



THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION

Hedgerow Planting (422) for Pollinators:

Western Oregon & Washington

Specifications and Implementation Requirements



June 2013

The Xerces Society for
Invertebrate Conservation

www.xerces.org

Western bumble bee (Bombus occidentalis) foraging on Canada goldenrod (Solidago canadensis). (Photograph by Rich Hatfield, The Xerces Society.)

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(Photo credit: Mace Vaughan, Xerces Society)

The Xerces Society for Invertebrate Conservation

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Hedgerow Planting for Pollinators: Western Oregon & Washington

Specifications

Definition and Purpose

These instructions provide in-depth guidance on how to install dense vegetation in a linear design to enhance pollen, nectar, and nesting habitat for pollinators. To plan a specific project, use this guide with the Practice Installation Job Sheet found at the end of this document.

Client Conservation Objectives

Depending on landowner objectives and project design, pollinator hedgerows also may provide food, cover, and corridors for other wildlife, provide windbreaks, reduce soil erosion, protect water quality, and attract other beneficial insects such as predators and/or parasitoids of crop pests.

Key Site Characteristics

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

- **Pesticide Drift:** Habitat must be protected from pesticides (especially insecticides and bee-toxic fungicides and herbicides). Only sites with no to very low risk for pesticide drift should be established as new habitat. This includes some pesticides approved for use on organic farms.
 - **Accessibility:** New habitat should be accessible to equipment for planting and maintenance operations.
 - **Sunlight:** Most native shrubs grow best in full sunlight.
 - **Slope:** Steep or highly erodible sites should not be disturbed. For re-vegetating such sites, consider Critical Area Planting (342) or other suitable Practice Standards.
 - **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.
 - **Site History:** Factors such as past plant cover (e.g., weeds, crops, grass sod, and/or native plants), use of pre-emergent herbicides or other chemicals, and soil compaction can affect plant establishment. It is also important to know if sites may have poor drainage, or may flood, as such conditions make habitat establishment more difficult or require a plant mix adapted to the site.
 - **Soils and Habitat:** Most plants listed in the Appendix of this guide are tolerant of many soil conditions and types, however all plants establish better when matched with appropriate conditions.
 - **Irrigation:** To establish plants from plugs, pots, or bare root will require irrigation.
 - **Other Functions:** The site may offer opportunities to serve other functions – such as run-off prevention, stream bank stabilization, wildlife habitat, or windbreaks. Those factors can influence plant choice and/or design.
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Plant Selection

Native Plants: Plant species selection should be limited to plants providing pollen- and nectar-rich forage resources for bees. The Appendix provides information on acceptable plants in Western Oregon & Washington.

If you are designing a custom plant list, individual species should be chosen so that there are consistent and adequate floral resources throughout the season. In order to achieve this goal, a minimum of three species from each blooming period (early, mid, and late season), should be included. 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.

Non-Native Plants: Plant selection should focus on pollen and nectar rich native plants, but non-invasive, non-native plants may be used when cost or availability are limiting factors. Please see the Appendix for acceptable non-native plants.

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. Research indicates that weedy borders harbor more pests than are found in diverse native plantings.

Site Preparation

Site preparation is **one of the most important** and often inadequately addressed components of project success. It is also 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. *In particular, site preparation should focus on the removal of perennial weeds* (there are more options to address annual or biennial weeds after planting). Regardless of whether the objective is to establish herbaceous or woody vegetation, more effort and time spent eradicating undesirable plants prior to planting will result in higher success rates in establishing the targeted plant community. Weed removal methods are provided in **Table 1** (for site preparation where wildflowers will be seeded within or adjacent to a hedgerow, see the *Conservation Cover (327) for Pollinators Installation Guide and Job Sheet: Western Oregon & Washington*).

Note: If weed pressure is high, then the weed abatement strategies detailed here 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 actively 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 base. Hedgerows with berm-bases are preferred in some regions for greater windbreak and screening benefits (due to the raised base). Hedgerow berms are often roughly 3 feet in width and height, and are created using soil excavated from the sides of the berm (creating a parallel ditch on both sides of the hedgerow). Field stones are sometimes added to hedgerow berms as well, adding additional height and structure.

