



## Improving Pest Management and Pollination with Farmscaping

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Farmscaping is a holistic, ecologically-based approach to pest management that emphasizes the arrangement of plants that promote biological pest management and pollination by attracting and sustaining beneficial organisms. Ideal farmscape plantings provide habitat for beneficial insects, suppress weeds, and grow in close proximity to the cash crop without competing for light, water and nutrients. Research has shown that maintaining high levels of species diversity is a key characteristic of a proper functioning agroecosystem. Unfortunately, intensive farming operations often manage their farms by growing large monocultures, cultivating regularly, and applying excessive amounts of pesticides, which often leads to a dramatic reduction in arthropod diversity. This includes natural enemies that often keep many pest insects below damaging levels and pollinators that ensure proper fruit set. Farmscaping is



a technique designed to add diversity back to agricultural systems and to minimize disturbances in order to increase natural enemy and pollinator populations.

Successful conservation of beneficial insects involves manipulation of the environment to favor natural enemies and pollinators, either by eliminating adverse

factors or by providing improved conditions for colonization and survival. The use of

farmscaping increases pollen and nectar resources for pollinators and may increase alternative prey to bolster natural enemy populations when other food resources are scarce. Farmscape plantings, especially perennial farmscape plantings, can also serve as an overwintering habitat or nesting resource for natural enemies and pollinators to ensure carryover of beneficial insects from year to year.

### Why should I farmscape?

While the primary goal of farmscaping is to improve pest management and pollination, it is important to remember that farmscaping plants can provide additional value and can improve your bottom line.



Additional reasons to farmscape include:

1. *Work smarter, not harder.* Working with and using natural processes, like farmscaping, will help control pests and provide pollination sustainably, increasing farm productivity with less direct intervention and labor inputs.
2. *Increased profits.* Farmscaping lowers the production costs of crops by suppressing pests below threshold, and increasing pollination and yields of small fruits and squashes.
3. *It's cheap and easy!* You only need to farmscape about 5% of field area. Thus, for every acre, you need about 2200 square feet of flowering plants which costs between \$5.00 - 10.00 for seed.
4. *You can put farmscaping plants anywhere.* As long as the plants are near your cash crops, you can utilize otherwise unusable land such as drainage ditches and steep banks.
5. *Erosion control/soil building.* Farmscaping in places that are easily eroded gives stability to the soil and can be used as buffers, providing benefits to crops growing nearby.



### Designing a farmscape

There are some basic questions you need to consider when designing your farmscape. Where do you want to plant it? Do you want to plant annuals or perennials? Do you want to stick with all native plant species? What's the right mix of plants? Answering these fundamental questions will get you started on a concrete plan.

Where you intend to plant your farmscape is the first step to deciding what to plant. It can be ideal to locate farmscapes on the less productive land of your farm. This may include areas with poorly draining or sandy soils or along steep slopes. These areas of the farm are especially suitable for perennial farmscapes because they can help improve the soil and prevent erosion. It can also be very beneficial to intentionally integrate farmscapes into the cropping system because they will attract beneficial insects right near where you need them. This can be done by intercropping individual plants or by adding rows of farmscape plants alongside rows of crops. In these situations, annual plants may be better than perennials because they can be tilled yearly with the rest of the cropland.

Whether you plant annual or perennial farmscape plants may be largely determined by where you decide to locate them, but there are additional factors to consider in your farmscape design. Annuals will need to be planted every spring. This requires yearly planning and more maintenance than perennial plantings. Perennial farmscape can last five years or even more with proper maintenance. With annuals, you can be assured prolific blossoms during the planting year whereas the beauty of perennial farmscapes does not become especially apparent until the second year. Weeds may be easier to manage in annuals systems by tilling each year than in perennial systems. During the first year, especially, perennial farmscapes can be very weedy as the plants are investing energy into their extensive root systems and it is important to be able to tell your farmscape plants from your weeds. This extensive root system can improve the soil and provides more drought tolerance in perennial farmscapes than in annual farmscapes. Some farmers mix annual and perennial farmscaping plants to reassure themselves that the farmscape established and to enjoy blossoms the first year.

Once you know your preference for annuals versus perennials, you can consider other plant characteristics such as their native range. Farmers focused on conservation may want to prioritize only native plants that are local to the Southeastern United States. These are likely to be adapted to the local growing conditions and are especially suitable to provide resources

to local natural enemies and pollinators. They also cannot escape into the wild and then compete with native plants. On the other hand, using non-native plants provides more planting options. Furthermore, the European honeybee, which we rely on heavily in agriculture, is also not a native species and may do even better on some farmscape plants from Europe such as clover than on native farmscape plants.

You will also want to consider the complementarity of blooms to choose the right mixture of farmscape species. Mixtures are usually best as they can provide floral resources for beneficial insects throughout the growing season. One rule of thumb is to create a nine-species mix with three early-, three mid-, and three late-season flowering plants. At any given location, some species will be more suitable than others. Providing a mix of farmscaping plants with redundant flowering times will help ensure that something has established to flower throughout the growing season. It is not unusual to see only five of nine species establish and the specific species that flourish can vary from location to location. With perennial or annual/perennial farmscapes mixes, you will also see the dominance of the different flower species shift over the years. Annuals will tend to not reseed themselves after the first couple years.

