

Can You Build It and Do They Come?:

A Case Study of the Creation and Effectiveness of a Wildflower Installation on an Organic Hudson Valley Farm.



What did we look at and why?

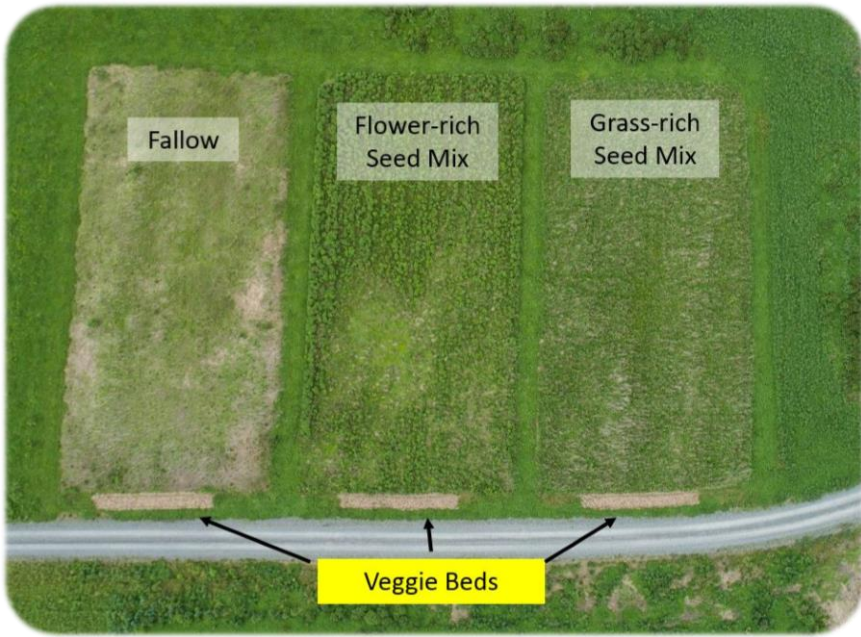
Creating on-farm wildflower habitat has sometimes been shown to increase native biodiversity and beneficial insects. It can also add welcome color and variety. State, federal, and non-profit programs have encouraged and, at times, financially supported wildflower installations. For example, USDA, in collaboration with the Xerces Society, offers cost-share programs for perennial wildflower installations on farms in the context of an approved pollinator habitat plan.

However, the suggested methods for establishing such patches often involve herbicide use, hence making them inappropriate for organic farms. Furthermore, judging from work around the world, the effectiveness of such plantings seems to be variable and may be heavily influenced by the ecology of the surrounding landscape. Because of these uncertainties, we have undertaken a multiyear study to see if one could successfully install and maintain wildflower plantings using only organic methods and then to evaluate the effectiveness of those plantings in supporting biodiversity and enhancing on-farm beneficials here in the Hudson Valley. Do our wildflower plantings attract a diversity of species including some rare ones? Do they harbor creatures that can benefit adjacent crops?

This is a detailed case study from the Hudson Valley of New York. If we have learned one thing from our work, it is that factors such as site and weather can have a huge influence on the trajectories of wildflower plantings. Taken alone, this work simply adds one more data point to a global collection of studies. We hope it has some added significance because so little of this type of work has been undertaken in the Hudson Valley.

What we did – Our Seedings.

Wildflowers can be established in various configurations, indeed one of the common suggestions is that farmers consider how to fit wildflower patches into the nooks and crannies of their farms. For the purposes of this study however, we chose to create half-acre rectangular plots (100' x 200'). We used two different seed mixes to test the effects of plant combinations on insect life and to compare the efficacy of a 'deluxe' and more economical seed mix. The former, our "flower-rich" mix, had 22 species of perennial, native (or 'near-native') wildflowers and one species of native grass, while the latter, our "grass-rich" mix, had only six species of perennial wildflowers, but eight species of grasses. (See the appendix for a full listing of what was planted). In addition, we also established a fallow control which was managed like both of the seeded plots, except that nothing was seeded. This set of three plots was replicated three times around the edges of a 68 acre hay field.



The plots were seeded in the spring of 2017 on land that had decades of use as a conventional crop field and had only begun the conversion to organic two years previously. After a cover crop of Rye during the 2016 season, followed by winter-killed Oats, the plots were harrowed three times in April/May of 2017, and then seeded with a Great Plains seeder in late May. As with many crops, management is intense early in establishment, when young plants are most liable to be overrun by weeds. In the case of the wildflower plots, this management included carefully timed cuts, which favored slower growing seeded species over more rapidly growing weeds. Spot weeding was also required on a few occasions.



Were we able to establish our wildflowers organically?

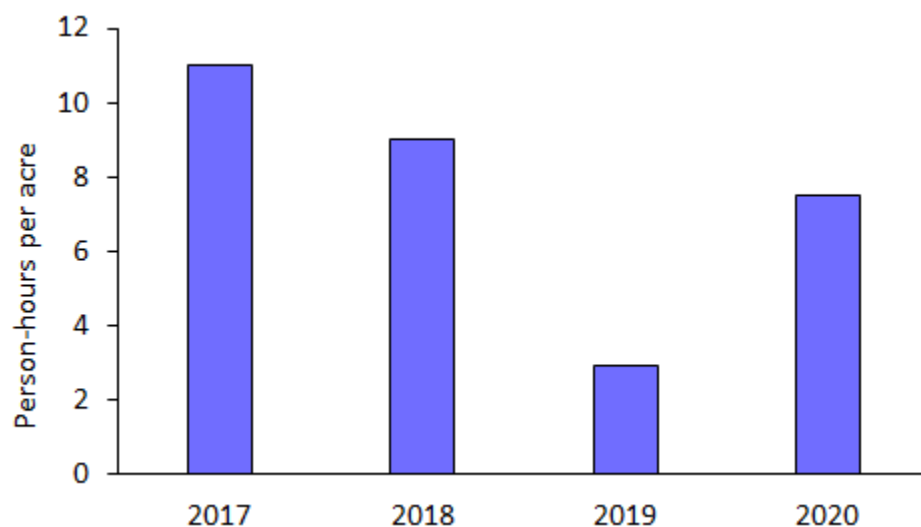
In terms of practicality, it was possible to establish the wildflowers organically and the intensity of the required management may be diminishing slightly over time. The final test will be to see if flower abundance can be maintained in the long-term using only minimal management such as annual cuttings.

To date, each year has brought somewhat different plant communities. In part, this may reflect stages of vegetation development along a somewhat predictable trajectory, as short-lived perennials are replaced by longer-lived plant species. However, random fluctuations and/or the differentiated responses of the various species to particular annual weather and soil conditions may also play a large role. We shall see if the apparent rate of change slows in coming years.