Figure 1



(Photo: Ed Vaughn)

The site on the left is not ready for planting. Site preparation should focus on removing existing weedy vegetation.



(Photo: Oregon NRCS)

Weedy vegetation has been removed from the site on the right; creating a clean planting area where hedgerow plants can become established with less competition for sunlight and water.

Table 1: Weed Removal Methods

METHOD: MOWING OR STRIP TILLAGE	
Where to Use <ul style="list-style-type: none"> • Where weed pressure is low • Areas with a low risk of erosion • Areas accessible to equipment 	Timing <ul style="list-style-type: none"> • Total time: 1 + month • Begin: anytime • Plant: anytime, but October to November is best
Basic Instructions: <ol style="list-style-type: none"> 1. Where weed pressure is low, mow or till the existing vegetation as low to the ground as possible for the length of the hedgerow. 2. If necessary, rake or lightly harrow the strip to create a clean surface for installing transplants. 	
METHOD: NON-SELECTIVE (NON-PERSISTENT) HERBICIDE	
Where to Use <ul style="list-style-type: none"> • Where weed pressure is high • Conventional farms and organic farms* • Areas with a low risk of erosion • Areas accessible to sprayer 	Timing <ul style="list-style-type: none"> • Total time: 1 + month • Begin: anytime • Plant: anytime, but October to November is best
Basic Instructions: <ol style="list-style-type: none"> 1. Mow existing thatch as needed at least two weeks before beginning herbicide treatments to expose new weed growth to the herbicide spray. 2. Apply a non-selective, non-persistent herbicide as per label when weeds are actively growing. 3. If necessary, repeat herbicide applications as weeds reach 4” to 6” in height until the desired level of weed control is achieved. 4. Plant the transplants, waiting at least 72 hours after the last herbicide treatment. Refer to the Planting Methods section of this document for specific recommendations. <p>NOTE: <u>Do not till.</u> 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).</p> <p>* Choice of herbicide must be acceptable to OMRI for organic operations or, if not, used outside of certified ground AND approved by an organic certifier.</p>	

Table 1 (Cont.): Weed Removal Methods

METHOD: SOLARIZATION	
Where to Use <ul style="list-style-type: none"> • Where weed pressure is high • Organic and conventional farms • Areas with a low risk of erosion • Areas accessible to mowing equipment • Locations with full sun 	Timing <ul style="list-style-type: none"> • Total time: 6+ months • Begin: spring • Plant: fall
Basic Instructions: <ol style="list-style-type: none"> 1. Mow, 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. Weigh down the center of the plastic if necessary to prevent the wind from lifting it. Use greenhouse repair tape for any rips that occur during the season. 3. Remove the plastic in early-fall before the weather cools and the area beneath the plastic is recolonized by nearby rhizomatous weeds. 4. Immediately install transplants. Refer to Planting Methods section of this document for specific bed preparation recommendations. <p><i>NOTE: 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 and Materials

Regular shovels are usually adequate for transplanting most woody nursery stock. However, dibble sticks or mechanical transplanters are sometimes helpful for plug-planting. Power augers and mechanical tree spades can be helpful for larger plants.

Depending on weed pressure, hedgerow plants can be installed through planting holes cut into landscape 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 4' – 10' centers (depending upon size at maturity), with most herbaceous plants spaced closer on 2' – 3' centers. It is helpful to measure the planting areas prior to purchasing transplants, and to stage the transplants in the planting area prior to installing them in the ground.

Transplanting can occur any time the ground can be worked, but should be timed to avoid prolonged periods of hot, dry, or windy weather. The **best time** for western Oregon and Washington is October or November for potted plants. Bareroot material is often cheaper, most available in February, and should be planted before buds break.

Some species of shrubs, such as willows and OTHERS, may be established from cuttings. This can be a very inexpensive way of securing plant materials, but requires cutting and planting in November to maximize success. Cuttings should be pushed at least 12 inches into the ground or into the water table.

