

422A Hedgerow Planting, Pollinators: *Central Valley, Central Coast, Southern California*

Conservation Practice Specification



(Photo: Jessa Kay Cruz / Xerces Society)

Specifications

These instructions provide in-depth guidance on how to install hedgerows for pollinators. To plan a specific project, use these Specifications to fill out the Implementation Requirements form. These requirements and considerations are in addition to those in the *Hedgerow Planting (422) Specification* written for all purposes.

Definition and Purpose

Establishment of dense vegetation in a linear design to enhance pollen, nectar, and nesting habitat for pollinators.

Client Conservation Objectives

Depending on landowner objectives and project design, hedgerows for pollinators may also provide food, cover and corridors for other wildlife, provide habitat for predaceous and beneficial invertebrates as a components of an integrated pest management plan, provide food, cover or shade for aquatic organisms in adjacent streams or increase carbon storage.

Planning Considerations

Key Site Characteristics

Site selection for pollinator habitat should take the following into consideration:

- **Pesticide Drift:** Habitat must be protected from pesticide (especially insecticides and bee-toxic fungicides and herbicides). This includes some pesticides approved for use on organic farms. Only sites with no or very low risk for pesticide drift should be established as new habitat. See 'References and Resources' section of this document for more information about protecting habitat from pesticides.
- **Sunlight:** Most native shrubs grow best in full sunlight.
- **Slope:** Steep or highly erodible sites should not be disturbed. For revegetating such sites, consider Critical Area Planting (342) or other suitable NRCS Practices.
- **Weed Pressure:** Areas with high weed pressure will take more time and effort to prepare for planting. It is also important to note the primary weed composition. Knowing the most abundant weed species on site, their reproductive methods, and whether they are grass or broadleaf, perennial or annual, and woody or herbaceous, will help significantly in planning for site preparation and follow up weed management during establishment.
- **Accessibility:** The site should be accessible to equipment for planting and maintenance operations.
- **Site History:** Factors such as past plant cover (e.g., weeds, crops, grass sod), use of pre-emergent herbicides or other chemicals, and soil compaction can affect plant establishment. It is important to find out whether a proposed hedgerow site has poor drainage or may flood, as such conditions require a plant mix adapted to the site.
- **Local Soil Conditions:** Hedgerow plants will establish best when matched with a species-appropriate soil type.
- **Irrigation:** Establishing plants from transplants will require supplemental irrigation such as dripline in most cases.
- **Other Functions:** The site may offer opportunities to serve other functions, such as run-off prevention, stream bank stabilization, wildlife habitat, or a wind barrier. Additional required functions can influence hedgerow plant choice and/or design.

Plant Selection

Plant species selection should be limited to plants that provide pollen- and nectar-rich forage and/or nesting resources for bees and other pollinators. Pollinator hedgerows may include flowering perennials and herbaceous plants as well as flowering shrubs or trees. They should also include bunch grasses and pithy-stemmed plants for nesting substrate.

If you are designing a custom plant list, individual species should be chosen so that floral resources are present throughout each season. In order to achieve this goal, at least two species from each blooming period (early, mid, and late season), are recommended. Plant composition (i.e., percent of each species) can be designed to complement adjacent crop bloom time or other abundant species in the landscape, with more plants blooming immediately before and after adjacent crops. For a list of acceptable species for pollinator hedgerows, please see either the NRCS eVeg Guide (www.calflora.org/nrcs) or Xerces pollinator plant lists (<https://xerces.org/pollinator-resource-center/california>). NOTE: NRCS planners must use eVEG Guide. For more information about establishing wildflowers, please see *Conservation Cover, Pollinators (327A) Specifications*.

Alternate Pest or Disease Hosts: In most cases native pollinator plants do not serve as alternate hosts for crop pests or diseases, but selected plants should be cross-referenced for specific crop pest or disease associations. University of California research indicates that weedy borders harbor more pests than are found in diverse native plantings.