During the first growing season, a glorious flush of golden flowers (mainly Lance-leaf Coreopsis and Black-eyed Susan) put on a fine show in our flower-rich plots. In recent years, that sun burst has been more muted, but the mid-summer mauve of Bee Balm and the contrasting yellows and purples of late-summer goldenrods and New England Aster have increased in prominence. Our grass-rich plantings and the fallows have also contributed to the display, although with less visual drama.

Based on our experiences to date, we would make the following general observations on organic wildflower establishment:

- Ground preparation is crucial, the cleaner the slate at the time of planting the better.
- Seed mixes can be honed by excluding some rare but expensive flowers.
- Be prepared to watch and react over the first two or three years; keep an eye out for problem weeds and nip them in the bud.
- Your meadows will change with time, that's part of working with ecology, don't be discouraged.
- As with all agriculture, your fate is partially in the hands of the weather gods.

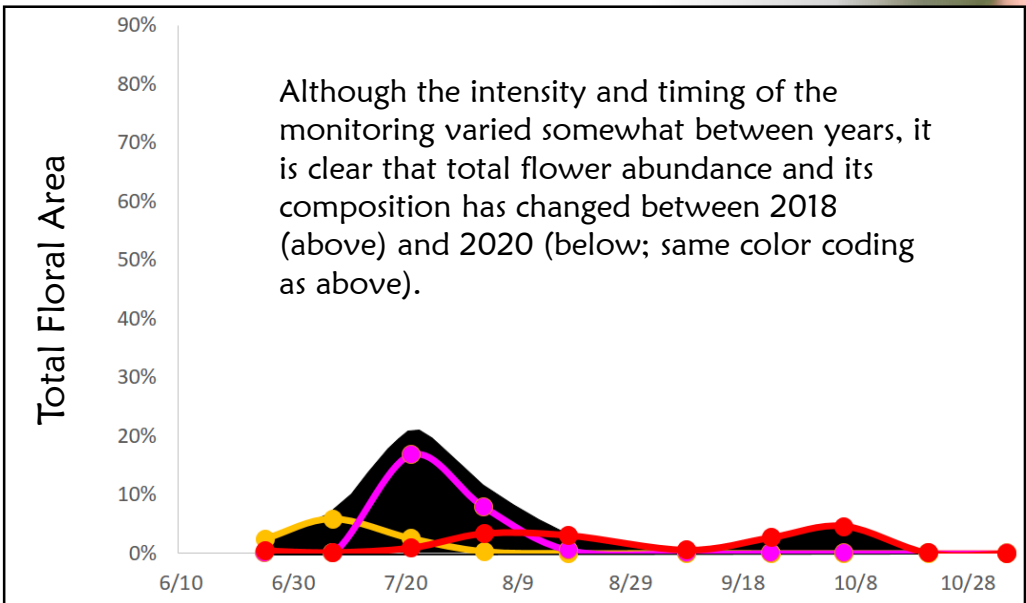
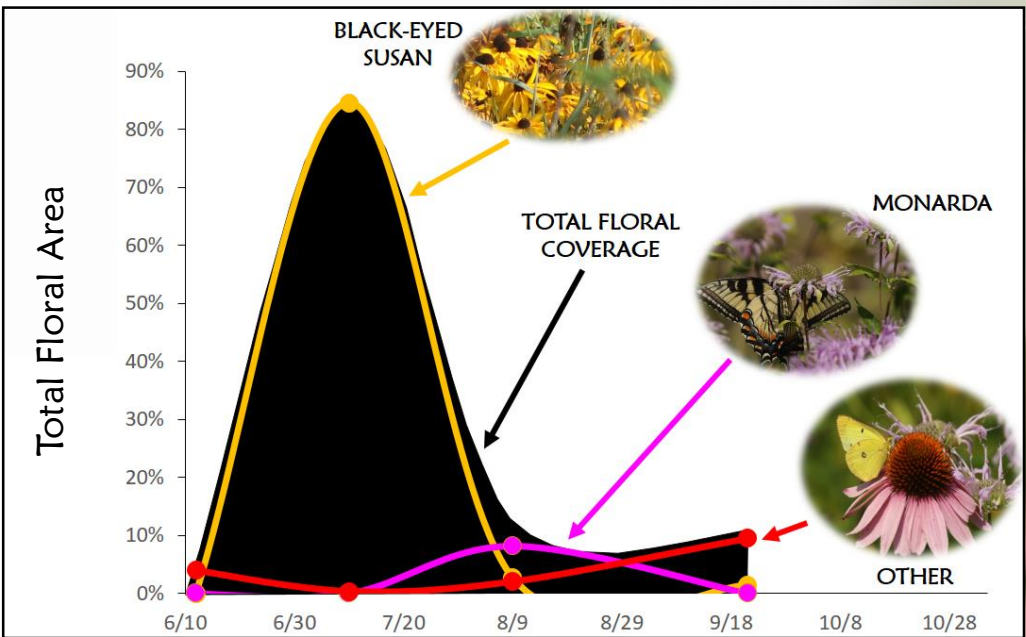


Wildflower plantings could work from a conservation perspective by providing habitat to rare or declining species; they could work for farming by supporting pollinators or crop pest predators or parasitoids.

Before looking at ways of directly evaluating such functionality, let's consider why these plantings might provide those benefits. First, and perhaps best known, wildflowers can provide nectar and pollen sources for bees. Those resources can, in turn, boost bee populations above levels that are supported by crops alone or, at least, tide them over during periods when crop flowers are few. Not only bees can benefit from flowers. Parasitoid wasps, insects whose larvae kill the hosts they parasitize and so can be important in controlling crop pests, also feed on flower nectar as adults.

Plantings can also support beneficials by providing banker crops. Pest predators and parasitoids seem to be most effective if they are already present in the environment when pest populations start to grow - they may be better able to prevent outbreaks before they occur than to control them once they are under way. However, those beneficial insects will only be present if their prey or host is also already present. Ironically, to avoid a bad dose of the poison, you sometimes need to take a small sip of it ahead of time. By supporting the likes of aphids, leaf hoppers and various caterpillars, wildflower patches help support background levels of important beneficials. The ideal solution is when the beneficials can be supported by species who are not also crop pests themselves, but this only works for somewhat generalized predators and parasitoids.

