

Bee Stewards Pollinator Toolkit



Long-horned bee (*Melissodes* sp.) on great northern aster (*Canadanthus modestus*) | Photo: Matthew Shepherd

A guide to attracting and sustaining pollinators

March 2018



sustinea



Introduction

This is a hands-on toolkit in support of the Bee Stewards Initiative for the City of Wilsonville. The main objective is to help people attract and sustain pollinators in their home gardens through habitat creation. The toolkit contains professionally developed content to empower you for success. It is designed as a long-term resource with diagrams, fact sheets, charts, pocket guides and plant and bloom lists. The toolkit also includes material for supporting native bees and bee-safe pest management. It has been created with the home gardener in mind. We truly hope this toolkit inspires, educates and encourages you to attract and sustain pollinators in your home garden while creating more beauty in all of our lives.

Special thanks to everyone who contributed to the professional content and funding of this toolkit: The City of Wilsonville, Habitat Landscape Design, Northwest Center for Alternatives to Pesticides, Xerces Society for Invertebrate Conservation, Sustinea Design, OSU Extension, Portland Parks and Recreation, The Master Gardener Program, Metro, National Fish and Wildlife Foundation, West Multnomah Soil and Water Conservation District, East Multnomah Soil and Water Conservation District and Backyard Habitat Certification Program.

Maritime Northwest Region



Nootka rose, coyotebrush, and Pacific ninebark

The Maritime Northwest is a diverse geographic region, encompassing the coastline and coastal range of southern Vancouver Island, Washington, Oregon, and northern California; the grasslands of the Puget Trough and Willamette Valley; and ending on the eastern side of the Cascade Mountains. Large elevation and rainfall changes throughout this region have created diverse plant communities, ranging from the temperate rainforests of the Olympic Peninsula, the oak savannah grasslands of the Valleys, and the evergreen forests and subalpine meadows of the Cascade range.

Corresponding to this striking diversity of plant communities is an equally remarkable range of pollinators, including the once prominent Western bumble bee (*Bombus occidentalis*). Imperiled butterflies, including the Oregon silverspot (*Speyeria zerene hippolyta*), Taylor's checkerspot (*Euphydryas editha taylori*), Fender's blue (*Icaricia icarioides fenderi*), and Puget blue (*I. i. blackmorei*) butterflies also inhabit this region. As a group, these and other pollinators maintain healthy, productive plant communities, provide food that sustains wildlife, and play an essential role in crop production.

Providing wildflower-rich habitat is the most significant action you can take to support pollinators. Adult bees, butterflies, and other pollinators require nectar as their primary food source. Female bees also collect pollen as food for their offspring. Native plants, which are adapted to local soils and climates, are usually the best sources of nectar and pollen for native pollinators. Incorporating native wildflowers,

shrubs, and trees into any landscape promotes local biological diversity by providing shelter and food for wildlife. Native plants are better adapted to regional climate cycles, do not need fertilizers, and are less likely to become weedy.

This guide features regional native plants that are highly attractive to pollinators and are well-suited for small-scale plantings in gardens, on business and school campuses, in urban greenspaces, and in farm field borders. In addition to supporting native bees and honey bees, many of these plants attract nectar-seeking butterflies, moths, and hummingbirds, and some are host plants for butterfly and moth caterpillars. With few exceptions, these species occur broadly across the region and can be purchased as seed or transplants. Please consult regional Floras, the Biota of North America's North American Plant Atlas (<http://bonap.net/napa>), or the USDA's PLANTS database (<http://plants.usda.gov>) for details on species's distributions in your area.

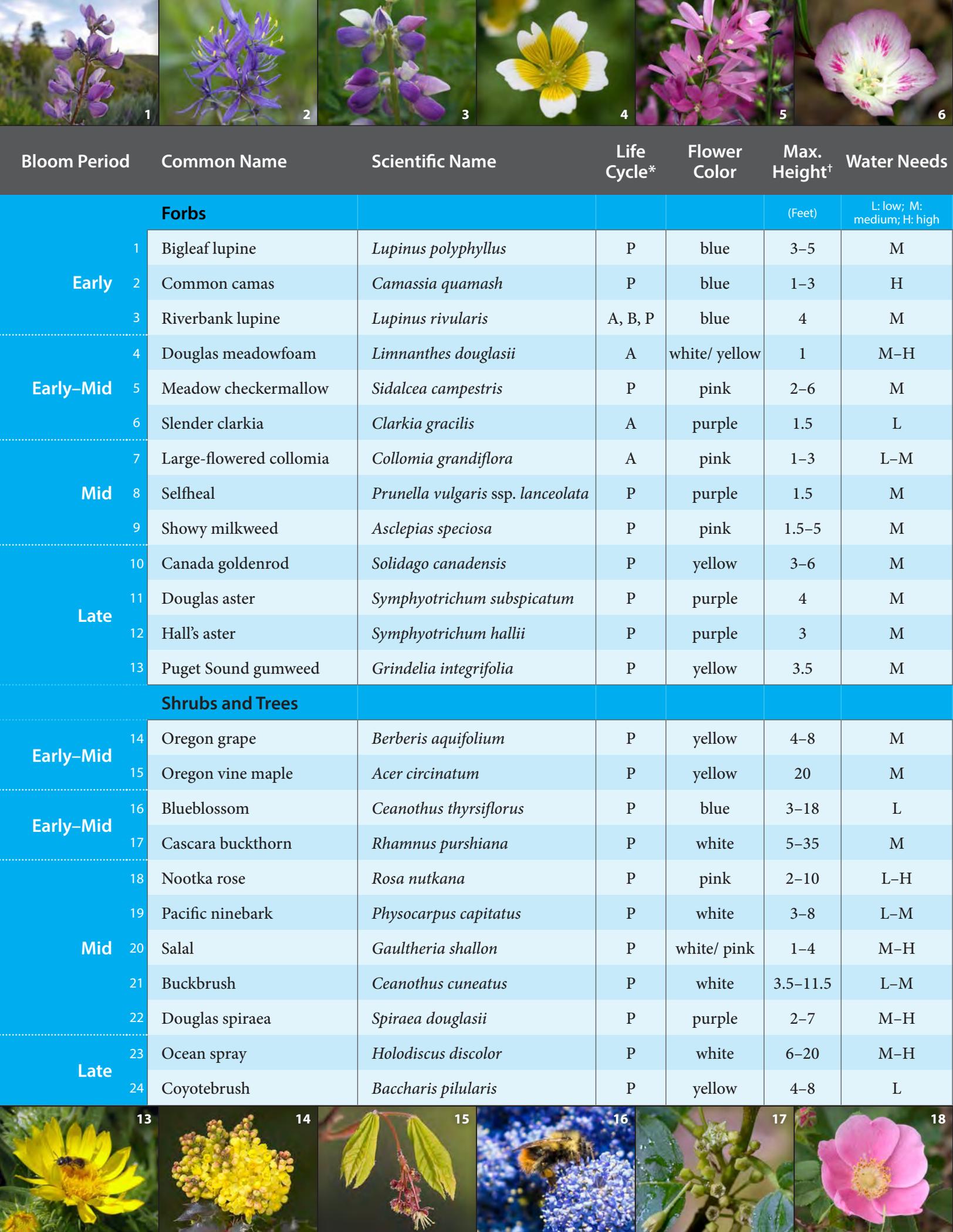
Our **Bring Back the Pollinators** campaign is based on four principles:

