

ESTIMATED COSTS TO ESTABLISH WILDFLOWER PLANTINGS

Using Solarization



This native wildflower planting was installed after clearing the site of weeds organically using solarization. (Photographs by Jessa Kay Cruz, The Xerces Society.)

Estimated Cost of Establishing Pollinator Wildflower Plantings Using Solarization:

The table below outlines the estimated costs of establishing wildflower habitat for pollinators using a method referred to as solarization. These cost-estimates are applicable to relatively small-scale (e.g., <1 ac) on-farm habitat plantings. They represent average cost ranges and are derived from a series of pollinator habitat projects across the United States that involved establishing conservation cover from seed. Specific costs will vary by project and by region.

ACTIVITY	RECOMMENDED METHOD(S)	MATERIALS		LABOR		TOTAL CPU ¹	COMMENTS
		ITEM	CPU ¹	WHPU ²	CPU ¹		
SITE PREPARATION	Solarization	Clear, UV-stabilized plastic (4mm–6mm)	\$40.00–\$100.00	1	\$20.00	\$60.00–\$120.00	Cost does not include shipping of materials
SEEDING	Broadcast or native seed drill	Wildflower seed mix ³ + bulking agent	\$6.50–\$22.60	0.5	\$10.00	\$16.50–\$32.60	Cost varies significantly by region ³
MAINTENANCE (3 YEARS)	Hand-weeding, mowing, selective herbicide applications		N/A ⁴	3.5	\$70.00	\$70.00	Cost of tools/equipment not included ⁴
UNIT COST (WITHOUT IRRIGATION)		TOTAL	\$46.50–\$122.60	5	\$100.00	\$146.50–\$222.60	
IRRIGATION	Drip irrigation	In-line drip emitter tubing and pins	\$93.00	0.5	\$10.00	\$103.00	Only necessary in arid climates or drought conditions.
	PER UNIT SUBTOTAL		\$139.50–\$215.60	5.5	\$110.00	\$249.50–\$325.60	Use PER UNIT SUBTOTAL when estimating costs for large plots
	<i>Additional irrigation materials⁵</i>		<i>\$95.00</i>				One-time cost ⁵
COST FOR ONE UNIT (WITH IRRIGATION)		TOTAL	\$234.50–\$310.60	5.5	\$110.00	\$344.50–\$420.60	

NOTE: In this estimate one unit is equal to 1,000 ft². See ADDITIONAL NOTES on next page for more details.

I. Site Preparation

Solarization

Solarization has consistently provided some of the best results nationwide as a site-preparation method for establishing wildflower habitat from seed. Solarization is a non-herbicidal method of controlling weeds by placing a clear plastic sheet on soil during periods of high ambient temperature. The clear plastic allows for the transfer of the sun's radiant energy to the soil, where it becomes trapped under the plastic and heats the upper levels of the soil. Solarization during the hot summer months can increase soil temperature to levels that kill not only existing vegetation but also many weed seeds. Maximum temperatures from previous trials have ranged from approximately 125–145°F. Plastic can be laid in the spring or early summer, and is left in place until the fall, just prior to planting.

Other site-preparation methods may be available and viable to use for certain projects. These methods include chemical fallow, smother cropping, sheet mulching, mechanical weed management, and full soil inversion. However, solarization has proven to be one of the most effective methods under most conditions, thus this cost analysis focuses on solarization.

The material used for solarization should be clear, UV stabilized, 4–6 mil. plastic. 4 mil. plastic is generally less expensive than 6 mil. plastic and results in the highest temperatures, however, it is not as commercially available as 6 mil. plastic. 6 mil. greenhouse is more durable than 4 mil., and may last for several seasons. Black plastic, or non-UV-stabilized plastic, is not recommended. Black plastic will

absorb the heat rather than transmitting it into the ground and result in lower soil temperatures. Non-UV-treated plastic may break down in the field part way through the summer and can shatter, leaving pieces of plastic scattered throughout the project area, and resulting in ineffective weed control.

