

Organic Site Preparation Methods



Pollinator planting integrated into organic farm (left), solarizing a site in Wisconsin to create pollinator habitat (right).

Pollinators are a priority resource concern for many people, particularly in the organic farming community. Pollinator habitat projects supported by USDA Natural Resources Conservation Service (NRCS) cost-share programs, for example, have received tremendous interest and participation from organic farmers. However, since herbicides are often the go-to method for preparing a site for pollinator habitat, farmers interested in organic methods have been left with minimal options and guidance.

To address this, the Xerces Society conducted field trials throughout the eastern, midwestern, and western United States to inform best practices for wildflower establishment using organic site preparation methods. We tested seven organic site preparation approaches: solarization, smother cropping, sheet mulching, repeated shallow cultivation, soil inversion, organic herbicides, and sod removal.

The results of these national field trials were published as the Xerces Society guidelines, *Organic Site Preparation for Wildflower Establishment*, a comprehensive reflection of what we learned about the effectiveness of each weed control technique, combined with the current science on organic weed control and the successes and failures of numerous other restoration projects across the country.

This fact sheet provides a brief overview of the site preparation methods covered in *Organic Site Preparation for Wildflower Establishment*, and is intended to help you quickly assess the suitability of each method for a given site. For more detailed information on the site preparation methods, including site- and region-specific recommendations, regional timelines, checklists, and other resources, download the guidelines at: www.xerces.org/guidelines-organic-site-preparation.

Organic Site Preparation Methods Overview

The table below provides a comparative overview of seven organic site preparation methods for wildflower plantings. Use this table to determine which method(s) are most appropriate for your situation; for example, consider the scale of your site, weed pressure, the timeline you are working with, the equipment you have available, and other factors. See back for more information on how to download the complete guidelines, *Organic Site Preparation for Wildflower Establishment*.