1. **Grow** a variety of pollinator-friendly flowers;
2. **Protect and provide** bee nest sites and caterpillar host plants;
3. **Avoid** using pesticides, especially insecticides: *and*
4. **Spread** the word!

You can participate by taking the **Pollinator Protection Pledge** and registering your habitat on our nationwide map at:

www.bringbackthepollinators.org.





Bloom Period	Common Name	Scientific Name	Life Cycle*	Flower Color	Max. Height† (Feet)	Water Needs L: low; M: medium; H: high
Forbs						
Early	1 Bigleaf lupine	<i>Lupinus polyphyllus</i>	P	blue	3–5	M
	2 Common camas	<i>Camassia quamash</i>	P	blue	1–3	H
	3 Riverbank lupine	<i>Lupinus rivularis</i>	A, B, P	blue	4	M
Early–Mid	4 Douglas meadowfoam	<i>Limnanthes douglasii</i>	A	white/ yellow	1	M–H
	5 Meadow checkermallow	<i>Sidalcea campestris</i>	P	pink	2–6	M
	6 Slender clarkia	<i>Clarkia gracilis</i>	A	purple	1.5	L
Mid	7 Large-flowered collomia	<i>Collomia grandiflora</i>	A	pink	1–3	L–M
	8 Selfheal	<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	P	purple	1.5	M
	9 Showy milkweed	<i>Asclepias speciosa</i>	P	pink	1.5–5	M
Late	10 Canada goldenrod	<i>Solidago canadensis</i>	P	yellow	3–6	M
	11 Douglas aster	<i>Symphyotrichum subspicatum</i>	P	purple	4	M
	12 Hall’s aster	<i>Symphyotrichum hallii</i>	P	purple	3	M
	13 Puget Sound gumweed	<i>Grindelia integrifolia</i>	P	yellow	3.5	M
Shrubs and Trees						
Early–Mid	14 Oregon grape	<i>Berberis aquifolium</i>	P	yellow	4–8	M
	15 Oregon vine maple	<i>Acer circinatum</i>	P	yellow	20	M
Early–Mid	16 Blueblossom	<i>Ceanothus thyrsiflorus</i>	P	blue	3–18	L
	17 Cascara buckthorn	<i>Rhamnus purshiana</i>	P	white	5–35	M
Mid	18 Nootka rose	<i>Rosa nutkana</i>	P	pink	2–10	L–H
	19 Pacific ninebark	<i>Physocarpus capitatus</i>	P	white	3–8	L–M
	20 Salal	<i>Gaultheria shallon</i>	P	white/ pink	1–4	M–H
	21 Buckbrush	<i>Ceanothus cuneatus</i>	P	white	3.5–11.5	L–M
Late	22 Douglas spiraea	<i>Spiraea douglasii</i>	P	purple	2–7	M–H
	23 Ocean spray	<i>Holodiscus discolor</i>	P	white	6–20	M–H
	24 Coyotebrush	<i>Baccharis pilularis</i>	P	yellow	4–8	L





Notes

This list of pollinator plants for the Maritime Northwest Region was produced by the Xerces® Society. For more information about pollinator conservation, please visit www.xerces.org.



*Life Cycle abbreviations: A: annual; P: perennial; B: biennial. †Max. Height is an average, individual plants may vary.

- Visited extensively by bumble bees and hummingbirds; prefers moist soils; a host plant for various blue (*Icaricia* spp.) butterflies
- Slow to establish from seed; establishes better from bulb; prefers moist soil, drought-tolerant after bloom; bulbs attractive to wildlife
- Short-lived and very aggressive; include at a low rate in seed mixes; frequently biennial; a host plant for various blue butterflies
- Easy to establish from seed; highly attractive to syrphid flies, mining bees, and mason bees; color variable among subspecies
- Hardy, long-lived plant; a host plant numerous butterflies and skippers, including west coast lady (*Vanessa annabella*)
- Fast-growing; easy to establish from seed; highly variable with numerous subspecies; prefers open, well-drained sites
- A very showy native that prefers partial shade and dry soils; bees collect bright blue pollen from the blossoms
- Easy to establish from seed; fast-growing ground cover that will tolerate mowing or grazing; highly attractive to various pollinators
- Slow to establish from seed; host plant for the monarch butterfly and a high-quality nectar source for a wide variety of floral visitors
- Slow-growing, rhizomatous plant; significant resource for honey bees and late-season native bees, such as bumble bees (pictured)
- Establishes better from transplant; visitors include leafcutter bees and the woodland skipper butterfly (*Ochlodes sylvanoides*) (pictured)
- Establishes better from transplant; drought-tolerant rhizomatous plant; one of the latest fall-blooming plants
- Long-lasting flowers; blooms year-round in warm weather; tolerates poor soils; highly attractive to green metallic sweat bees (cover)