The estimated number of labor hours required to complete solarization is based on completing all recommended steps, and makes some assumptions about the starting condition of the site. Prior to laying the plastic, the site should be tilled, leveled, and smoothed. Common farm equipment, such as a tractor or ATV, tiller, rake, harrow or box scraper, are usually sufficient to complete these tasks. The time estimate assumes that the site is reasonably clear of debris and level at the onset of the project, and that no major vegetation removal, grading, or excavating is needed. Lack of proper equipment or challenging pre-project site conditions will increase the time needed to complete this step of site preparation.

The soil should also be moist when the plastic is laid in order to facilitate germination of weed seeds in the seed bank. In dry climates or drought conditions, this may mean pre-irrigating the site prior to laying the plastic. If permanent irrigation is installed, it can simply be run in order to soak the area prior to laying the plastic. If permanent irrigation is not installed and the site is not adequately moist from rainfall, the area can be pre-irrigated with temporary sprinklers, soaker hose, or using a mobile water tank, but the time required for this step of solarizing will be increased.

Once the site is adequately prepared, the solarization plastic can be laid and the edges buried. Various tractor implements can be used for this task, particularly furrowing equipment for digging a trench along the perimeter of the project area and burying the edge of the plastic. If equipment is not available, the time required for this step will be increased as the trenches will need to be dug and filled by hand.

For more information on solarization—such as how to lay out and bury plastic and recommended equipment to use—plus other site preparation techniques, see *Wildflower Establishment: Organic Site Preparation Methods*, available at www.xerces.org/organic-farms.

II. Wildflower Seed and Planting

The cost of wildflower seed varies widely, between different projects, regions or seasons. The estimated cost provided in the table above is based on a sample native seed mixes sown at the recommended rates for each region. The cost of these mixes generally range from \$30–\$130/lbs, and the recommended seeding rates range from about 5–9 lbs/ac. Generally, purchasing an industry-provided seed mix will be less expensive and more effective than attempting to formulate and purchase a custom-mix. For more information on commercially available, recommended seed mixes please visit: www.xerces.org/pollinator-seed.

ADDITIONAL NOTES: (from previous page)

1. Cost Per Unit (=1,000 ft²)
2. Work Hours Per Unit
3. See www.xerces.org/pollinator-seed for a list of recommended mixes.
4. Cost of tools and equipment use not included, as they are usually insignificant/already in possession of most farmers.
5. Additional irrigation materials: remote water timer and drip conversion materials, generally one-time cost, regardless of project size = \$95.00

SAMPLE COSTS:

Using solarization for site preparation, a ½ acre wildflower field will range in price from approximately \$1,007.00–\$4,780.00 for materials and a total of \$3,178.00–\$7,180.00 for both labor and materials. For larger projects, different site preparation and establishment techniques may be appropriate. Please see *Wildflower Establishment: Organic Site Preparation Methods* (www.xerces.org/organic-farms) for guidance on larger projects.

Details for each item included in the table are explained in sections I–V. For more information on wildflower installation and regional recommended pollinator plant lists, please see:

- ↪ www.xerces.org/pollinator-habitat-installation-guides
- ↪ www.xerces.org/providing-wildflowers-for-pollinators
- ↪ www.xerces.org/pollinator-conservation/plant-lists

Because wildflower seeds are often very small and the seeding rates, in terms of lbs./ac, are generally low, equipment calibration and even seed dispersal can be challenging. To facilitate calibration and dispersal, it is helpful to mix in polenta (coarse cornmeal) or another bulking agent with the seed mix at a 1:1 ratio. The cost of polenta is approximately \$2.00/lbs, and will add \$15.00/ac to the seed mix cost.

III. Maintenance

Thorough site-preparation prior to planting should keep maintenance costs to a minimum; however, some on-going site management will be necessary. Annual flail mowing in the fall is recommended to prevent thatch build-up and promote wildflower seed germination. Some on-going weed management will also likely be needed. This weed management could consist of hand-weeding within the project site, managing weeds on the perimeter of the site through mowing or herbicide use, spot or selective herbicide use in the project area, additional mowing to target specific weed species, or occasional inter-seeding to maintain species diversity and wildflower cover. Inadequate site preparation will increase the cost of on-going maintenance, see *Maintaining Diverse Stands of Wildflowers* (www.xerces.org/providing-wildflowers-for-pollinators) for more information on managing wildflower plantings.