METHOD	WHEN TO USE	WHEN NOT TO USE
SOLARIZATION	<ul style="list-style-type: none"> ✓ Flat or gently sloping sites with low risk of erosion ✓ Sunny sites ✓ Small sites, ≤½ ac (see page 10[†] for solarization options for large sites) ✓ Cultivation equipment is unavailable ✓ Used clear UV-stable plastic is available or new is affordable ✓ Minimal maintenance of the site during summer is desired 	<ul style="list-style-type: none"> ✗ Steep slopes or areas with microtopography ✗ Shady or wet sites ✗ Large sites (>½ ac) ✗ Regions where average summer temperatures are low ✗ Clear UV-stable plastic is unavailable or unaffordable ✗ Sites where deer pressure is high, as deer can easily puncture plastic
SMOTHER CROPPING	<ul style="list-style-type: none"> ✓ Flat or gently sloping, sunny, and well-drained sites ✓ Cover crop rotations are already used or easily fit into existing operations ✓ Weed pressure is low to moderate ✓ Timelines* can be strictly followed throughout entire site prep process ✓ Proper equipment is available and can be calibrated and operated specifically for cover-cropping ✓ Irrigation is available and can be used as needed ✓ Minimal maintenance of the site during summer is desired 	<ul style="list-style-type: none"> ✗ Steep slopes/sites with high erosion potential or poor drainage ✗ Cover crop rotations are not used or do not fit into farm plan ✗ Weed pressure is high (i.e., fallow fields) ✗ Timelines* cannot be strictly followed (see text[†]) ✗ Proper equipment for planting and termination are not available ✗ Irrigation is not available or easily accessed ✗ In designated wetlands or area with poorly drained soil ✗ Where planting non-native plants is prohibited or native plants may be threatened by the unintentional escape of non-native/cultivated species
REPEATED SHALLOW CULTIVATION	<ul style="list-style-type: none"> ✓ Flat or gently sloping, sunny or shady sites ✓ Transitioning crop fields or sites with low weed pressure ✓ Proper equipment is available and can be used for this purpose ✓ Irrigation is available ✓ Timelines* can be strictly followed throughout entire site preparation process 	<ul style="list-style-type: none"> ✗ Steep slopes ✗ Where erosion is of concern ✗ Site is fallowed or weed pressure is medium to high ✗ Shallow tillage equipment is unavailable (see Appendix B[†]) ✗ Irrigation is unavailable ✗ Designated wetlands or areas with poorly drained or fragile soil
SHEET MULCHING	<ul style="list-style-type: none"> ✓ Flat or gently sloping, sunny or shady, and humid sites ✓ Small sites, up to ~½ ac ✓ Cultivation is impractical (e.g., rocky conditions, weed pressure, etc.) ✓ Minimal maintenance of the site is desired ✓ Mulching materials are available or affordable ✓ Solarization is impractical (e.g., plastic unavailable/unaffordable, site is shady) 	<ul style="list-style-type: none"> ✗ Steep slopes or arid sites without irrigation ✗ Large sites (>½ ac) ✗ Arid or semi-arid climates without access to irrigation ✗ Site contains aggressive or persistent deep-rooted, perennial, rhizomatous or woody weeds ✗ Mulching materials are unavailable or unaffordable (see text[†])
SOIL INVERSION	<ul style="list-style-type: none"> ✓ Flat/gently sloping sites; sites where soil erosion is not a concern ✓ Large sites, >½ ac ✓ Sites with medium to high weed pressure or dense grass sod ✓ Effective on sunny or shady sites ✓ Moldboard plow is available or affordable and an experienced operator is available 	<ul style="list-style-type: none"> ✗ Steep slopes ✗ Erosion concerns are very high ✗ Moldboard plow is unavailable or unaffordable ✗ Abundant deep-rooted perennial weeds (less susceptible to method) ✗ Weed pressure is low and other methods can be used
ORGANIC HERBICIDE APPLICATIONS	<ul style="list-style-type: none"> ✓ Flat to sloping, sunny or shady sites ✓ Cultivation is impractical (e.g., rocky conditions or conservation concerns) ✓ Targeted weeds are annual broadleaf species (see text[†]) ✓ Targeted weeds are at seedling stage 	<ul style="list-style-type: none"> ✗ Application equipment is unavailable or unaffordable ✗ Targeted weeds are monocots (grasses), succulents, or perennials ✗ Targeted weeds are taller than 6" ✗ Water pollution concerns are high
SOD REMOVAL	<ul style="list-style-type: none"> ✓ Sites composed of dense sod, regularly mowed for several years ✓ Small sites (<¼ ac) where sod removal is feasible 	<ul style="list-style-type: none"> ✗ Large sites where sod removal would be impractical

NOTES:

† See the guidelines, *Organic Site Preparation for Wildflower Establishment*

‡ This refers to the cost of materials using this site preparation method, relative to the other methods. It does not include the cost of the time/labor involved, nor the cost of the planting itself (e.g., native seed). Prices of materials may vary.

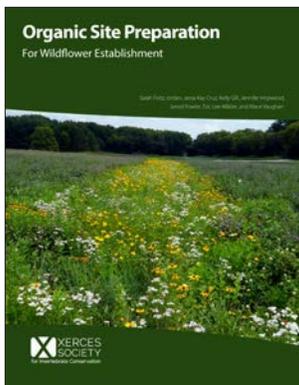
* Download the accompanying *Organic Site Preparation Timelines & Checklists* at: www.xerces.org/guidelines-organic-site-preparation