### Ideal plants for farmscaping

The best farmscaping plants will, ideally, support populations of beneficial insects but not pests. To avoid attracting pests, farmscape plants should come from different plant families than your crops. Plants that attract beneficial insects will include flowers that provide ample nectar and pollen. Many plants in the carrot family (*Apiaceae*) make exceptional



farmscaping plants because they contain exposed floral nectaries. In addition, many plants in the legume family (*Fabaceae*) contain extra floral nectaries, which are nectar glands not associated with the flower, that make resources highly accessible to natural enemies. Additionally, leguminous plants fix nitrogen and improve soil fertility.

We list popular popular farmscaping plants in Table 1.

**Table 1. Beneficial farmscaping plants**

Common Name	Scientific Name	Native (Y/N)	Life Cycle (A=Annual/P=Perennial)	Legume (Y/N)	Color	Bloom Period
Plains coreopsis	<i>Coreopsis tinctoria</i>	Y	A	N	yellow	early spring
Indian blanket	<i>Gaillardia pulchella</i>	Y	A	N	red	spring
Fava bean	<i>Vicia fava</i>	N	A	Y	white	spring
Hairy vetch	<i>Vicia villosa</i>	N	A	Y	purple	spring
Blackeyed Susan	<i>Rudbeckia hirta</i>	Y	A	N	yellow	early summer
Partridge pea	<i>Chamaecrista fasciculata</i>	Y	A	Y	yellow	summer
Anise	<i>Pimpinella anisum</i>	N	A	N	white	summer
Coriander/Cilantro	<i>Coriandrum sativum</i>	N	A	N	white	summer
Cosmos	<i>Cosmos binpinnatus</i>	N	A	N	pinks	summer
Sunflower	<i>Helianthus annuus</i>	Y	A	N	yellow	summer
Tansy	<i>Tanacetum vulgare</i>	N	A	N	yellow	summer
Red clover	<i>Trifolium pratense</i>	N	A	Y	pink	summer
Buckwheat	<i>Fagopyrum esculentum</i>	N	A	N	white	summer
Dill	<i>Anethum graveolens</i>	N	A	N	yellow	late summer
Showy evening primrose	<i>Oenothera speciosa</i>	Y	P	N	pink	early spring
Tall white beardtongue	<i>Penstemon digitalis</i>	Y	P	N	yellow	early spring
Lanceleaf coreopsis	<i>Coreopsis lanceolata</i>	Y	P	N	yellow	spring
Alfalfa	<i>Medicago sativa</i>	N	P	Y	purple	spring
Grey-headed coneflower	<i>Ratibida pinnata</i>	Y	P	N	yellow	late spring
Illinois bundleflower	<i>Desmanthus illinoensis</i>	Y	P	Y	white	early summer
Chamomile	<i>Anthemis nobile</i>	N	P	N	white	early summer
Yarrow, milfoil	<i>Achillea millefolium</i>	N	P	N	white	early summer
Purple coneflower	<i>Echinacea purpurea</i>	Y	P	N	purple	summer
Wild bergamot	<i>Monarda fistulosa</i>	Y	P	N	purple	summer
Mountain mint	<i>Pycnanthemum tenuifolium</i>	Y	P	N	white	summer
Gray goldenrod	<i>Solidago nemoralis</i>	Y	P	N	yellow	summer
Butterfly milkweed	<i>Asclepias tuberosa</i>	Y	P	N	orange	summer
Common milkweed	<i>Asclepias syriaca</i>	Y	P	N	pink	summer
White clover	<i>Trifolium repens</i>	N	P	Y	white	summer
Maximilian sunflower	<i>Helianthus maximiliani</i>	Y	P	N	yellow	late summer
Marsh blazingstar	<i>Liatris spicata</i>	Y	P	N	purple	late summer
Wingstem	<i>Verbesina alternifolia</i>	Y	P	N	yellow	late summer

## Installing and maintaining a farmscape

Proper site preparation is key to a successful farmscape. It is important to completely kill the existing vegetation before planting. This preparation can begin the fall before planting or in the spring by using herbicides and/or tillage. Research has shown that tillage right before planting can bury seeds and inhibit plant establishment. Therefore, it is ideal to cultipack after tilling or to wait for rains to pack the soil while not allowing too many weeds to germinate before planting. If herbicides are used to clear existing vegetation, it is important to minimize any plant residues left on the soil surface that can inhibit seed to soil contact. Residues can be minimized by mowing the existing plants before applying herbicides or by doing a controlled burn if plant residues are heavy.

Maintenance is key to the longevity of perennial farmscapes. In perennial-only farmscapes, it can be useful to mow them, ideally, at least five inches above the ground, during the first year of planting before the annual weeds set seed. This will not kill the perennials but will prevent the shedding of additional annual weed seeds. You will see a dramatic difference in the second year of perennial farmscapes as weed: wildflower ratios can shift from 9:1 in the first year to 1:9 in subsequent years. Farmscapes should be mowed at least annually in the fall after the plants have dried out to prevent the encroachment of unwanted woody plants. Consistent maintenance will ensure that farmscapes will stay beautiful and useful for many years.

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