- Evergreen; protect growth points at tips during pruning; attracts long-tongued bee species, such as mason and bumble bees
- Prefers shade; primarily attracts mason and bumble bees; a host plant for the western tiger swallowtail (*Papilio rutulus*) butterfly
- Fast-growing evergreen; prefers partial shade; establish from seed or cuttings; a host plant for the pale tiger swallowtail (*P. eurymedon*)
- Tall at maturity, but can be maintained as a shrub with pruning; prefers moist soils; drought- and shade-tolerant
- Thrives in wet or dry soils; expands by suckering; a source of nesting material for leafcutter bees; a host plant for numerous butterflies
- Establishes fairly well from cuttings; extensively visited by small bees; a host plant for the spring azure (*Celastrina ladon*) butterfly
- Evergreen; occurs north of southwestern Oregon; mostly visited by bumble bees; requires partial shade to prevent scorching
- Long-lived evergreen; establish from containers or cuttings; maintain live branch tips during pruning
- Expands by suckering; frequently visited by bumble bees; prefers partial shade and moist soils; tolerates occasional flooding
- Visited by a wide variety of bees, including bumble bees and tiny sweat bees; a host plant for the spring azure; tolerates shade
- Drought-tolerant dioecious evergreen; male plants provide critical late-season pollen source for honey bees and native bees



Planting for Success

Sun Exposure

Most pollinator-friendly plants prefer sites that receive full sun throughout most of the day and are mostly open, with few large trees. A southern exposure can provide the warmest habitat, but is not required.

Plant Diversity

Choosing a variety of plants with overlapping and sequential bloom periods will provide food for pollinators throughout the seasons.

Habitat Size and Shape

Habitat patches that are bigger and closer to other patches are generally better than those that are smaller and more isolated from one another. However, even a small container garden can attract and support pollinators!

Planting Layout

Flowers clustered into clumps of one species will attract more pollinators than individual plants scattered through a habitat patch. Where space allows, plant clumps of the same species within a few feet of one another.

Seeds or Transplants

It is usually cheaper to establish large habitat areas from seed; however, seeding native wildflowers on a large-scale is an art unto itself. For step-by-step instructions, see *Establishing Pollinator Meadows from Seed* and the Pollinator Habitat Installation Guides listed in the Additional Resources section. For smaller areas like gardens, transplants are usually easier to use and will bloom faster than plants started from seed.

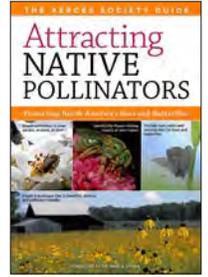
Protect Pollinators from Insecticides

Although dependent on timing, rate, and method of application, all insecticides have the potential to poison or kill pollinators. Systemic insecticides in particular have received significant attention for their potential role in pollinator declines (imidacloprid, dinotefuran, clothianidin, and thiamethoxam are examples of systemic insecticides now found in various farm and garden products). Because plants absorb systemic insecticides as they grow, the chemicals become distributed throughout plant tissues and are sometimes present in pollen and nectar. You can help protect pollinators by avoiding the use of these and other insecticides. Before purchasing plants from nurseries and garden centers, be sure to ask whether they have been treated with insecticides. To read more about threats to pollinators from pesticides, please visit: www.xerces.org/pesticides.

Additional Resources

Attracting Native Pollinators

Our best-selling book highlights the role of native pollinators in natural ecosystems, gardens, and farms. This comprehensive guide includes information about pollinator ecology, detailed profiles of over 30 common bee genera, and habitat designs for multiple landscapes with over 50 pages of fully illustrated regional plant lists. Available in bookstores everywhere, and through www.xerces.org/books.



The Xerces Pollinator Conservation Resource Center

Our Pollinator Conservation Resource Center includes regional information on pollinator plants, habitat conservation guides, nest management instructions, bee identification and monitoring resources, and directories of native pollinator plant nurseries. www.xerces.org/pollinator-resource-center

Lady Bird Johnson Wildflower Center

The Xerces Society has collaborated with the Lady Bird Johnson Wildflower Center to create lists of plants that are attractive to native bees, bumble bees, honey bees, and other beneficial insects, as well as plant lists with value as nesting materials for native bees. These lists can be narrowed down with additional criteria such as state, soil moisture, bloom time, and sunlight requirements. The Center's website also features image galleries, how-to articles on native plant gardening, and more. www.wildflower.org/conservation_pollinators

Establishing Pollinator Meadows from Seed

These guidelines provide step-by-step instructions for establishing pollinator meadows from seed in areas that range in size from a small backyard garden up to an acre. Topics include: site selection, site preparation, plant selection, planting techniques, and ongoing management. www.xerces.org/establishing-pollinator-meadows-from-seed

Pollinator Habitat Installation Guides

These regional guidelines, developed in collaboration with the USDA's Natural Resources Conservation Service, provide in-depth practical guidance on how to install nectar and pollen habitat for bees in the form of wildflower meadow plantings or linear rows of native flowering shrubs. Region-specific seed mixes and plant recommendations are included in the appendices of each guide. www.xerces.org/pollinator-habitat-installation-guides