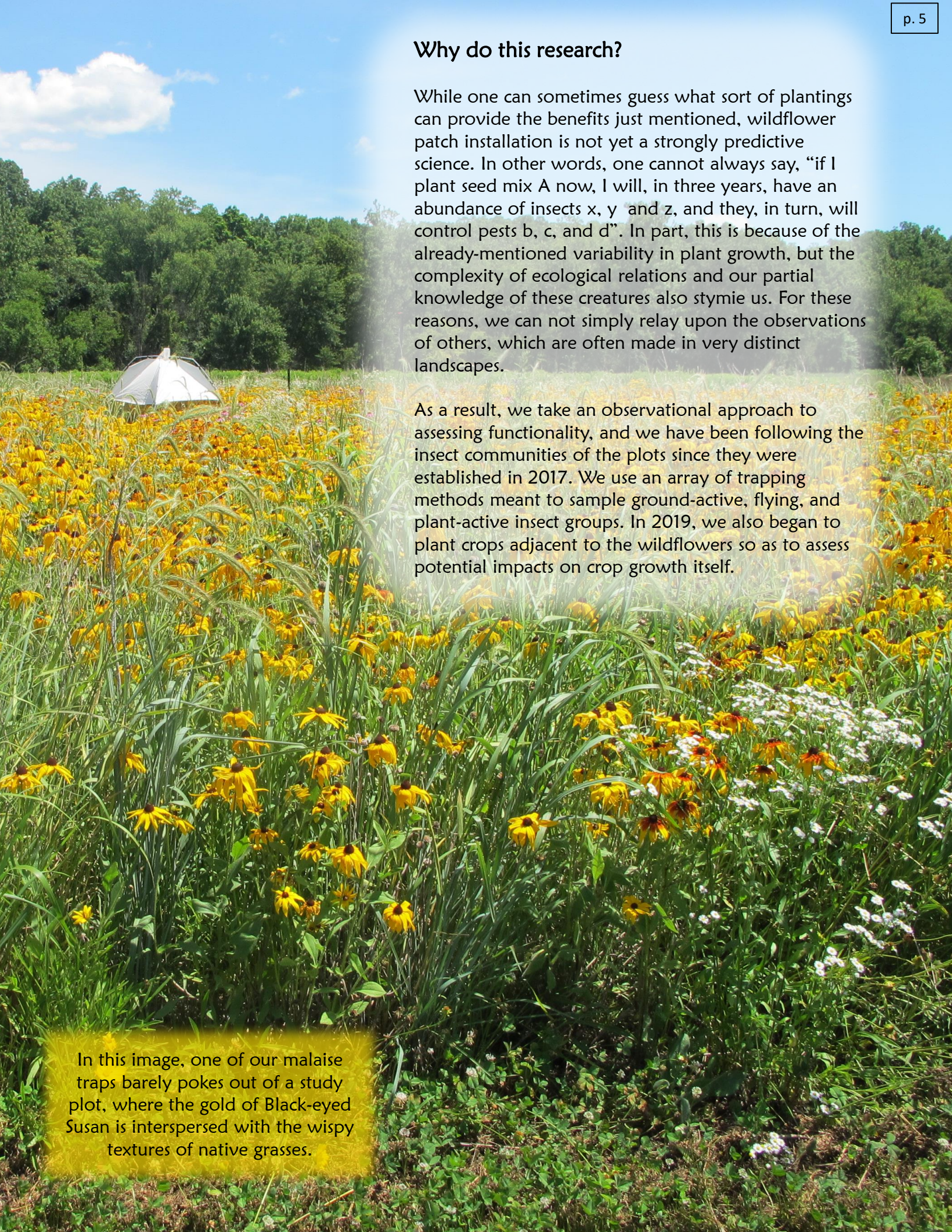
Finally, wildflower patches can provide shelter. For example, some insects overwinter in the hollow stems of grasses and certain other plants. These stems, in turn, are more common in tall patches of vegetation than in closely mowed areas or annual cropland.



Why do this research?

While one can sometimes guess what sort of plantings can provide the benefits just mentioned, wildflower patch installation is not yet a strongly predictive science. In other words, one cannot always say, “if I plant seed mix A now, I will, in three years, have an abundance of insects x, y and z, and they, in turn, will control pests b, c, and d”. In part, this is because of the already-mentioned variability in plant growth, but the complexity of ecological relations and our partial knowledge of these creatures also stymie us. For these reasons, we can not simply relay upon the observations of others, which are often made in very distinct landscapes.

As a result, we take an observational approach to assessing functionality, and we have been following the insect communities of the plots since they were established in 2017. We use an array of trapping methods meant to sample ground-active, flying, and plant-active insect groups. In 2019, we also began to plant crops adjacent to the wildflowers so as to assess potential impacts on crop growth itself.

A photograph of a field of yellow Black-eyed Susan flowers and green grasses. In the background, a white umbrella is visible. The sky is blue with some clouds.

In this image, one of our malaise traps barely pokes out of a study plot, where the gold of Black-eyed Susan is interspersed with the wispy textures of native grasses.

Tiphia wasps parasitize the grubs of June beetles and their relatives.

Do they work? – The cast of characters.

In looking at the impacts of our plantings on communities of insects and other invertebrates, we will focus on three widely recognized groups of beneficial insects: bees, parasitoid wasps and ground beetles. ‘Beneficial’ is in the eye of the beholder, and the three groups of “beneficials” that we focus on here illustrate the complexity of that term.

Bees are beneficial because of pollination, but a relatively large proportion of Northeast crops don’t actually require insect pollination for crop production (more need it for seed production). So the benefits a farmer might receive will depend on the crops they are growing. Furthermore, while bees might often (but not always!) be pollination generalists, flower morphology does influence pollinator ‘fit’ and additionally various bee species fly at different times of year. Early-season crops might, for example, be ‘serviced’ by a reduced fleet of bee species. Nonetheless, for the most part, a particular bee species is usually either considered beneficial for farm production or neutral.