Regardless of when planting occurs, however, the new planting should be irrigated thoroughly 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 even native and drought tolerant plants should be irrigated with at least 1" of water per week (except during natural rain events), for the first two years after planting. Long, deep watering is best to encourage deep root system development and shallow irrigation should be avoided. Drip irrigation is useful, and other methods that allow for deep watering can be successful. It is advisable to irrigate at the base of plants and avoid overhead irrigation that would encourage weed growth. Once plants are established, irrigation should be removed or greatly decreased. Non-native plants may require more frequent irrigation, and may still require supplemental irrigation once established.

Most of the plants in the Appendix are adapted to a variety of soil conditions and do not need any specific amend-

ments. However, in areas where the soil is compacted, degraded, or depleted, compost should be used during planting. Compost should be free from weed seeds, aged properly, and mixed thoroughly with soil in the holes during planting.

Where rodent damage may occur, underground wire cages around roots are recommended. Plant guards also may be needed to protect plants from above ground browsing or antler damage by deer. Newly planted areas should be clearly marked to protect them from herbicides or other disturbances.

Mulching (2" to 3" deep) is recommended to reduce weed competition and to retain moisture during the establishment

phase. Recommended materials include wood chips, bark dust, weed-free straw, nut shells, grapeseed pumice, or other regionally appropriate weed free mulch materials.

Seeding Wildflowers: Wildflowers can also 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 for Pollinators Installation Guide and Job Sheet: Western Oregon & Washington*.

Planting Method Photos



(Photo: Eric Mader, Xerces Society)



(Photo: Gwendolyn Ellen, Oregon State University)

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.



Figure 3. Grow tubes or trunk protectors may help during establishment to reduce browsing by herbivores and trunk damage from mowers or weeding operations (top left) (Photo by: John Anderson, Hedgerow Farms). Wildflowers can be seeded in linear strips alongside newly planted hedgerows to provide pollen and nectar resources while slower growing shrubs become established (top right) (Photo by: Jessa Guisse, Xerces Society). Site preparation and weed eradication needs to be very rigorous prior to planting seeds. See *Conservation Cover (327) for Pollinators Installation Guide and Job Sheet: Western Oregon & Washington*. Most species will benefit from an inch of water per week during the first two years of establishment, either from natural rainfall, or from irrigation, such as the drip irrigation lines used on this hedgerow (left) (Photo by: Eric Mader, Xerces Society).

Maintenance During Establishment (Short-Term)

Weed control is critical in the first and second years after planting. If the site is well prepared, then less effort will be required for weeding after project installation. Maintenance practices must be adequate to control noxious and invasive species and may involve tools such as mowing, string trimming, hand hoeing, or spot spraying with herbicides.

Weeds should be prevented from going to seed in, or adjacent to, the hedgerow during the first two (and possibly three) 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 on larger project areas. Care should be taken that

herbicides do not drift or drip onto desirable plant species.

- **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, or see the *Pacific Northwest Weed Management Handbook*.
- **Managing Irrigation:** Whenever possible, irrigation should be supplied at the base of the transplant (through drip irrigation, for example) to avoid watering nearby weeds.
- **Mowing / String Trimming:** Mowing or string trimming can be utilized to keep weedy species from going to seed and shading out hedgerow plants.
- **Hand Weeding:** Hand-weeding (including hoeing) can be effective in small areas with moderate weed pressure.

Operations and Maintenance (Long-Term)

Control herbivores as needed, but remove tree guards or other materials that could impede plant growth as soon as possible after establishment. In most cases, irrigation can be removed from transplants by the end of the second year after planting. Continue to protect habitat from pesticides and herbicides except when necessary to control noxious or invasive plants. On-going herbicide use (spot-treatment) or occasional hand weeding may be necessary to control noxious weeds. Maintain the long-term plant diversity of pollinator habitat by re-planting as necessary.