Acknowledgments

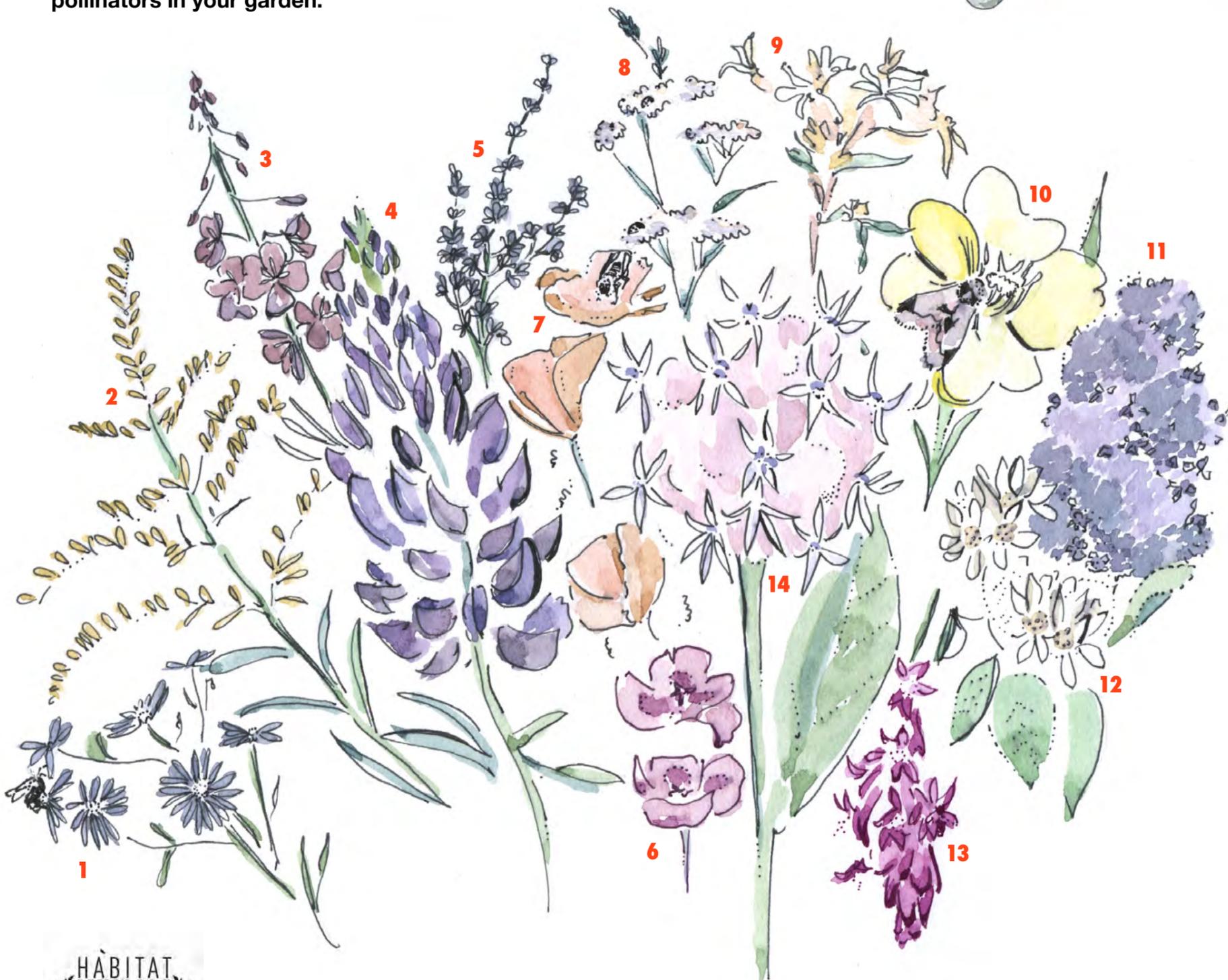
Support, background information, and other contributions to this publication were generously provided by The Ceres Foundation, CS Fund, Disney Worldwide Conservation Fund, Turner Foundation, Inc., Oregon Department of Agriculture, Western Sustainable Agriculture Research and Education, and the USDA's Natural Resources Conservation Service. We thank Rod Gilbert for permission to use his beautiful photos (www.pbase.com/rodg/root).

Written by Nancy Lee Adamson, Brianna Borders, Jessa Kay Cruz, Sarah Foltz Jordan, Kelly Gill, Jennifer Hopwood, Eric Lee-Mäder, Ashley Minnerath, and Mace Vaughan. Designed by Kaitlyn Rich. Formatted by Sara Morris. **PHOTO CREDITS:** [Thayne Tuason](#)*: 1; Rod Gilbert: 2, 7, 8, 9, 12, 14, 15, 17, 18 (inside), 20; Brent Miller ([foliosus](#))*: 3; [Philip Bouchard](#)*: 4, 21, 22; The Xerces Society/Mace Vaughan: 5, 6, 13 (inside), 19 (cover); The Xerces Society/Rich Hatfield: 10; Tom Brandt ([born1945](#))*: 11, 19 (inside); [Andrew A. Reding](#)*: 13 (cover), 16, 18 (cover); John J. Kehoe ([JKehoe_Photos](#))*: 23; Laura Camp ([campsjc](#))*: 24. *Via www.flickr.com. Photographs remain under the copyright of the photographer.

The Xerces Society is an equal opportunity employer and provider. © 2014 by The Xerces Society for Invertebrate Conservation. Xerces® is a trademark registered in the U.S. Patent and Trademark Office.

FORAGE FOR POLLINATORS

Gardens play a critical role in supplying forage, shelter, and nest sites for pollinators as they navigate urban and fragmented landscapes. Native plant selection is incredibly valuable for birds, bees, butterflies, and many more flying insects that have coevolved with native plants, and whose pollinating habits sustain food systems. Filling your garden with a rich and dynamic community of flowering shrubs, perennials and annuals will bring constancy, flavor, and year-round refuge for pollinators in your garden.



1 Aster **2 goldenrod** **3 fireweed** and **4 lupine** are native perennial wildflowers with long bloom periods, making them dependable nectar sources for bees, butterflies, moths, and birds. The billowy foliage and rigid stems of aster and goldenrod are especially valuable overwintering habitat for insects.

5 Herbs like **sage** play an important role in supplying forage for pollinators in the garden. Bees and butterflies harvesting nectar from the flowers are easily protected beneath the full, aromatic foliage.

6 Clarkia and **7 poppy** will naturally reseed, prolonging their bloom span from spring into summer.

8 Flat clusters of **Western yarrow** blossoms provide a soft landing pad for butterflies and beneficial pest-eating insects like ladybugs, who spend long periods of time foraging from all of the flower heads.

9 Bumblebees will continue to forage for nectar from **grand collomia** cones late in the season after the petals have dropped.

10 Evening primrose blooms at dusk, providing a nectar source for nighttime foraging insects like nocturnal moths.

11 Early flowering shrubs like **ceanothus** **12 serviceberry** and **13 red-flowering currant** are important nectar and pollen sources for hummingbirds that migrate and native bees that emerge in spring. The foliage also provides food for insects, birds, and butterfly larvae.

14 Milkweed is a host plant for several moths and butterflies, including **15 monarchs**, whom as caterpillars depend on milkweed leaves as their sole food source. Milkweed blooms in early summer.

16 In winter, **milkweed pods** dry and crack open, allowing the wispy white 'coma' to catch in the wind and carry seeds to the ground. Hummingbirds will line their nests with the soft plumes.

Link, Russell. 1999. Landscaping for Wildlife in the Pacific Northwest.
Tallamy, Douglas W. Bringing Nature Home.
Xerces Society. 2016. Gardening for Butterflies.