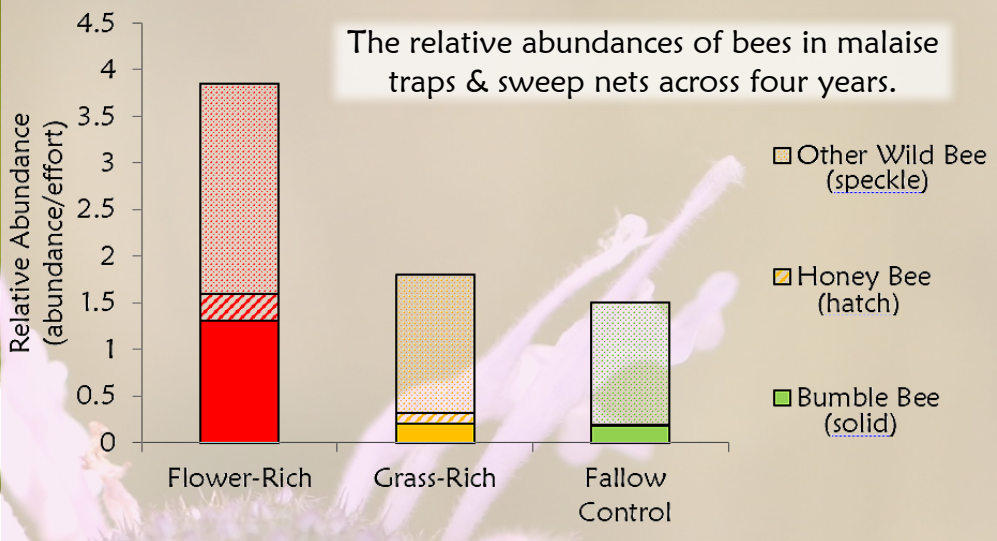
Parasitoid wasps tend to be more specialized, with particular wasp species parasitizing only one or a few other insect species. However, those hosts are not always pests – for example there are wasps known to parasitize designated beneficials such as spiders, ground beetles, lady beetles and hover flies. However, if you know which wasp species are present, you can get some indication of whether they’re likely to be affecting pests or beneficials.

Finally, most ground beetles are relatively generalized feeders, some even include both plants and animals in their diet. As a result, depending upon what a particular individual is feeding on (e.g., weed seeds vs strawberries), it might be considered a pest or a beneficial. Unlike with bees, it is not valid to assume a ground beetle will likely be beneficial or only neutral and unlike many parasitoids, species identification does not necessarily clarify a species’ standing. For ground beetles, and other generalist predators such as spiders, there may be few short cuts to understanding a species’ agroecological role in a particular ecological and agricultural situation, and direct observation of some sort might be necessary.

A *Poecilus* ground beetle roams the ground.

A male *Peponapis* bee peers from a squash flower.





Do they work for Bees?

Our flower-rich plots had significantly higher abundances of bees than either our grass-rich plots or our controls. This is what we had hoped for! Digging in more deeply, we see that the most dramatic difference was in bumble bees – these were about 500% more abundant amongst the wildflowers than elsewhere, whereas Honey Bees are only 75% higher, and wild bees were only 50% higher than in the controls and grass-rich plantings. However, this pattern didn't hold across all bee genera. For example, bees of the genus *Halictus* – one group of so called fuzzy sweat bees - were as common in the grass-rich plots as in the flower-rich plots.

In terms of biodiversity conservation, the number of bees species found in the flower-rich plots was about 60% higher than in the grasses, although declining bee species were only slightly more common in the wildflowers than in the grass plots (3 species vs 2). The fallow controls were even less diverse than the grass-rich plots. Among the rarer bee species observed were two bumble bees, the Tri-colored Bumble Bee and the Northern Amber Bumble Bee, which are considered very unusual in New York State.

In terms of agricultural significance, the differences among our plantings may be even more marked than those for simple diversity. Looking at bee species reported to pollinate three common, bee-pollinated crop families – Cucurbits, Legumes and Nightshades - we estimated that our flower-rich plantings attracted a minimum of five and a maximum of 13 times the number of pollinators in either the grass or fallow plots. Additional factors would influence the translation of these numbers into actual pollination benefits for nearby crops, but the evidence suggests strong potential benefits of the wildflower planting.

Do they work for Wasps?

The role of wasps in agricultural situations is often overlooked. The most important species are quite small and most people quickly associate wasps with nasty stings. However, under some circumstances, parasitoid wasps can provide important, organic

The wasp communities in our test plots appeared to show a mirror image of the bee fallow controls. This pattern may, in part, be due to the fact that the fallow fields tended to have more of the small flowers that many tiny wasps seem to favor, and higher abundance leads to more species in the same diversity of accents even if the source communities have an equal diversity of tongues.

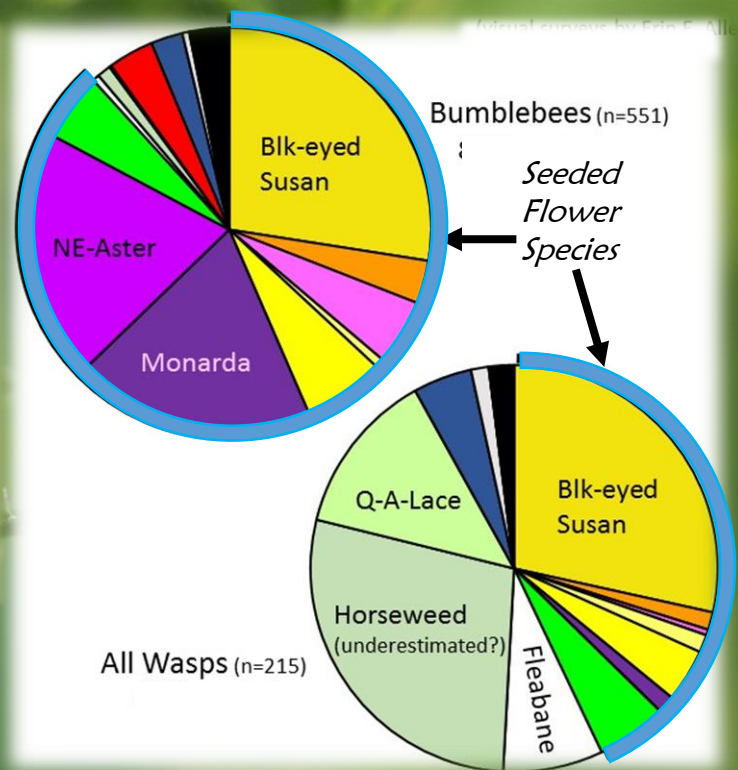
It may also partially reflect the diverse paths of fallow field regrowth which saw one of our fallows erupt in Cottonwoods, while others were dominated by herbaceous vegetation. It is clear we still have much to learn about wasps in and around our plots – we don't even know the hosts of some of the most common parasitic wasps we found, while for others, whose hosts have been reported to be pests, we have no idea how widespread their parasitism is and hence how relevant to pest control.