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 (e.g., preferred wildlife structure) larger hedgerow species are sometimes cut back to a stump and allowed to re-sprout (called coppicing) to produce multiple bushy stems. Another practice, called hedge-laying involves cutting most of the way through upright trunks, then pushing the still partially attached trunks over at an angle in line with the hedgerow. New growth from the stumps and laid trunks results in thicker hedgerow structure and fills in gaps where other shrubs may have died. Regardless of management needs, do not prune hedgerow plants during critical wildlife nesting seasons (between March 15 and July 15).

Finally, note that 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 habitat hedgerow is outside of the sprayed area and/or protected from application and drift.

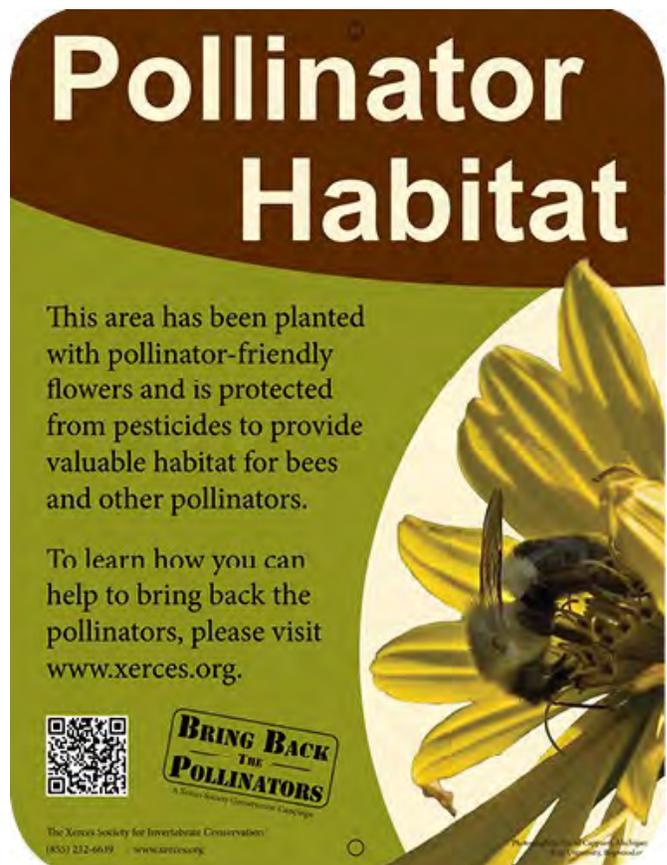


Figure 6. Newly planted areas should be clearly marked to protect them from herbicides or other disturbances. Using signs such as the one above can be a useful tool to designate protected pollinator habitat.

Appendix: Recommended Plants, Sources, and References

Recommended Native Hedgerow Plants for Pollinators. Most woody plants on this list can be maintained as a hedge or cut back to 3 feet tall during the dormant season.