1 Fireweed 2 russian sage

3 goldenrod 4 lupine and 5 aster are native perennials with overlapping months of bloom. Perennials with bold and dynamic structures will often have hollow stems that provide wintertime refuge for insects.

6 Clarkia and 7 poppy naturally reseed themselves, giving early and long-lasting blooms of delicate, wine-cupped blossoms.

8

The blossoms of milkweed begin to provide pollen and nectar in early summer.

9

Primrose is a nighttime nectar source for nocturnal insects like moths and some species of bees.

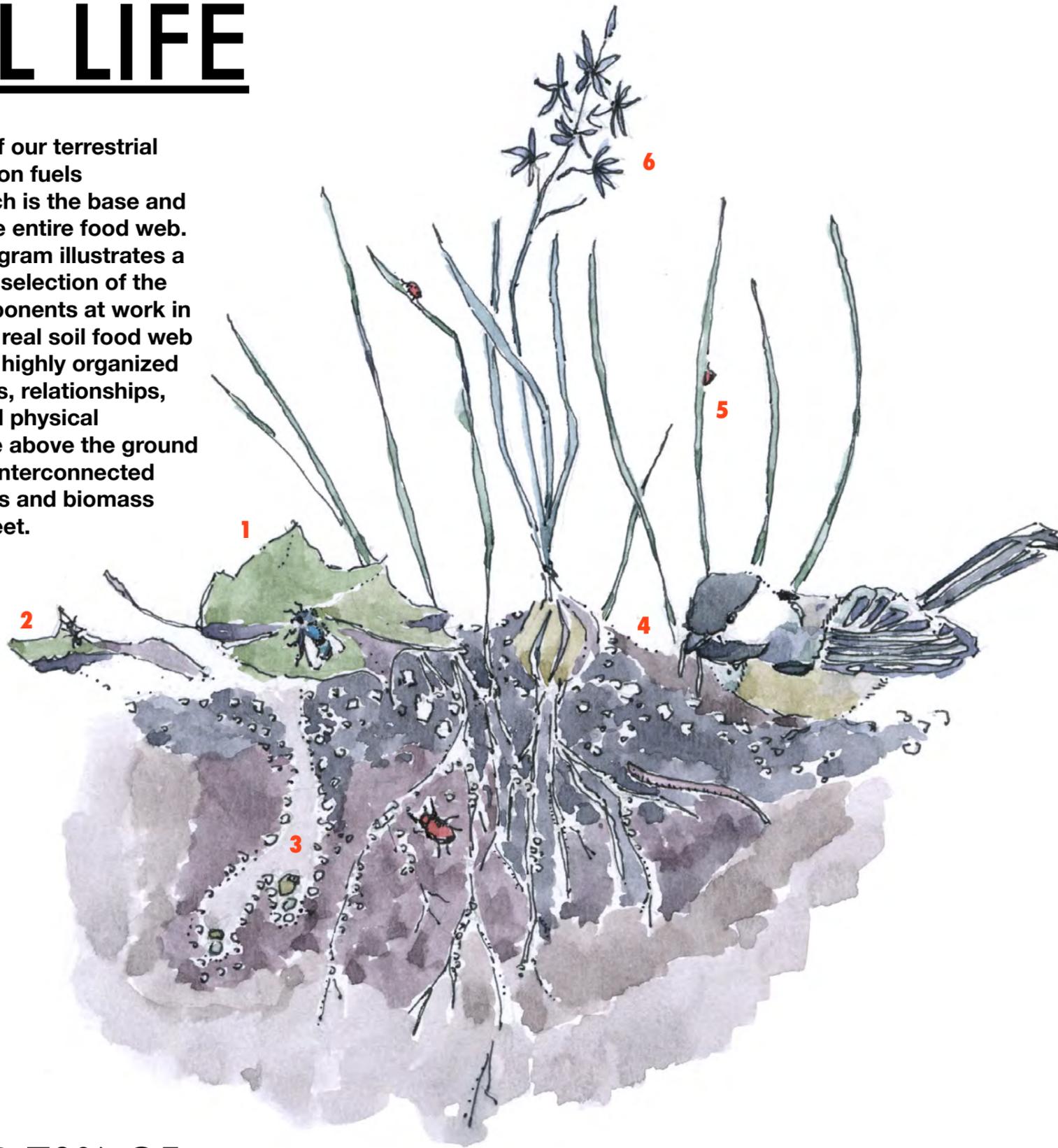
10 Ceanothus 11 serviceberry and

12 Red-Flowering currant are shrubs that produce nectar-filled blossoms. Shrubs also provide forage and nest material for birds and small mammals.



PROTECTING SOIL LIFE

Soil is the layer of our terrestrial earth where carbon fuels metabolism, which is the base and sustenance of the entire food web. The following diagram illustrates a simple and small selection of the soil making components at work in your garden. The real soil food web is a complex and highly organized set of interactions, relationships, and chemical and physical processes. All life above the ground depends on this interconnected world of creatures and biomass right below our feet.



1 Messy, organic ground cover like leaf duff protects ground-dwelling creatures and insects that build nests within and on the soil. Leaf blowers disturb fertile soil habitat by removing composting material. Rake where necessary and leave some places bare, mossy, undisturbed and with leaf debris soil for bees to dig their nests and be protected.

2 Decomposition happens when ants and other arthropods shred organic matter, break it down and excrete it. This process incorporates nutrients into the soil.

3 Ground dwelling native bees carve nests into the soil, lay their eggs in cells, and cover them with nectar and pollen. This serves as a food source once the bees become larvae and before they emerge in spring. Native pollinators provide the pollination series necessary for 'one-third of humankind's food' ¹. One ground-dwelling mason bee 'does the service of 60 honeybees' ².

4 Plants depend on fungi and bacteria because they work in the soil to exchange nutrients between the soil and roots. This helps to balance the soil composition and support the soil community.