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These charts, based on visual surveys by graduate student Erin Allen, show the types of flowers upon which bumble bees and wasps were observed. Only the most common flower species are labeled. Bumble bees favored the showy, seeded wildflowers (upon which they were observed 87% of the time), whereas the wasps preferred the smaller, shallower and often wild flowers, such as the Horsetweed shown in the background of this page

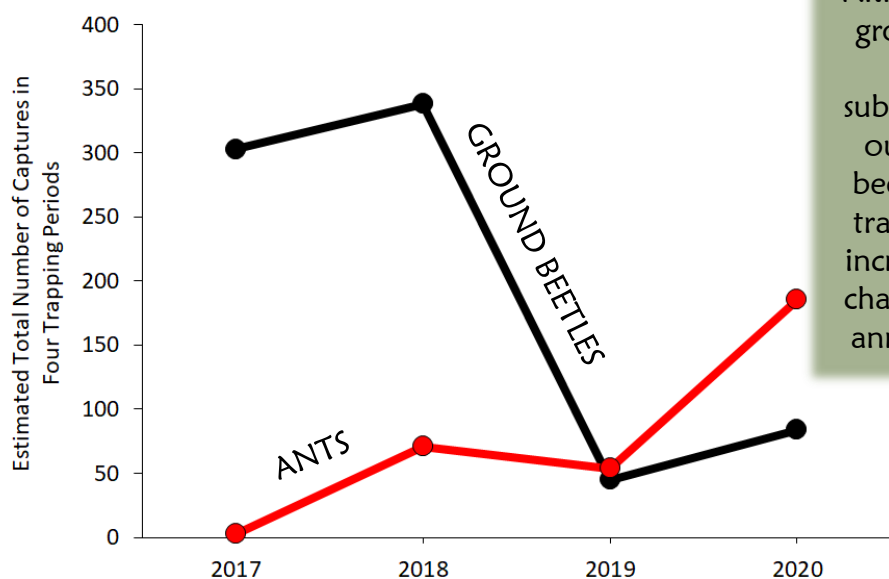


A *Microctonus* wasp attempts to lay an egg in a flea beetle.

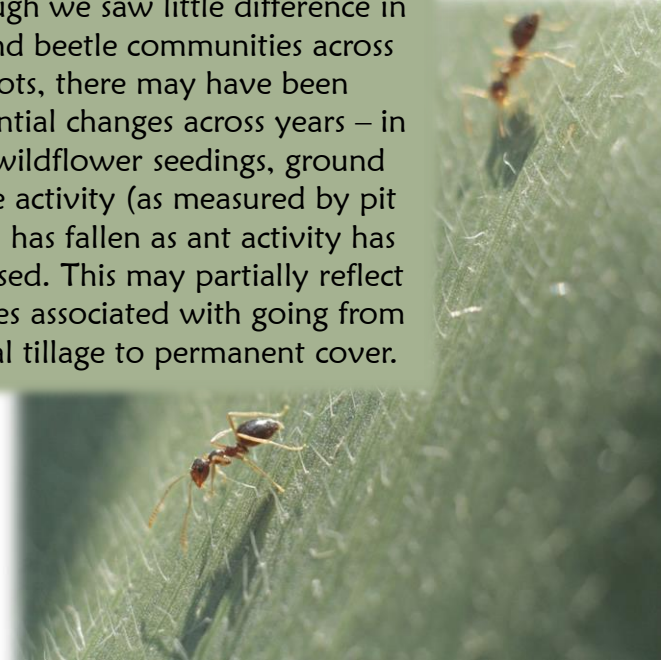
The ground beetle fauna did not seem to be strongly affected by the plantings we made – composition varied little across the plots; the wildflower-rich plots had slightly fewer species, but the difference was small. Looking at rarity and agronomic relevance, the communities also varied little. If anything, the wildflower plots tended to have slightly more common species, a lower number of pest predators, and a higher number of the ground beetle species sometimes considered pests. Differences were slight, and the most we can say is that there was no sign that our flower-rich seed mix enhanced the ground beetle communities from a biodiversity or agroecological-services perspective. Communities did seem to be evolving, with ground beetle abundances declining over the four years and ant abundances increasing in both the flower-rich and the grass-rich plots.



Harpalus rufipes, an exotic, is a common ground beetle on regional farms.



Although we saw little difference in ground beetle communities across plots, there may have been substantial changes across years – in our wildflower seedings, ground beetle activity (as measured by pit traps) has fallen as ant activity has increased. This may partially reflect changes associated with going from annual tillage to permanent cover.





Do they work for Other Creatures?

We found creatures other than bees, wasps, and ground beetles in the plots. While we rarely capture butterflies using our trapping techniques, during one year collaborator Erin Allen made visual observations of butterflies. She found that butterflies were 5-20 times more common and slightly more diverse (19 species vs 11-16 species) in the flower-rich plots than in our other plots. While butterflies are sometimes described as pollinators, in our agricultural systems they probably are rarely significant for pollination. However, the caterpillars of some butterflies, such as those of Cabbage Whites and Black Swallowtails, can sometimes be noted pests. If we consider not only adult butterflies but also moths and all caterpillars, we see that such captures were indeed also most common in our flower-rich plantings. As noted, this could mean more attractive, potentially pollinating butterflies, but also more leaf-nibbling caterpillars.

Some of the other creatures we captured, like hover flies, lady beetles and spiders (but see photo below) are generally considered beneficials, while others, like leafhoppers, flea beetles, Tarnished Plant Bugs, and aphids, are usually described as pests. Putting aside the difficulties of such stereotypes, we again find a mixed message in our results. Lady beetles and spiders were most common in our controls, and two prominent pests, flea beetles and aphids, also shared that apparent preference. This latter observation adds a note of caution to our attempts to directly link the abundance of certain creatures to flower structure (for example, small wasps and small flowers): as we have found in previous studies, it is sometimes the presence of prey or hosts that influence the occurrence of predators and parasitoids more than the vegetation itself. So, the high abundance of wasps in our fallows is probably at least partially tied to the abundance of wasp-hosting aphids in those controls. We could discern no clear plot preferences by another oft-mentioned group of beneficials, the sometimes aphid-eating, flower-pollinating hover flies.

By and large, it seems the soil-dwelling mites, springtails, thrips, and other creatures may have, like ground beetles, shown relatively little differentiation amongst our plots. In fact, mites and springtails seemed unusually rare across our plots, perhaps reflective of intense past land use. If there were community differences, they seemed to be between some hay field sites we included for this comparison and the remainder of our sites, including our plantings and the fallows.

Life is complicated!

On the left, a jumping spider deals with a caterpillar, possibly earning a farmer's praise, while on the right a crab spider has dispatched a bumble bee, a welcome pollinator on farms. So, are spiders pests or beneficials?



Might wildflowers affect nearby crops?