COMMON NAME	SCIENTIFIC NAME	MATURE HEIGHT	WATER REQUIREMENTS	NOTES
Early Season Blooming Species				
Chokecherry	<i>Prunus virginiana</i>	20 ft	Medium	Manage as a tree or shrub based on pruning. Poisonous to livestock.
Oregon Grape	<i>Mahonia aquifolium</i>	8 ft	Medium	Evergreen. Take care to protect growth points at tips of branches during pruning
Vine Maple	<i>Acer circinatum</i>	20 ft.	Medium	Will grow well in shade or sun
Riverbank Lupine	<i>Lupinus rivularis</i>	4 ft	Medium	Large, evergreen short-lived bush form of lupine; limited tolerance for freezing; fast/aggressive growth; reseeds.
Salmonberry	<i>Rubus spectabilis</i>	12 ft	High	Host for spotted wing drosophila. Flowers attract migrating hummingbirds. Suckering will expand plant over time. Fair establishment from cuttings.
Saskatoon Service-berry	<i>Amelanchier alnifolia</i>	15-20 ft	Medium	
Scouler's Willow	<i>Salix scouleriana</i>	20+ ft	High	Dioecious. Plant male plants to provide critical pollen source. Maintained as a tree or shrub based on pruning. Good establishment from cuttings.
Sitka Willow	<i>Salix sitchensis</i>	20+ ft	High	Dioecious. Plant male plants to provide critical pollen source. Can be maintained as a tree or shrub based on pruning. Establishes well from cuttings.
Twinberry	<i>Lonicera involucrata</i>	10 ft	Medium	Does best in wetter conditions. Good establishment from cuttings.
Red Currant	<i>Ribes sanguineum</i>	10 ft	Medium	Important plant for hummingbirds.
Early to Mid Season Blooming Species				
Red Elderberry	<i>Sambucus racemosa</i>	12 ft	Medium	Provides pithy stems for solitary bee nests. Fair establishment from cuttings.
Antelope Bitterbrush	<i>Purshia tridentata</i>	6 ft	Low	Southwest Oregon
Cascara	<i>Frangula purshiana</i>	35 ft	Medium	Tall at maturity, but can be maintained as shrub based on pruning
Mock Orange	<i>Philadelphus lewisii</i>	10 ft	Medium	Use native, single flowered varieties.
Nootka Rose	<i>Rosa nutkana</i>	10 ft	Medium	Does well in wet prairies. Suckering will expand plant over time.
Baldhip Rose	<i>Rosa gymnocarpa</i>	3 ft	Low	Does well in dry sites. Suckering will expand plant over time.
Oregon Crabapple	<i>Malus fusca</i>	15 ft	Medium	Performs best with higher moisture.
Evergreen Huckleberry	<i>Vaccinium ovatum</i>	5-10 ft	Medium	Host for spotted wing drosophila
Red Huckleberry	<i>Vaccinium parviflorum</i>	5-10 ft	Medium	Does well in shade.
Pacific Ninebark	<i>Physocarpus capitatus</i>	8 ft	Medium	Fair establishment from cuttings.
Buckthorn	<i>Frangula (Rhamnus) californica</i>	15 ft	Low	Southwest Oregon
Deerbrush	<i>Ceanothus integerrimus</i>	13 ft	Low	Southwest Oregon. Evergreen. Pruning ok so long as maintain live branch tips.
Redstem Ceanothus	<i>Ceanothus sanguineus</i>	10 ft	Medium	Slow-growing. Pruning ok so long as maintain live branch tips.
Salal	<i>Gaultheria shallon</i>	6 ft	Low	Evergreen. Occurs north of SW Oregon
Snowberry	<i>Symphoricarpos albus</i>	4 ft	Low	Suckering will expand plant over time. Fair to good establishment from cuttings.

Recommended Native Hedgerow Plants for Pollinators (Continued)

Mid Season Blooming Species				
Buckbrush	<i>Ceanothus cuneatus</i>	8 ft	Low	Slow-growing. Evergreen. Pruning ok so long as maintain live branch tips.
Blue Elderberry	<i>Sambucus nigra</i>	6-20ft	Medium	Good establishment from cuttings.
Douglas Spirea	<i>Spirea douglasii</i>	6 ft	Medium	Suckering will expand plant over time.
Mid to Late Season Blooming Species				
Ocean Spray	<i>Holodiscus discolor</i>	12 ft	Medium	
Late Season Blooming Species				
Coyotebrush	<i>Baccharis pilularis</i>	10 ft	Low	Dioecious. Plant male plants to provide critical pollen source. Evergreen.
Hall's Aster	<i>Symphyotrichum hallii</i>	3 ft	Medium	A tall growing herbaceous perennial for the Willamette Valley; incorporates well in hedgerow edges
Douglas Aster	<i>Symphyotrichum subspicatum</i>	4 ft	Medium	A tall growing herbaceous perennial; incorporates well in hedgerow edges
Canada Goldenrod	<i>Solidago canadensis</i>	3 ft	Medium	
Western Goldentop	<i>Euthemia occidentalis</i>	3 ft	High	Does best along streams and ditches
Grey Rabbitbrush	<i>Chrysothamnus ('Ericameria') nauseosa</i>	4 ft	Low	Southwest Oregon