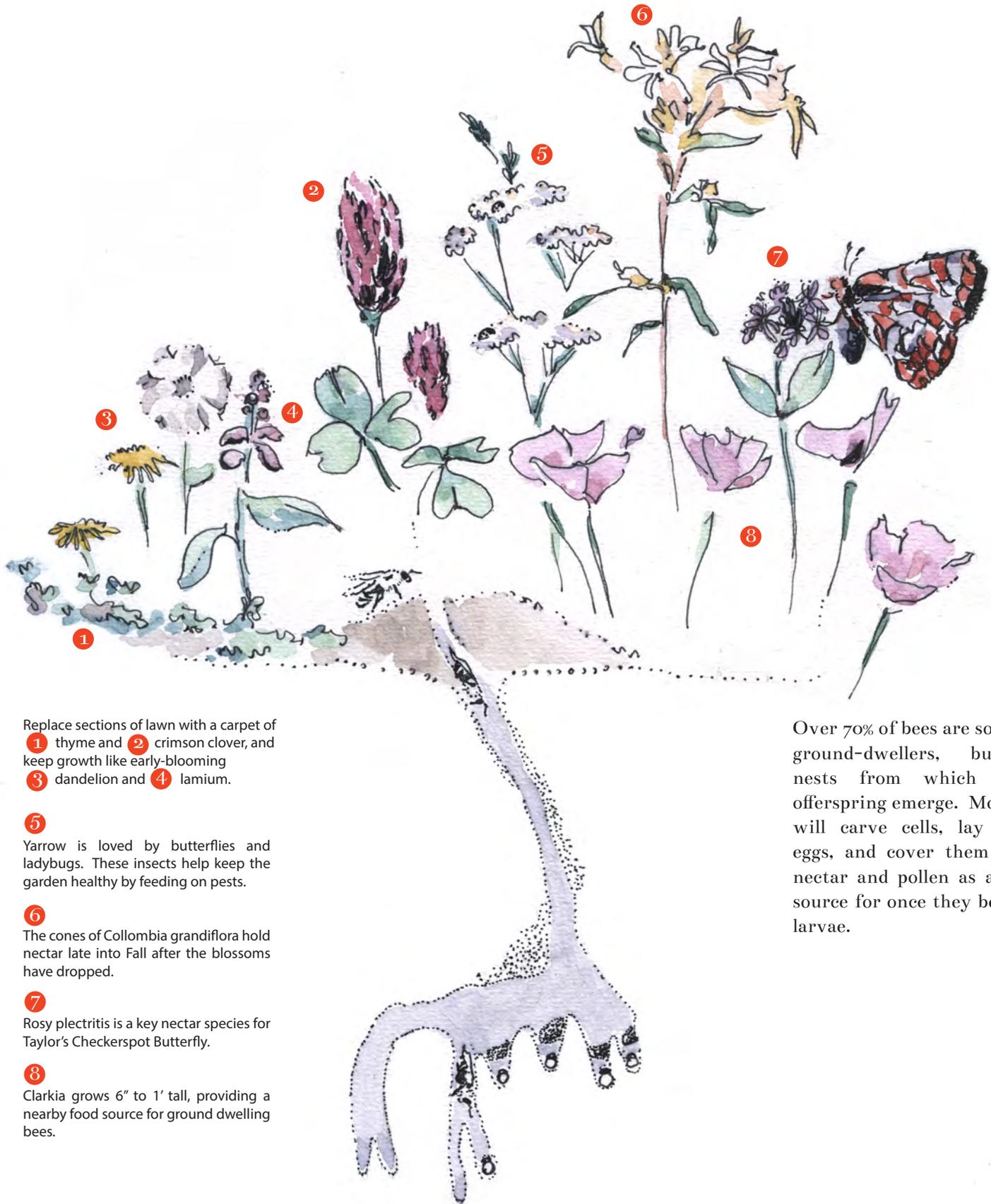
5 Ladybugs are pretty little warriors of the garden. They eat pests like aphids and mites, but they also love pollen and mushrooms. Keep your garden clean of pesticides to support insects, and they will return the favor by helping to keep your plants healthy.

6 Native plants, like **camas**, are a part of the soil community and are adapted to specific soil conditions. Their strong and dynamic roots strengthen the soil and pull water and oxygen into its structure. These workings nourish microscopic creatures, cleanse and reduce stormwater runoff. Native perennial forbs, grasses, and self-seeding annuals protect this habitat with foliage on the surface and complex root systems below. Much deeper than lawn grass roots, native roots stabilize soil structure and provide the subterranean habitat that supports all our food systems.

OVER 70% OF
NATIVE BEES
LIVE IN THE GROUND.

¹ The Xerces Society Guide to Attracting Native Pollinators

² Backyard Habitat Certification Program Newsletter
Lowenfels, Jeff and Wayne Lewis. Teaming with Microbes; The Organic Gardener's Guide to the Soil Food Web.
USDA-NRCS Soil Complexity Diagram



Replace sections of lawn with a carpet of **1** thyme and **2** crimson clover, and keep growth like early-blooming **3** dandelion and **4** lamium.

5 Yarrow is loved by butterflies and ladybugs. These insects help keep the garden healthy by feeding on pests.

6 The cones of *Collombia grandiflora* hold nectar late into Fall after the blossoms have dropped.

7 Rosy plectritis is a key nectar species for Taylor's Checkerspot Butterfly.

8 *Clarkia* grows 6" to 1' tall, providing a nearby food source for ground dwelling bees.

Over 70% of bees are solitary ground-dwellers, building nests from which their offspring emerge. Mothers will carve cells, lay their eggs, and cover them with nectar and pollen as a food source for once they become larvae.



PROTECT THE SOIL FOR GROUND DWELLING INSECTS

NW Natives for Homeowners & Backyard Gardeners
Created by Colleen Lockovitch: Sustinea Horticulture & Design

SHADE/PART SHADE LOVING PERENNIALS (with low water needs)

- *Aruncus dioicus* – Goatsbeard
- *Aquilegia formosa* – Red Columbine
- *Asarum caudatum* - Wild Ginger
- *Athyrium filix-femina* – Lady Fern (will need more water during summer)
- *Dicentra formosa* - Pacific Bleeding Heart
- *Maianthemum racemosum* - False Solomon's Seal
- *Oxalis oregano* – Oregon Redwood Sorrel
- *Polystichum munitum* – Sword Fern
- *Thalictrum occidentale* – Western Meadow Rue

SHADE/PART SHADE LOVING WOODY SHRUBS (with low water needs)