One can make guesses concerning the agricultural impacts of our plantings based upon which pests and beneficials are present in the respective samples. For example, one might suppose that the abundance of bees in our wildflowers might have a trickle-over pollination benefit to adjacent crops or that an abundance of parasitoid wasps might dampen nearby pest populations. However, there are many reasons why such simple conclusions can be misleading. For example, many of our cultivars don't need pollination to produce the market crop, and those that do, sometimes are best 'serviced' by a relatively small number of bee species. Likewise, only one or a few wasp species might parasitize a certain pest, and even if they do parasitize them, agronomically meaningful population control may not be forthcoming. For example, we have studied the wasps that parasitize flea beetles and, despite regularly being able to observe such wasps in action, flea beetles remain a daunting challenge to organic farmers.

Given these uncertainties, the best thing to do may be to ask the crops themselves. To do this, we have planted crops adjacent to each of our seeded plots and the fallows. We have then followed the crops through to harvest, recording damage, measuring growth, and tallying visiting insects. If wildflower plantings provide meaningful benefits to growers then we would hope to see those reflected in the quality and quantity of harvest.

In this background image, Sweet Corn and Butternut Squash grow up next to Bee Balm, Black-eyed Susan and Echinacea

Our plantings provide homes not for only insects and other invertebrates, but also for birds and mammals. Some (such as Groundhogs like this) venture into adjacent crops for a meal. These depredations can be an important caution for certain growers.

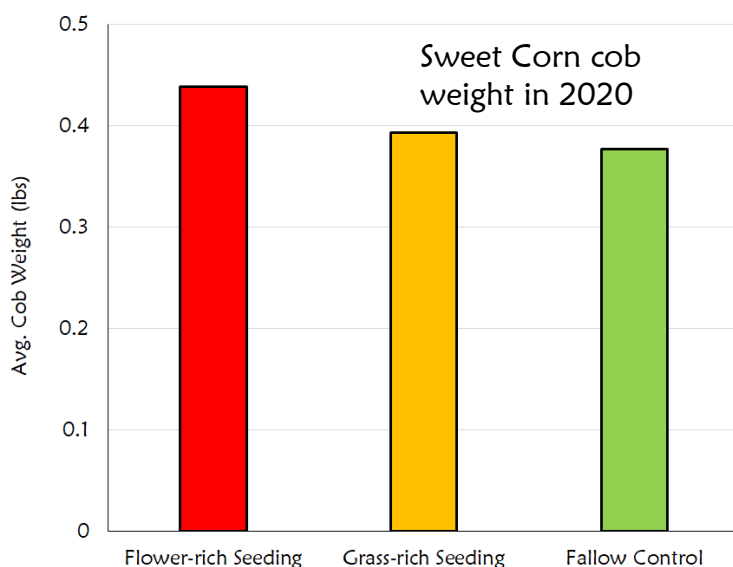
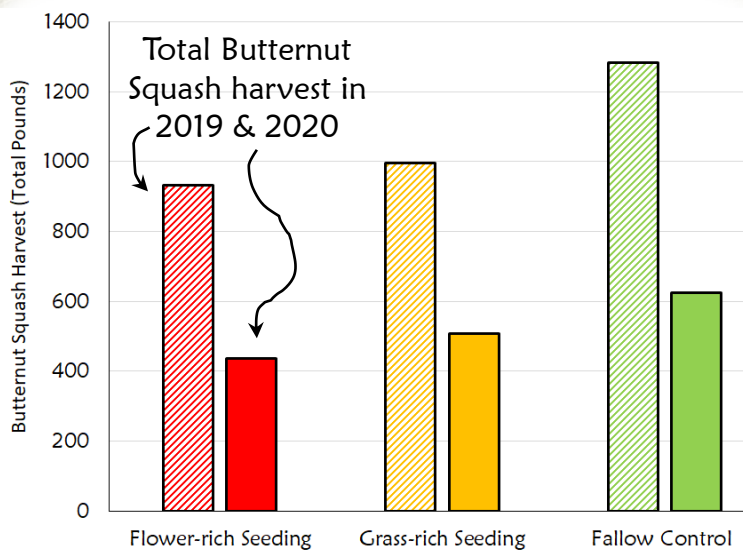


What happens if you grow crops next to wildflowers?

For the past two years, we have planted Butternut Squash next to our plots, and last year we planted Sweet Corn. As the 'mixed' results for the insects might lead you to predict, the results of our vegetable growing have not been clear-cut. In both years, Butternut Squash grew best next to our fallow controls. There tended to be more and larger squash in those sites, so that the total harvest was about 40% higher adjacent to the fallows than adjacent to the wildflowers. The opposite of what we had initially predicted! More data are needed, but, so far, we certainly have had no indication that Butternut Squash benefits from growing next to wildflowers.

The results from the Sweet Corn have been slightly different. During our first year, the corn next to the wildflowers averaged about 15% heavier than that next to the control, seemed to enjoy higher rates of fertilization, and appeared to suffer lower leaf damage. There was, however, some indication that stink bug damage to kernels may have been higher near wildflower plantings. In both cases, plantings next to our grass-rich seedings showed intermediate levels of growth.

Various explanations are possible for these results. Perhaps squash pollinators next to the wildflowers were distracted from their agricultural 'tasks' by the abundance of alluring nearby wildflowers but readily perched on the higher tassels of the Sweet Corn, thereby aiding their pollination. Perhaps some of the parasitic wasps attracted to the fallow controls did venture out into the adjacent squash and had an influence on squash pests and hence on squash growth. Or perhaps the lush vegetation of some of our native plant seedings influenced the neighboring crop soils or microclimates in ways that had differing effects on squash and corn. We did tally insects in the crops themselves and the results suggested that there may have been effects from the adjacent plots, but the picture was mixed and didn't encourage a straight-forward interpretation of our observations.