A native hedgerow is one of the most common types of plantings for providing on-farm pollinator habitat. (Photo: Cameron Newell / Xerces Society)

Requirements

Site Preparation

Site preparation is one of the most important and often inadequately addressed components of project success. It is a process that may require more than one season of effort to reduce competition from invasive, noxious, or undesirable non-native plants prior to planting. Site preparation should focus on the removal of perennial and aggressive annual weeds. More effort and time spent eradicating undesirable plants prior to planting will result in higher success rates in establishing the targeted plant community.

Site preparation methods are provided in **Table 1** (page 4).

Note: If weed pressure is high, then the weed abatement strategies detailed in Table 1 should be repeated for an additional growing season. High weed pressure conditions are characterized by:

- Persistent year-round cover of undesirable plants (covering the entire surface of the site);
- Sites where weeds have been growing and producing seed for multiple years;
- Sites dominated by introduced sod-forming grasses and rhizomatous forbs (e.g. Canada thistle).

If desired, site preparation can also include the creation of a berm to serve as the hedgerow's base. Bermed hedgerows are preferred in some regions for greater windbreak and screening benefits (due to the raised base). In areas where drainage is poor, they may support a wider range of plants. Hedgerow berms are often roughly 3' in width and height, and are created using soil excavated from the sides of the planting. Field stones are sometimes added to hedgerow berms as well, adding additional height and structure.

Figure 1 The first site (top) is not ready for planting. Site preparation should focus on removing existing weedy vegetation. Weedy vegetation has been removed from the next site (bottom); creating a clean planting area where hedgerow plants can become established with less competition for sunlight and water. (Photos: Jessa Kay Cruz / Xerces Society)



Western tiger swallowtail on showy milkweed. (Photo: Claudia Street / Yuba-Sutter Farm Bureau)

Table 1. Weed Removal Methods

METHOD: MOWING, WEED-WHACKING, OR FLAMING	
<p>Where to Use</p> <ul style="list-style-type: none"> • Where weed pressure is low to moderate • Area is dominated by non-invasive annual weeds • Areas with a low risk of erosion • Areas accessible to equipment 	<p>Timing</p> <ul style="list-style-type: none"> • Total time: 9-12 months before planting • Begin: late winter or early spring • Plant: fall or early spring
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Begin the process by smoothing and leveling, grading, or berming the hedgerow area if needed. Clear the area of any debris or thick thatch. Do not cultivate unless necessary, as any disturbance can promote the germination of additional weed species 2. Mow, weed-whack, or flame weed the area when weed growth occurs and repeat regularly as needed until planting. Do not allow weeds to set seed in the area 	
METHOD: NON-PERSISTENT HERBICIDE	
<p>Where to Use</p> <ul style="list-style-type: none"> • Where weed pressure is low to high • Areas with a low risk of erosion 	<p>Timing</p> <ul style="list-style-type: none"> • Total time: 9-12 months before planting • Begin: late winter or early spring • Plant: fall or early spring
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Clear away existing thatch as needed before beginning herbicide treatments to expose new weed growth to the herbicide spray. Begin the process by leveling, grading, or berming the hedgerow area if needed. Clear the area of any debris or thick thatch. Do not cultivate unless necessary, as any disturbance can promote the germination of additional weed species 2. Apply a non-persistent herbicide as per label whenever weeds are actively growing 3. Repeat regularly as needed until planting. Do not let weeds grow above 4". Do not let weeds go to seed 4. Wait at least 72 hours after the last herbicide treatment before planting. Plant using gallon-sized potted plants. Refer to the Planting Methods section of this document for specific recommendations <p><i>NOTE: Do not till. Avoid any ground disturbance that may bring up additional weed seed. An additional year of site preparation is recommended if weed pressure is particularly high. Avoid use of herbicides that are bee-toxic (e.g. Paraquat and Gramoxone).</i></p>	
METHOD: SOLARIZATION	
<p>Where to Use</p> <ul style="list-style-type: none"> • Where weed pressure is moderate to high • Areas with little fog or heavy winds during treatment • Areas protected from livestock or wildlife activity • Areas with a low risk of erosion • Areas accessible to equipment • Locations with full sun 	<p>Timing</p> <ul style="list-style-type: none"> • Total time: 2-5 months • Begin: June or July (inland areas); late summer (coastal areas) • Plant: Fall
<p>Basic Instructions:</p> <ol style="list-style-type: none"> 1. Mow and till or lightly harrow and smooth the site in the spring (raking off debris, if necessary) 2. After smoothing the site, irrigate thoroughly and lay UV stabilized plastic (such as high tunnel plastic) burying the edges to prevent airflow between the plastic and the ground. Use greenhouse repair tape for any rips that occur during the season 3. Remove the plastic in the fall just prior to planting <p><i>NOTE: Solarization may not be as effective in coastal climates where temperatures are lower and summer sun is limited. After solarization, avoid any ground disturbance that may bring up additional weed seed. An additional year of site preparation is recommended if weed pressure is particularly high.</i></p>	