Recommended Non-Native Hedgerow Plants for Pollinators

COMMON NAME	SCIENTIFIC NAME	MATURE HEIGHT	WATER REQUIREMENTS	NOTES
Early to Mid Season Blooming Species				
Rosemary	<i>Rosmarinus officinalis</i>	4 ft	Low	
Redbud	<i>Cercis spp.</i>	15 ft	Medium	
California Wild Lilac	<i>Ceanothus spp.</i>	10 ft	Low	Slow-growing
Highbush Blueberry	<i>Vaccinium corybosum</i>	6 ft	Medium	Host for spotted wing drosophila
Mid to Late Season Blooming Species				
English Lavender	<i>Lavendula angustifolia</i>	4 ft	Medium	
Basswood	<i>Tilia spp.</i>	40+ ft	Medium	Very tall at maturity
Hyssop	<i>Hyssopus officinalis</i>	2 ft	Low	
Russian Sage	<i>Perovskia atriplicifolia</i>	6 ft	Low	Tough herbaceous perennial, very drought tolerant, grows to the size of a small shrub in summer, dies back to the ground in winter
Late Season Blooming Species				
Sunflower	<i>Helianthus annuus</i>	7 ft	Medium	The only annual on this list. Sunflower will frequently reseed well.

Regional Native Plant Nurseries

Inclusion on this list does not constitute an endorsement or a recommendation. Other vendors not listed below may also have suitable plant materials. Before ordering, ensure that all plants or seeds purchased for pollinator habitat have **NOT** been treated with systemic insecticides.

Althouse Nursery • Cave Junction, OR • 541-592-2395 •
www.althousenursery.com

Beaverlake Nursery • Beavercreek, OR • 503-632-4787 •
www.beaverlakenursery.com

Bosky Dell Natives • West Linn, OR • 503-638-5945 •
www.boskydellnatives.com

Champoeg Nursery • Aurora, OR • 503-678-6348 •
www.champoegnursery.com

Clearwater Native Plant Nursery • Redmond, OR • 541-350-5261 •
www.clearwaternatives.com

Derby Canyon Natives • Peshastin, WA • 509-548-9404 •
www.derbycanyonnatives.com

Forest Farm • Williams, OR • 541-846-7269 •
www.forestfarm.com

Fourth Corner Nurseries • Bellingham, WA • 360-592-2250 •
www.fourthcornernurseries.com

Heritage Seedlings • Salem, OR • 503-585-9835 •
www.heritageseedlings.com

Native Grounds Nursery • Brownsville, OR • 541-466-3561 •
www.nativegroundsnursery.com

Oak Point Nursery • Independence, OR • 503-508-9555 •
www.oakpointnursery.com

Plantas Nativa • Bellingham, WA • 360-715-9655 •
www.plantasnativa.com

Seven Oaks Native Nursery • Albany, OR • 541-738-2607 •
www.sevenoaksnativenursery.com

Sound Native Plants • Olympia, WA • 360-352-4122 •
www.soundnativeplants.com

Storm Lake Growers • Monroe, WA • 360-794-4842 •
www.slgrowers.com

Woodbrook Native Plant Nursery • Gig Harbor, WA • 253-857-6808 •
www.woodbrooknativeplantnursery.com

References

Plants for Pollinators in Oregon (USDA-NRCS: technical note)
This Oregon NRCS Technical Note describes the biology and habitat needs of native bees and other beneficial insects. An extensive and detailed list of plant species is included on pages 15 to 20.
http://plants.usda.gov/pollinators/Plants_for_Pollinators_in_Oregon_PM%2013.pdf

Conservation Buffers (US Forest Service Technical Guide)
Design guidelines for buffers, corridors, and greenways. Includes extensive information on hedgerows and windbreaks.
www.unl.edu/nac/bufferguidelines/docs/conservation_buffers.pdf

Windbreaks Designed with Pollinators in Mind (*Inside Agroforestry*)
An overview of multi-purpose windbreaks designed with pollinator-friendly trees and shrubs.
www.unl.edu/nac/insideagroforestry/vol20issue1.pdf