IV. Irrigation

Although it is recommended that native or locally adapted wildflower species be used in conservation cover projects, installing an irrigation system may still be necessary for project success, particularly in arid climates or areas experiencing drought conditions.

The irrigation estimates in the tables above assume that the system can be hooked into an existing irrigation system on the farm, with a separate irrigation line for the habitat area. As wildflower plantings need significantly less water than most crops, a separate line and shut-off for the habitat areas is recommended. The one-time cost for hooking into an existing system includes the purchase of a remote water timer that can be programmed for the habitat area, and dripline conversion materials such as pressure compensators and couplings. If new valves or pumps must be installed, the cost of irrigation will increase significantly.

The most water-efficient irrigation for conservation cover projects is in-line drip emitter tubing. Tubing can be ordered with in-line emitters on 1' centers, and the driplines can be laid about 2' apart, thus one linear foot of dripline will cover about 2 ft². This will generally ensure even soaking of the entire project area. Ground pins can be used to secure the drip line in place, at the rate of one pin approximately every 6'.

V. Cost Comparisons

Chemical Fallow vs. Solarization for Wildflower Establishment

Chemical fallow is generally less effective at eradicating weeds and weed-seeds from a site as compared soil solarization, and thus requires significantly more labor in terms of on-going management to keep the site weed-free. However, chemical fallow methods cost far less in material costs as compared to solarization. The cost of establishing a 1,000 ft² wildflower planting using chemical fallow ranges from \$8.00–\$212.00 for materials and \$318.00–\$532.00 for materials and labor combined. The cost of establishing a 1,000 ft² wildflower planting using solarization ranges from \$46.00–\$310.00 for materials, and \$146.00–\$420.00 for materials and labor combined.

Wildflower Establishment vs. Hedgerow Establishment

Native wildflower plantings and native hedgerows are two of the most common types of planting for providing on-farm pollinator habitat. Hedgerow costs are typically provided in \$/linear foot, and wildflower costs are provided in \$/ft². In order to compare costs, assume a 10' width for hedgerows, so that a 100' (linear) hedgerow is approximately equal to a 1,000 ft² wildflower planting. A 100' (linear) hedgerow costs approximately \$107.00–\$218.00 for materials, and \$217.00–\$338.00 for materials and labor combined. Overall, the total cost of wildflower and hedgerow establishment is not that different. However, because the cost of native wildflower seed mixes varies greatly by region, as does irrigation requirements, a site-specific evaluation may be necessary to determine which type of planting is more economical in a given situation. It is also important to consider other factors beyond cost that affect the relative benefits of one type of planting over another. For example, it is generally easier to establish hedgerows in sites with high weed pressure than wildflowers. Hedgerows can also provide nesting sites for cavity nesting bees. On the other hand, wildflower plantings can be established in very narrow areas, or in areas that need to be mowed down at certain times of year. It is important to consider all establishment and resource concerns, in addition to cost, when comparing these two practices.



One piece of plastic can be reused on a large site over multiple years—increasing the size of the habitat planting over time. This ¼ ac area in Wisconsin was solarized with 6 mil UV-stable high tunnel plastic over summer 2015. That fall, the plastic was unburied on three sides and flipped over to the right. The uncovered area was seeded and the plastic was pulled taut over the newly covered area and the three edges were buried. (Photographs courtesy of Kerry Lynch.)



This wildflower planting in California—featuring diverse, pollinator-attractive, native species—was successfully installed after solarizing the site for one season. (Photograph by Jessa Kay Cruz, The Xerces Society.)

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Acknowledgements

This material is based upon work supported by the Natural Resources Conservation Service, U.S. Department of Agriculture (USDA), under number 69-3A75-12-253. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the U.S. Department of Agriculture.

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