Planting Methods

Regular shovels are usually adequate for transplanting most woody nursery stock. However, power augers and mechanical tree spades may be helpful for planting large projects. Gallon-sized container plants are recommended for most hedgerow projects, and are required for NRCS cost-share hedgerow projects.

If weed pressure is high, hedgerow plants can be installed through planting holes cut into weed fabric (after which the fabric is typically covered with mulch). While this practice may be highly effective for weed control, it likely reduces nesting opportunities for ground-nesting pollinators and other wildlife. Hedgerows should be installed without landscape fabric when possible.

Plant size at maturity should be considered when planting. Most woody shrubs can be spaced on 6 – 12' centers (depending upon mature size), with most herbaceous plants and bunch grasses spaced on 3 – 5' centers. It is helpful to measure the planting area prior to purchasing transplants, and to stage the transplants in the planting area prior to installing them in the ground (e.g., see Figure 2).

The best time to install transplants in California is fall or early spring. Transplants should be thoroughly irrigated immediately after planting. Holes for plants can be dug and pre-irrigated prior to planting as well. Follow-up irrigation is dependent upon weather and specific site conditions, but generally native and drought tolerant plants should be irrigated with at least 2 gallons of water every 7 to 10 days (except during natural rain events) for the first three years after planting. Long, deep watering is best to encourage deep root system development and shallow irrigation should be avoided. Drip irrigation is ideal, though other methods that allow for deep watering can be successful. It is advisable to irrigate at the base of plants and avoid overhead or spray irrigation that would encourage weed growth. Once plants are established, irrigations should be greatly decreased. Established native plants can thrive in most conditions with little or no supplemental water.

Most native hedgerow plants do not need any specific amendments. However, in areas where the soil is compacted, degraded, or depleted, compost should be used during planting. Compost also facilitates faster establishment and healthier soils in any environment. Compost should be free from weed seeds, aged properly, and mixed thoroughly with native soil in the holes during planting.

At sites where rodent damage is likely to occur (e.g. gophers, ground squirrels), underground wire cages around roots are recommended. Above-ground plant guards also may be needed to protect plants from browsing wildlife or livestock. Newly planted areas should be clearly marked to protect them from herbicides or other disturbances.

Mulching is recommended to reduce weed competition and to retain moisture during the establishment phase. Recommended materials include wood chips, weed-free straw, nut shells, grapeseed pumice, or other regionally appropriate weed-free mulch materials. Plastic mulch is not recommended.

Seeding Wildflowers: Wildflowers also can be planted from seed within or adjacent to hedgerows to provide additional plant structure and diversity. Seeding requires **excellent** site preparation to reduce weed pressure since weed control options are limited when the wildflowers start to germinate. For more information on establishing wildflowers from seed, see the *Conservation Cover, Pollinators (327A) Specifications*.