SOLARIZATION	SMOTHER CROPPING	REPEATED SHALLOW CULTIVATION	SOIL INVERSION
HOW IT WORKS	COMMENTS	EQUIPMENT NEEDED	
<p>Kills existing vegetation by heat and smothering;</p> <p>Reduces weed seed bank by heat;</p> <p>Reduces weed seed by flushing plants from soil</p>	<ul style="list-style-type: none"> Consistently out-performed other site preparation methods in our trials Can kill soil-dwelling plant pathogens Ideal in hot climates Plastic can be re-used for multiple seasons 	<ul style="list-style-type: none"> Clear UV-stable plastic (4 or 6 mil thickness) Greenhouse repair tape Mower Cultivation equipment (cultivation recommended in most situations) Equipment to dig and backfill trench around perimeter; AND/OR hoes and shovels to dig and backfill trench by hand 	
<p>RELATIVE COST OF MATERIALS*—HIGH; new UV-stable plastic is very costly (note: this method is low-cost if used plastic can be obtained)</p>			
<p>Prevents weeds from spreading;</p> <p>Reduces weeds by cultivation and smothering</p>	<ul style="list-style-type: none"> Improves soil health Gives wildlife temporary forage and cover Planting and termination dates vary by region 	<ul style="list-style-type: none"> Mower Cultivation equipment and implements (see Appendix B¹) Irrigation system or water tank and water source Seeding equipment (broadcast seeder, seed drill) Cover crop termination equipment /implement (disk, mower, roller-crimper) 	
<p>RELATIVE COST OF MATERIALS*—LOW; if cultivation equipment is available; seed for smother cropping is generally inexpensive</p>			
<p>Kills weeds by cutting and dislodging;</p> <p>Reduces weed seed bank by repeated disturbance;</p> <p>Weakens weed root systems</p>	<ul style="list-style-type: none"> Diminishes soil health May expose dormant weed seeds and cause future weed pressure Must remain shallow and only disturb top layer of soil 	<ul style="list-style-type: none"> Mower or brushhog Cultivation equipment and implements (see Appendix B¹). Cultipacker or lawn barrel (tow behind or push) Irrigation system or water tank and water source 	
<p>RELATIVE COST OF MATERIALS*—LOW; if appropriate cultivation equipment is available</p>			
<p>Kills existing vegetation by smothering;</p> <p>Prevents seeds from germinating by smothering</p>	<ul style="list-style-type: none"> Can be used for seeds, but is ideal for transplants Can prepare new habitat, or enhance existing habitat Performs well in shady or rocky sites On organic certified land, mulching materials that are free from synthetic chemicals and weed seeds are required 	<ul style="list-style-type: none"> Mower, no-till roller/crimper, scythe, or string-trimmer Core or spike lawn aerator or spading fork Irrigation system or water tank and water source Carbon- and nitrogen-based mulching materials (see text¹) 	
<p>RELATIVE COST OF MATERIALS*—MODERATE; mulching materials can be moderately costly, unless they are available as farm products/by-products</p>			
<p>Kills weeds by burying in weed-free and nutrient poor subsoil;</p> <p>Reduces seed bank germination;</p> <p>Weakens weed root systems</p>	<ul style="list-style-type: none"> Effectively breaks up grass sod Provides wildflowers with a competitive advantage over weeds Reduces soil compaction and increases water infiltration This method will not always kill deep-rooted perennial weeds like nut sedge or bermuda grass 	<ul style="list-style-type: none"> Mower Moldboard plow Cultivation equipment and implements 	
<p>RELATIVE COST OF MATERIALS*—LOW; if appropriate cultivation equipment is available</p>			
<p>Weakens weeds with chemicals;</p> <p>Reduces weed seed bank by repeatedly damaging germinated weeds</p>	<ul style="list-style-type: none"> Burns plant tissues by direct-contact, not translocated through plants Requires repeated applications for effective control May be ineffective against grasses and many broad-leaf weeds This method was the least effective in our trials 	<ul style="list-style-type: none"> May require special equipment that can tolerate caustic herbicides or herbicides that can clog nozzles Backpack sprayer or tractor/ATV and spray rig 	
<p>RELATIVE COST OF MATERIALS*—HIGH; most organic herbicides are significantly more expensive than conventional herbicides</p>			
<p>Kills existing weeds by cutting roots and removing sod in large sheets from site</p>	<ul style="list-style-type: none"> Excellent method for converting small areas of lawn to native wildflowers 	<ul style="list-style-type: none"> Manual sod cutter ("kick-type"), or gas-powered sod cutter 	
<p>RELATIVE COST OF MATERIALS*—LOW; if equipment is available (note: if not, rental can be costly)</p>			



Seeding native wildflower habitat into a well-prepared seed bed.



Download the full guidelines at: <http://xerces.org/guidelines-organic-site-preparation>

Source

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