Pacific Northwest Weed Management Handbook.
For more information on weed management and control of specific weed species, Oregon, Washington, and Idaho land grant universities have compiled information into this on-line resource.
<http://pnwhandbooks.org/weed/>

Soil Solarization: A Nonpesticidal Method for Controlling Diseases, Nematodes, and Weeds

This fact sheet, produced by the University of California Cooperative Extension discusses the solarization process, including plastic selection, installation, removal, and underlying principles.
www.vric.ucdavis.edu/pdf/soil_solarization.pdf

Attracting Native Pollinators: Protecting North America's Bees and Butterflies

This comprehensive book on pollinator conservation includes information about pollinator ecology, guides for identifying common bees, and habitat designs for multiple landscapes.
www.xerces.org/announcing-the-publication-of-attracting-native-pollinators/

Pollinator Conservation Resource Center

For additional information on pollinator plant lists, conservation guides, pesticide protection and more.
www.xerces.org/pollinator-resource-center

Hedgerow Planting (422) for Pollinators: Western Oregon & Washington

Implementation Requirements

Client:	Planned By:	Date:
Location:	Farm/Tract:	County:
Client Conservation Objectives:		

Purpose

This Implementation Requirement form documents the process of establishing dense vegetation in a linear design to enhance pollen, nectar, and nesting habitat for pollinators. Other natural resources also may benefit, depending on your conservation objectives and the integration of this habitat with other conservation practices. Installation shall be in accordance with these requirements and any attached drawings. **No changes are to be made without prior approval from the technical specialist who approved the installation plan.**

For detailed instructions on filling out each step in this Implementation Requirements form, please see the *Hedgerow Planting (422) for Pollinators Specifications: Western Oregon and Washington*.

Key Site Characteristics

Risk of pesticide drift on site? Low to high Very low to none

Weeds: weed pressure, and primary weed species of concern:

Site history: historic and current plant cover, past use of land, pre-emergent herbicide use, compaction, etc.:

Soils and habitat: soil texture (coarse to fine), drainage, and moisture level:

Irrigation: availability and method (necessary if transplants are to be used):

Other concerns or conservation goals that may affect plant choice or site preparation and planting:

Plant Selection: Native Flowering Shrubs and Subshrubs

Fill in at least three species for each bloom period. See the Appendix in the Installation Guide for list of species

Early Blooming Species	Early to Mid Blooming Species	Mid to Late Blooming Species
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Note: Hedgerows can also include herbaceous wildflowers as an understory feature, or as linear strip plantings running alongside the row of shrubs. For suggested wildflowers, see the *Conservation Cover (327) for Pollinators Installation Guide and Job Sheet: Western Oregon & Washington*

Note herbaceous species being established here:

Site Preparation Method

Choose an option and note any adjustments.

- Mowing Herbicide Solarization

Adjustments:

Planting Method

See *Hedgerow Planting (422) for Pollinators Installation Guide: Western Oregon & Washington*

Adjustments:

Maintenance During Establishment

Choose all options that apply and note any adjustments.

- Spot spraying weeds with herbicide Mowing / string-trimming
 Grass specific or other selective herbicide Hand weeding and/or hoeing
 Managing irrigation Other: _____

Adjustments:

Long Term Site Operations and Maintenance

Control herbivores as needed, but remove plant guards or other materials that could impede plant growth as soon as possible after establishment. In most cases, irrigation of transplants is no longer required by the end of the second growing season after planting. Maintain the long-term plant diversity of pollinator habitat by re-planting or re-seeding as necessary.

Finally, after establishment, no more than 30% of the habitat area should be mowed, grazed, or burned in any one year to ensure sufficient undisturbed refuge areas for pollinators and other wildlife. Continue to protect habitat from pesticide applications and drift (especially insecticides and bee-toxic fungicides). Herbicide spot-treatments and hand weeding may be used to control noxious or invasive plants.

Check Out and Certification Requirements

Amount completed: _____ units. Mark as-built location on plan map and attach photos.

Remarks _____

This practice meets NRCS standards and specifications: Yes No

Check out completed by: _____ Date: _____

Certified by: _____ Date: _____