Planting Method Photos



Figure 2

Hedgerow plants can be staggered in multiple rows, providing a wider habitat feature, with greater secondary benefits, such as screening, wind reduction, and dust control (left). Where weed pressure is particularly severe, the ground below the hedgerow can be covered in weed barrier landscape fabric (right). The use of weed barrier however may reduce the value to ground-nesting wildlife, including many species of bees. (Photos: Jessa Kay Cruz / Xerces Society; Mace Vaughan / Xerces Society)

Post Planting Establishment Requirements

Maintenance During Establishment (Short Term)

Weed control is critical in the first several years after planting. If the site is well prepared, then less effort will be required for weeding after plants are installed. Maintenance practices must be adequate to control noxious and invasive species and may involve mowing, weed-whacking, hand hoeing, or spot spraying with herbicides.

Weeds should be prevented from going to seed in, or adjacent to, the hedgerow during the first several years after planting to help ensure long-term success. Familiarity with the life cycle of weeds will facilitate appropriate timing of management activities.

Common weed-management strategies include:

- **Spot Spraying:** Spot spraying with herbicides can be effective, relatively inexpensive, and require minimal labor even in larger project areas. Care should be taken that herbicides do not drift or drip onto desirable plant species. Do not apply herbicides within five feet of desirable plants
- **Selective Herbicides:** Grass-selective herbicides can be used to control weedy grasses in hedgerows. Contact a local crop advisor or Extension specialist for appropriate herbicide selection and timing
- **Managing Irrigation:** Whenever possible, irrigation should be supplied near the base of the plant (through drip irrigation, for example) to avoid watering nearby weeds
- **Mowing / String Trimming:** Mowing, flaming, or weed-whacking can be utilized to keep weedy species from going to seed and overtaking hedgerow plants
- **Hand Weeding:** Weeding by hand or with hand tools (such as a hoe) can be effective in small areas with moderate weed pressure

Operations and Maintenance (Long-Term)

Manage for herbivores as needed, but remove any tree guards or other materials that could impede plant growth as soon as possible after establishment. In most cases, irrigation can be turned off by the end of the third year after planting. Ongoing occasional weed management may be necessary to control weeds. Re-plant as necessary if hedgerow plants die.

Hedgerow plantings may need to be managed over time to prevent shrub encroachment into adjacent fields or roadsides or to cut back large trees that shade out other hedgerow species. Depending on management goals larger hedgerow species are sometimes cut back to a stump and allowed to re-sprout (called coppicing) to produce multiple bushy stems. Regardless of management needs, do not prune hedgerow plants during critical wildlife nesting seasons (consult an NRCS wildlife biologist for specific guidance). After establishment, no more than 30% of the hedgerow area should be disturbed in any one year to ensure sufficient undisturbed areas for pollinators and other wildlife.

Finally, some common farm management practices can cause harm to bees and other beneficial insects. Insecticides are especially problematic, including some insecticides approved for organic farms. Therefore, if insecticide spraying is to occur on the farm, it is critical that the pollinator hedgerow is outside of the sprayed area and/or protected from application and drift.



Figure 3. Newly planted areas should be clearly marked to protect them from pesticides or other disturbances. Using signs such as the one above can be a useful tool to designate protected pollinator habitat.

Appendix A: Native Seed Vendors and Native Plant Nurseries

Inclusion on this list does not constitute an endorsement or a recommendation. Listings are for information only. Suppliers not listed need only request to be included on future lists. To verify that a company is currently licensed call the contractors state License Board at (800) 321-2752 or visit cslb.ca.gov.

⚠ Before ordering, ensure that all plants or seeds purchased for pollinator habitat have NOT been treated with systemic insecticides. ⚠

