

There are many species of non-native flowers that are, for better or worse, in our lawns for the long haul. Some of these species are relatively well behaved outside of lawns, but many can become invasive in other areas. When considering non-native plants for flowering lawns, it is important to have a good sense of how aggressive they can be outside of their desired location and if they have any value to bees. Unfortunately that is no easy task. Some non-native species that have value for bees, such as Siberian squill (*Scilla siberica*) and bugle weed (*Ajuga reptans*), are aggressive and rapidly spread outside of their planting area. Others such as sweet alyssum (*Lobularia maritima*) and English lawn daisy (*Bellis perennis*) may stay constrained to lawns, but have questionable value to wildlife and are not reliably winter hardy in central Minnesota.

Management of a Flowering Lawn

Once flowers are established in the lawn, managing flowers or other weeds that are not desirable can be a challenge. Hand weeding will always be the preferred option for weed control in a flowering lawn, although this can be quite labor intensive. Spot treating weeds with selective herbicides can limit plants that are not wanted. Using a broadcast broadleaf herbicide will kill most flowers that you have planted. The exception is Dutch white clover, which is fairly resistant to one common herbicide, 2,4-D. Iron chelate products can also be used to spot-treat broadleaf weeds as they establish and this is an organic option for weed control. Synthetic and organic preemergence herbicides applied in the spring can help to prevent the germination of summer annual weedy grasses, like crabgrass and foxtail. Corn gluten meal, which acts as both a preemergent herbicide and a fertilizer, is an organic option that will work once all grasses and flowers are established in lawns. Some synthetic preemergent products could be damaging to flowers, so be sure to read the label and follow all application directions.

Mowing the flowering lawn to a height of between 3.5 and 4 in. will ensure that flowering plants survive and produce flowers to sustain pollinators. Higher mowing heights will also reduce the required mowing frequency and will enable the grasses and flowering plants to have a deeper, more robust root system improving the quality and stress tolerance of the lawn. The one third rule is a good guide to help determine mowing frequency: do not cut off more than one third of the vegetation at one time. If the desired mowing height is 4 in., then the lawn

should be mowed when it reaches 6 in., cutting off 2 in. or one third. Be sure to maintain sharp mower blades to reduce mowing stress. Returning clippings when mowing will also help to add nutrients back to the soil.

Soil moisture status should be monitored and replenished through irrigation during extended drought periods and this will change based on the season and year. In an average year, irrigation requirements will be minimal, with lawns requiring from 0-3 irrigation events over the course of a growing season from May to October. Generally speaking, 2-3 in. of precipitation per month should be enough to sustain the quality of a flowering lawn, assuming the precipitation does not occur all at once. In dry years, irrigation requirements will be greater. If no precipitation occurs over a 2-week period, consider irrigating with 0.5 to 1 in. of water. This can be accomplished with an in-ground irrigation system, portable sprinklers or by hand watering.

Fertilizer requirements will be minimal if clippings are returned, mowing heights are kept high, and the soil quality is good. Soils with greater levels of organic matter (> 5% by weight) will hold more nutrients and moisture. Organic matter can be determined from a soil test. See <http://soiltest.cfans.umn.edu>. If organic matter is less than 5%, consider incorporating high quality compost or peat into the lawn during the renovation process. This can be accomplished through tillage, if conducting a complete renovation, or through aerating, topdressing lightly with the chosen material and working it into the aeration holes. For lawns with low density and vigor, consider making one fertilizer application in the fall around Labor Day. This application should generally supply 1 pound of nitrogen and 0.5 pounds of potassium per 1000 ft². For example, a 20-0-10 fertilizer contains 20% nitrogen, 0% phosphorus, and 10% potassium. Applying this fertilizer at a rate of 5 pounds per 1000 ft² will achieve the desired nitrogen and potassium rates. Be sure to select a fertilizer that has at least 30% of the nitrogen in the slow release form; 30% of 20 = 6% of the nitrogen in this fertilizer example should be slow release. This will help to reduce environmental loss of nitrogen and provide long-term nutrition. Organic fertilizers are also a good option and will contain slow release nitrogen. Any more fertilizer than recommended will most likely encourage grass over flowers. For additional nutrients, such as phosphorus, consider having your soil tested.



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A dark red banner with yellow accents. On the left is the "Bee Lab" logo, which includes a stylized "M" and the text "Bee Lab". In the center, the website "www.BeeLab.umn.edu" is written in yellow. On the right is the "Bee Squad" logo, which includes a stylized "M" and the text "Bee Squad". Below the website name, the names "Ian Lane, Eric Watkins, Marla Spivak, Mary Meyer" are listed in yellow.