- *Holodiscus discolor* – Oceanspray
- *Mahonia aquifolium* – Tall Oregon Grape
- *Oemleria cerasiformis* – Indian Plum
- *Philadelphus lewisii* – Lewis' Mock Orange
- *Vaccinium ovatum* – Evergreen Huckleberry (grows well in sun, buy larger size)

SUN/PART SUN LOVING PERENNIALS (with low water needs)

- *Achillea millefolium* – Yarrow
- *Allium cernuum* – Nodding Onion
- *Asclepias speciosa* – Showy Milkweed
- *Camassia quamash* or *leichtlinii* – Camas (Bulb)
- *Collomia grandiflora* – Large-flowered Collomia (Annual)
- *Clarkia amonena* – Farewell-to-spring (Annual)
- *Erigeron speciosus* – Showy Fleabane
- *Festuca californica* – California Fescue
- *Gilia capitata* – Globe Gilia
- *Mahonia repens* – Low Oregon Grape (Subshrub)
- *Penstemon richardsonii* - Richardson's Penstemon
- *Sedum oreganum* or *Sedum spathulifolium*
- *Solidago elongate* – Westcoast Canada Goldenrod
- *Symphyotrichum (Aster) subspicatum* - Douglas' Aster

SUN/PART SUN LOVING SHRUBS (with low water needs)

- *Arctostaphylos* – Manzanita (many species and cultivars)
- *Ceanothus* – Blueblossom (many species and cultivars)
- *Ribes sanguineum* – Red-flowering Currant
- *Vaccinium ovatum* – Evergreen Huckleberry (can also grow in shade)
- *Viburnum ellipticum* – Western Viburnum

Willamette Valley Meadow Seed Packet Info

Please plant these seeds in a full sun area of your yard that is free of weeds. The wildflower seeds were selected to represent the prairie plants that grew in the Portland area prior to development. The benefits provided by these native wildflowers include:

- They need no summer watering
- They provide wildlife habitat that is supportive of native pollinators such as bees and butterflies, birds, and other wildlife
- They also help manage stormwater and keep rivers and streams healthy
- Historically some of these plants were used as food or medicine by the indigenous peoples of the Portland area. For more information on plant uses reference: Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia and Alaska. Authors: Pojar and MacKinnon.



Site preparation: For best results please remove all weeds from the planting site before seeding. Depending on the current vegetation of your site, this is best done over a period of several weeks to a year by removing weeds by solarizing, handpulling or applying herbicide.

Planting: Scatter the seeds in this packet on bare soil that has been prepared as suggested above. Leave the seed on the surface of the soil or barely cover with a light dusting of compost or potting soil. Covering with more soil will inhibit the germination of the seeds. Plant native wildflower seeds during the rainy season. No watering or fertilizers are necessary! Alternately you can germinate the seed earlier in small pots or trays then transplant before rainy season begins. Seeds will germinate then grow a small amount in the fall, and will then winter over and grow again in the spring. Annuals will flower then die the first year; perennials and will not bloom until the second year and may live a long time.

Care: Carefully remove any weeds that you recognize, particularly morning glory, dandelion, black berry, ivy or any weedy grasses. This packet does not contain any grass seed so you may wish to purchase bunch grasses for planting later.

See www.heritageseedlings.com for more information to help with your meadow.

Packet contains ½ oz. of seed can cover approximately 100 square ft of plantable space.

This plant mix contains:

- Achillea millefolium – 6%
- Clarkia amoena – 5%
- Gilia capitata – 5%
- Heuchera chlorantha – 9%
- Iris tenax – 10%
- Lomatium dissectum – 9%
- Lotus purshianus – 4%
- Lupinus polycarpus – 5%
- Madia elegans – 2%
- Perideridia oregano – 9%
- Ranunculus occidentalis – 10%
- Sanguisorba annua (occidentalis) – 4%
- Sidalcea campestris – 11%
- Sidalcea malviflora ssp. virgate – 11%

Pollinator Plants and Bloom Periods - West Multnomah and Portland Metro Area



WEST MULTNOMAH
SOIL & WATER CONSERVATION DISTRICT

Tree/shrub Species - common name (<i>scientific name</i>)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
California hazelnut (<i>Corylus cornuta</i> var. <i>californica</i>)	yellow							
willow species (<i>Salix sitchensis</i> , <i>scouleriana</i> , and/or <i>lucida</i>)			yellow					
osoberry/indian-plum (<i>Oemleria cerasiformis</i>)			greenish-white					
tall Oregon-grape (<i>Mahonia Aquifolium</i>) aka <i>Berberis</i>			yellow					
salmonberry (<i>Rubus spectabilis</i>)			purple					
kinnikinnick (<i>Arctostaphylos uva-ursi</i>)			purple					
red elderberry (<i>Sambucus racemosa</i>)			white					
vine maple (<i>Acer circinatum</i>)			red					
bigleaf maple (<i>Acer macrophyllum</i>)			greenish-white					
dwarf Oregon-grape (<i>Mahonia nervosa</i>) aka <i>Berberis</i>			yellow					
Oregon crabapple (<i>Malus fusca</i>)			white					
western chokecherry (<i>Prunus virginiana</i> var. <i>demissa</i>)			white					
Pacific madrone (<i>Arbutus menziesii</i>)				white				
Pacific dogwood (<i>Cornus nuttallii</i>)				white				
Oregon white oak (<i>Quercus garryana</i>)				yellow				
red huckleberry (<i>Vaccinium parvifolium</i>)				pale pink				
swamp rose (or nootka or dwarf)				red				
red flowering currant (<i>Ribes sanguineum</i>)				red				
Pacific ninebark (<i>Physocarpus capitatus</i>)				white				
blue elderberry (<i>Sambucus caerulea</i>)				white				
Saskatoon serviceberry (<i>Amelanchier alnifolia</i>)				white				
black hawthorn (<i>Crataegus douglasii</i>)				white				
Pacific waterleaf (<i>Hydrophyllum tenuipes</i>)				white to cream				
salal (<i>Gaultheria shallon</i>)				white to pink				
mockorange (<i>Philadelphus lewisii</i>)				white				
thimbleberry (<i>Rubus parviflorus</i>)				white				
Douglas spiraea (<i>Spiraea douglasii</i>)				pink				
rose species (<i>Rosa gymnocarpa</i> , <i>pisocarpa</i> , and/or <i>nutkana</i>)				pink to purple				
snowberry (<i>Symphoricarpos alba</i>)					pink			
oceanspray (<i>Holodiscus discolor</i>)					white			