NATIVE SEED VENDORS & NATIVE PLANT NURSERIES				STOCK		REGION(S)		
VENDOR/ NURSERY	LOCATION(S)	PHONE	WEBSITE/ EMAIL	SEEDS	TRANSPLANTS	CENTRAL VALLEY	CENTRAL COAST	SOUTHERN CA
California Flora Nursery	Fulton	707-528-8813	www.calfloranursery.com	✓	✓		✓	
Central Coast Wilds	Santa Cruz	831-459-0656	www.centralcoastwilds.com		✓		✓	
Cornflower Farms	Elk Grove	916-689-1015	www.cornflowerfarms.com		✓	✓		
Elkhorn Slough Native Nursery	Moss Landing	831-763-1207	www.elkhornnursery.com	✓	✓		✓	
Floral Native Nursery	Chico	530-892-2511	www.floralnativenursery.com		✓	✓	✓	
Growing Solutions	Santa Barbara	805-452-7561	www.growingsolutions.org	✓	✓		✓	✓
Hedgerow Farms	Winters	530-662-6847	www.hedgerowfarms.com	✓	✓	✓		
Intermountain Nursery	Prather	559-855-3113	www.intermountainnursery.com		✓	✓		
Las Pilitas Nursery	Escondido, Santa Margarita	760-749-5930	www.laspilitas.com		✓		✓	✓
Native Here Nursery	Berkeley	501-549-0211	www.nativeherenursery.org	✓	✓		✓	
Native Revival Nursery	Aptos	831-684-1811	www.nativerivival.com		✓			
Tree of Life Nursery	San Juan Capistrano	949-728-0685	www.californianativeplants.com		✓			✓



Native hedgerow adjacent to a vineyard in California (Photo: Jessa Kay Cruz / Xerces Society)

Additional Resources

Xerces Society

Xerces Pollinator Conservation Resource Center

For additional information on pollinator plant lists, seed mixes, conservation guides, pesticide protection and more.
<https://www.xerces.org/pollinator-resource-center/california>

Pollinator Habitat Assessment Form and Guide: Farms and Agricultural Landscapes

This Xerces evaluation guide provides a before and after assessment for pollinator habitat projects in farmland.
<https://xerces.org/publications/hags/pollinators-farms-and-agricultural-landscapes>

Pollinator Habitat Assessment Form and Guide: Rangeland & Pastureland

This Xerces evaluation guide provides a before and after assessment for pollinator habitat projects in rangeland.
<https://xerces.org/publications/hags/natural-areas-and-rangelands>

Xerces Society's California Regional Plant Lists

Search for plant lists that include species for different regions of California.
<https://xerces.org/pollinator-resource-center/california>

Guidance to Protect Habitat from Pesticide

Contamination. This guidance document was designed to help growers, land managers, and others safeguard pollinator habitat from harmful pesticide contamination.
<https://xerces.org/publications/fact-sheets/guidance-to-protect-habitat-from-pesticide-contamination>

Western Monarchs are in Trouble, This is How You Can Help.

Guidance for helping the western population of monarch butterflies.
<https://xerces.org/publications/fact-sheets/how-you-can-help-western-monarchs>

Natural Resource Conservation Service (NRCS)

NRCS Field Office Technical Guide

<https://efotg.sc.egov.usda.gov/#/>

California NRCS technical resources

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/ca/technical/>

NRCS Monarch and Pollinator Evaluation Guides

<https://efotg.sc.egov.usda.gov/#/details>

NRCS Pesticide Screening Tool WIN-PST

go.usa.gov/KoK

NRCS California eVeg Guide

NRCS database for plant searches. This tool must be used for all NRCS projects
<https://www.calflora.org/nrcs/>

Preventing or Mitigating Potential Negative Impacts of Pesticides on Pollinators Using Integrated Pest Management and Other Conservation Practices: NRCS Agronomy Technical Note #9

<https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=34828.wba>

Other Resources

Bee Precaution

A searchable tool with information about how different pesticides may impact bees
www2.ipm.ucanr.edu/bee precaution/

Weed Identification and Management California Invasive Plant Council

www.cal-ipc.org

Soil Solarization for Gardens and Landscapes

A short illustrated guide for installing solarization plastic to control soilborne pests
ipm.ucanr.edu/PDF/PESTNOTES/pnsoilsolarization.pdf

Hedgerows for California Agriculture: A Resource Guide

Guidance on creating hedgerows in California developed by the Community Alliance with Family Farmers
www.scgalliance.com/wp-content/uploads/2019/08/Hedgerow_manual.pdf

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(Photo: Cameron Newell / Xerces Society)

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