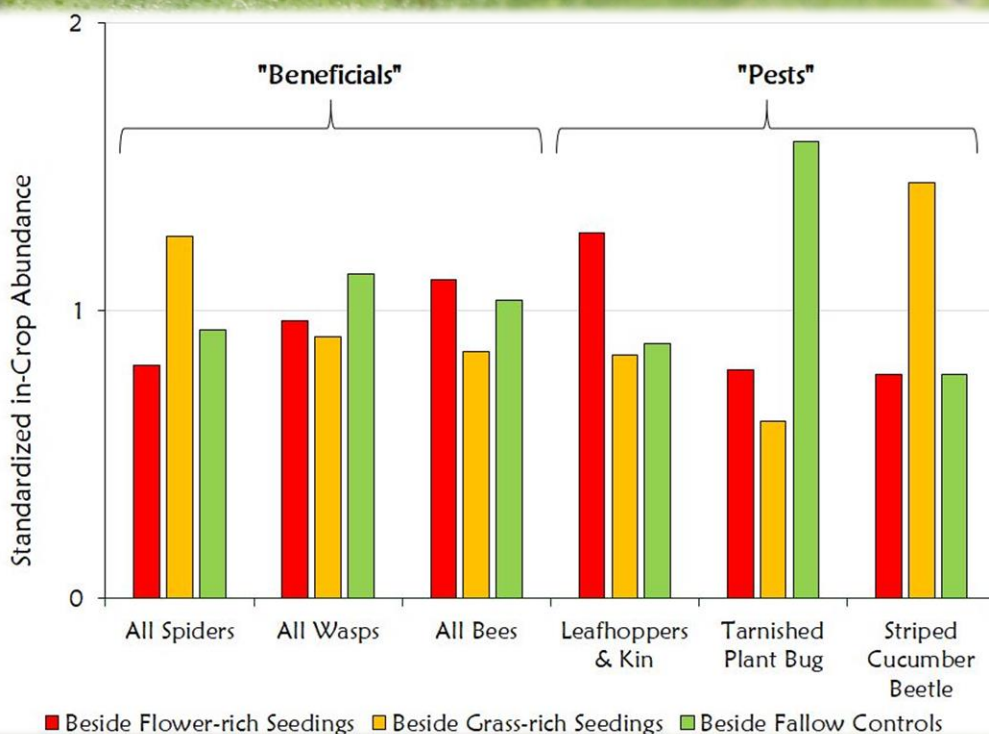


Conclusions - What have we learned?

It is possible to establish wildflower plantings organically, but ample physical soil preparation and some maintenance is needed. Between repeated initial tillage to knock back weeds and subsequent, well-timed mowing and selective weeding, about 10 hours of labor were needed per acre during each of the first two years. Even once established, such plantings continue to evolve, their trajectories influenced by site-specific conditions in interplay with the weather. Maintaining a steady state in terms of plant and flower composition would require impractically large levels of additional labor. We do not yet know where our plantings are headed and the degree to which a substantial population of wildflowers will persist.

At least over the first four years, the wildflower plantings did increase native flower diversity, and these did seem to attract a greater number and diversity of bees and butterflies. These gains did not seem to hold across all groups of creatures and our knowledge is too incomplete and our partial results too mixed to allow any global statements about the biodiversity bottom line. Furthermore, any such conclusions would need to take into account not only what the plantings harbored but what the surrounding landscape supported. For example, the relatively unclear consequences for ground beetle diversity might be largely irrelevant if other habitats in the landscape were already providing more than enough resources for these organisms. Likewise, if we could show that our planted wildflowers were providing an important 'bridging resource' that kept bees fueled at times when flower resources were rare elsewhere, this would give added conservation justification for our plantings.

In terms of food production consequences, even without considering the complications of identifying what species are truly beneficials and pests in an agronomic sense, our results do not provide clear indications of which habitats create the most 'farm friendly' insect community. Our crop grow-outs have only re-emphasized that uncertainty.



The varying abundances of beneficials and pests (such as the Striped Cucumber Beetles below) in our crop grow-outs echoed the mixed results of our harvest statistics.



So, should you plant wildflowers on your farm?

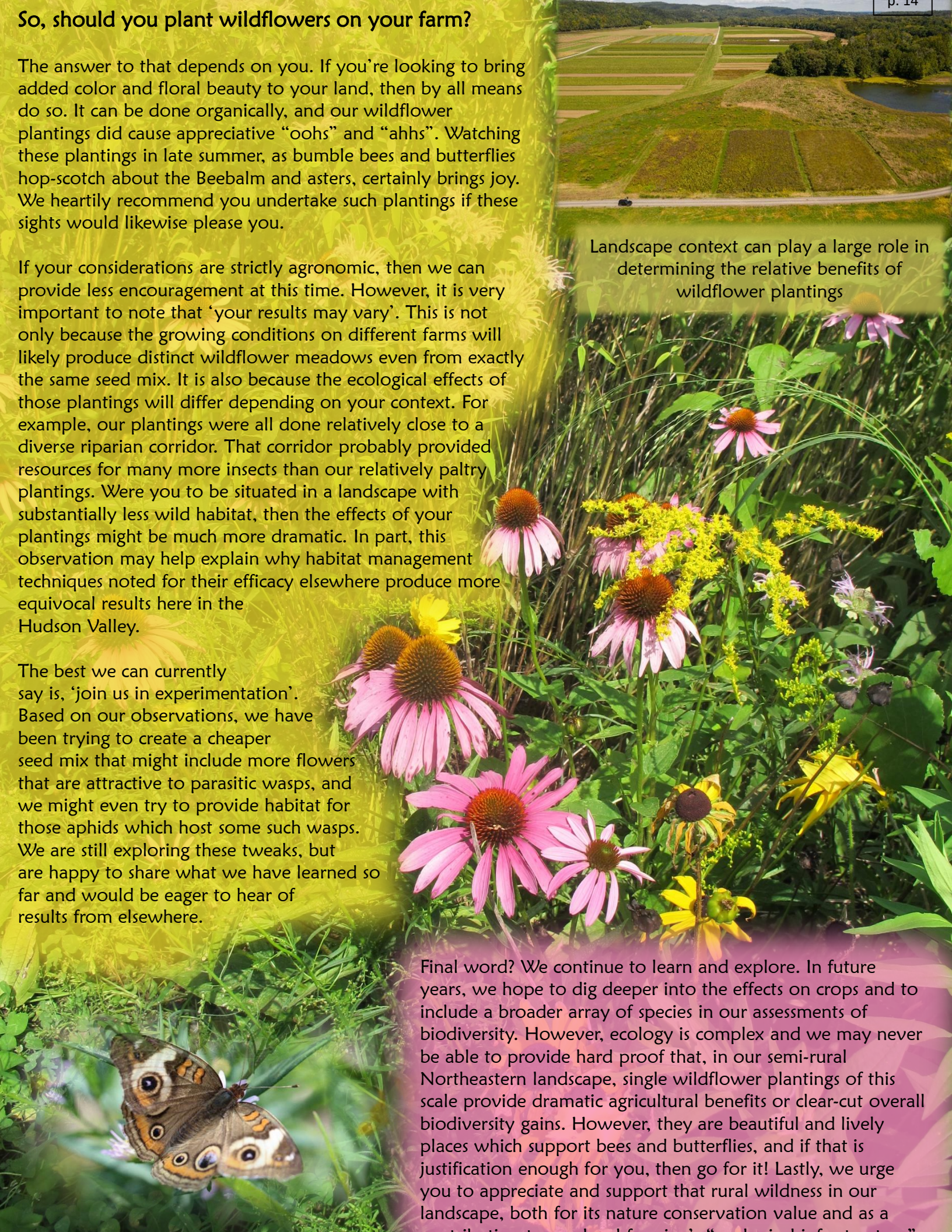
The answer to that depends on you. If you're looking to bring added color and floral beauty to your land, then by all means do so. It can be done organically, and our wildflower plantings did cause appreciative "oohs" and "ahhs". Watching these plantings in late summer, as bumble bees and butterflies hop-sotch about the Beebalm and asters, certainly brings joy. We heartily recommend you undertake such plantings if these sights would likewise please you.

If your considerations are strictly agronomic, then we can provide less encouragement at this time. However, it is very important to note that 'your results may vary'. This is not only because the growing conditions on different farms will likely produce distinct wildflower meadows even from exactly the same seed mix. It is also because the ecological effects of those plantings will differ depending on your context. For example, our plantings were all done relatively close to a diverse riparian corridor. That corridor probably provided resources for many more insects than our relatively paltry plantings. Were you to be situated in a landscape with substantially less wild habitat, then the effects of your plantings might be much more dramatic. In part, this observation may help explain why habitat management techniques noted for their efficacy elsewhere produce more equivocal results here in the Hudson Valley.

The best we can currently say is, 'join us in experimentation'. Based on our observations, we have been trying to create a cheaper seed mix that might include more flowers that are attractive to parasitic wasps, and we might even try to provide habitat for those aphids which host some such wasps. We are still exploring these tweaks, but are happy to share what we have learned so far and would be eager to hear of results from elsewhere.

Landscape context can play a large role in determining the relative benefits of wildflower plantings

Final word? We continue to learn and explore. In future years, we hope to dig deeper into the effects on crops and to include a broader array of species in our assessments of biodiversity. However, ecology is complex and we may never be able to provide hard proof that, in our semi-rural Northeastern landscape, single wildflower plantings of this scale provide dramatic agricultural benefits or clear-cut overall biodiversity gains. However, they are beautiful and lively places which support bees and butterflies, and if that is justification enough for you, then go for it! Lastly, we urge you to appreciate and support that rural wildness in our landscape, both for its nature conservation value and as a



This brochure was written by Conrad Vispo and Claudia Knab-Vispo, with field help and/or data analysis from Dylan Cipkowski, Kendrick Fowler and Nellie Ostow of the Hawthorne Valley Farmscape Ecology Program and Carmen Greenwood of SUNY - Cobleskill.

The work was done as part of the Applied Farmscape Ecology Research Collaborative located at and funded by the Hudson Valley Farm Hub.

We thank Anne Bloomfield of the Farm Hub for her enthusiasm and diligence in not only shaping the overall program but also holding the day-to-day logistics. The farmers and farm crew at the Farm Hub provided critical support for us non-farmers. Over the years, numerous interns have given much appreciated time and sweat to the effort.

All photos were taken by the Hawthorne Valley Farmscape Ecology Program except for the aerial image on the previous page which was the work of Jon Bowermaster / Oceans 8 Films.

Questions or comments? Please contact fep@hawthornevalleyfarm.org; to view detailed reports, please see hvfarmscape.org/agroecology.



Vane traps lure bees in a corn and squash planting adjacent to wildflowers.

APPENDIX: SEED MIX COMPOSTION



Our Flower-rich Seed Mix

Common Name	Scientific Name	Percent of mix by volume (seed/ft2)
Blackeyed Susan	<i>Rudbeckia hirta</i>	6.5%
Browneyed Susan	<i>Rudbeckia triloba</i>	2.2%
Butterfly Milkweed	<i>Asclepias tuberosa</i>	1.1%
Common Milkweed	<i>Asclepias syriaca</i>	1.1%
Dense Blazingstar	<i>Liatris spicata</i>	1.1%
Early Goldenrod	<i>Solidago juncea</i>	3.2%
Joe Pye Weed	<i>Eupatorium purpureum</i>	1.0%
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>	8.6%
Lavender Hyssop	<i>Agastache foeniculum</i>	8.6%
Little Bluestem	<i>Schizachyrium scoparium</i>	19.4%
Mistflower	<i>Eupatorium coelestinum</i>	6.5%
Narrowleaf Mountainmint	<i>Pycnanthemum tenuifolium</i>	3.8%
New England Aster	<i>Aster novae-angliae</i>	2.1%
Ohio Spiderwort	<i>Tradescantia ohiensis</i>	2.2%
Partridge Pea	<i>Chamaecrista fasciculata</i>	2.2%
Purple Coneflower	<i>Echinacea purpurea</i>	4.3%
Purple Prairie Clover	<i>Dalea purpurea</i>	2.2%
Roundhead Lespedeza	<i>Lespedeza capitata</i>	1.1%
Showy Goldenrod	<i>Solidago speciosa</i>	2.3%
Slender Lespedeza	<i>Lespedeza virginiana</i>	2.1%
Smooth Blue Aster	<i>Aster laevis</i>	2.1%
Tall White Beardtongue	<i>Penstemon digitalis</i>	9.7%
Wild Bergamot	<i>Monarda fistulosa</i>	6.7%

Our Grass-rich Seed Mix

Common Name	Scientific Name	Percent of mix by volume (seed/ft2)
Autumn Bentgrass	<i>Agrostis perennans</i>	15.0%
Big Bluestem	<i>Andropogon gerardii</i>	6.4%
Blackeyed Susan	<i>Rudbeckia hirta</i>	6.3%
Canada Wildrye	<i>Elymus canadensis</i>	10.7%
Indiangrass	<i>Sorghastrum nutans</i>	6.7%
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>	3.2%
Little Bluestem	<i>Schizachyrium scoparium</i>	16.0%
Partridge Pea	<i>Chamaecrista fasciculata</i>	1.1%
Purple Coneflower	<i>Echinacea purpurea</i>	5.3%
Purple Lovegrass	<i>Eragrostis spectabilis</i>	1.3%
Purple Prairie Clover	<i>Dalea purpurea</i>	2.1%
Purpletop	<i>Tridens flavus</i>	16.4%
Slender Lespedeza	<i>Lespedeza virginiana</i>	1.1%
Switchgrass	<i>Panicum virgatum</i>	8.5%