Pollinator Plants and Bloom Periods - West Multnomah and Portland Metro Area

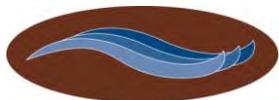
Flower Species - common name (<i>scientific name</i>)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
western buttercup (<i>Ranunculus occidentalis</i>)			yellow					
shooting star (<i>Dodecatheon hendersonii</i>)			pink					
western trillium (<i>Trillium ovatum</i>)			white to purple					
meadow checkerbloom (<i>Sidalcea campestris</i>)				light pink				
woodland strawberry (<i>Fragaria vesca ssp. Brachteata</i>)				white to pink				
Oregon iris (<i>Iris tenax</i>)				purple				
camas (<i>Camassia leichtlinii</i> or <i>quamash</i>)				blue				
western columbine (<i>Aquilegia formosa</i>)				red				
fringecup (<i>Tellima grandiflora</i>)				greenish-white to reddish				
varileaf phacelia (<i>Phacelia heterophylla</i>)				white				
lance selfheal (<i>Prunella vulgaris</i>)						purple		
slender cinquefoil (<i>Potentilla gracilis</i>)						yellow		
harvest brodiaea (<i>Brodiaea elegans</i>)						purple		
salebrosa goldenrod (<i>Solidago canadensis</i> var. <i>salebrosa</i>)						yellow		
Bunchgrass Species - common name (<i>scientific name</i>)	Height at maturity (ft)							
blue wildrye (<i>Elymus glaucus</i>)	3							
California brome (<i>Bromus carinatus</i>)	3							
tufted hairgrass (<i>Deschampsia caespitosa</i>)	3							
Roemer's fescue (<i>Festuca roemerii</i>)	2							
California fescue (<i>Festuca californica</i>)	3							

Web Addresses to help you find native plant nurseries in the area

<http://www.nwplants.com/information/landscaping/index.html>

<http://plantnative.org>

CREATED BY:



WEST MULTNOMAH
SOIL & WATER CONSERVATION DISTRICT



Local Sources of Native Plants

Portland Metro Area

This list is not comprehensive and is not an endorsement of any organization or business. It is intended to provide a starting place for your own research. If you wish to add a source to this list, please contact Julie with the East Multnomah Soil and Water Conservation District at 503-222-7645 x105. (Updated January, 2013)

LOCAL NATIVE PLANT SALES

- **East Multnomah Soil and Water Conservation District:** Annual bare-root native plant sale. Online pre-orders begin shortly after the New Year. Pick up is usually the 2nd or 3rd Saturday in February. Visit www.EMSWCD.org to learn more and place an online pre-order.
- **Audubon Society of Portland:** See www.audubonportland.org
- **Clackamas Community College Horticulture Department:** Usually the Friday before Mother's Day. See <http://depts.clackamas.cc.or.us/hort/>
- **Friends of Baltimore Woods:** See www.friendsofbaltimorewoods.org
- **Hardy Plant Society of Oregon:** See www.hardyplant.org
- **Jackson Bottom Wetlands Preserve:** In early April. See <http://www.jacksonbottom.org/>
- **Leach Botanical Garden:** See <http://www.leachgarden.org/>
- **Tryon Creek Trillium Festival:** See <http://www.tryonfriends.org/>
- **Tualatin Hills Natures Park:** See www.thprd.org/facilities/naturepark/specialevents.cfm

RETAIL AND WHOLESALE - LOCAL

- **Bosky Dell Natives**, 23311 SW Bosky Dell Lane, West Linn, 503-638-5945, www.boskydellnatives.com
- **Echo Valley Natives**, 18883 S Ferguson Rd, Oregon City, OR, 503-631-2451, www.echovalleynatives.com
- **Garden Fever!** 3433 NE 24th Ave, Portland, 503-287-3200, www.gardenfever.com
- **Humble Roots Farm and Nursery, Ilc.** Mosier, OR, 503-449-3694, <http://www.humblerootsnursery.com/>
- **Livingscap Nursery**, 3926 N. Vancouver Ave, Portland, OR 503-248-0104 www.livingscapenursery.com
- **Portland Nursery**, 5050 SE Stark, Portland, OR 97215, 503-231-5050 and 9000 SE Division, Portland, OR 97216, 503-788-9000, www.portlandnursery.com

WHOLESALE OR LARGE PROJECTS ONLY - REGIONAL

- **Aurora Nursery**, 22821 Boones Ferry Rd NE, Aurora, OR, 503-678-7903, www.auroranursery.com
- **Beaverlake Nursery**, 21200 S. Ferguson Rd, Beavercreek, OR, 503-632-4787, www.beaverlakenursery.com
- **Brooks Tree Farm**, 9785 Portland Rd, Brooks, OR, 503-393-6300, www.brookstreefarm.com

WHOLESALE, CONTINUED

- **Champoeg Nursery**, 9661 Yergen Rd NE, Aurora, OR, 503-678-6348, www.champoegnursery.com
- **Northwest Native Plants Inc.**, 23501 S. Beatie Rd., Oregon City, OR 503-632-7079, www.northwestnativeplants.com
- **Nursery Guide**, Oregon Association of Nurseries (this very useful site lets you search by plant name for nurseries) <http://www.nurseryguide.com/nurseryguide/search.lasso#plants>
- **Scholls Valley Native Nursery**, Tigard, OR, 503-624-1766, www.schollsvalley.com
- **Sevenoaks Native Nursery**, 29730 Harvest Drive SW, Albany, OR, 541-757-6520, www.sevenoaksnativenursery.com
- **Valley Growers Nursery**, 30570 Barlow Rd., Hubbard, OR 503-651-3535, www.valleygrowers.com
- **Watershed Garden Works**, 2039 44th Ave, Longview, WA, 360-423-6446, www.watershedgardenworks.com

WHOLESALE SEED - REGIONAL

- **Emerald Seed and Supply**, 9330 NE Halsey St, Portland, 800-826-8873, www.emeraldseedandsupply.com
- **E&S Environmental Restoration, Inc.**
PO Box 84, Corvallis, OR 97339, 541-758-5777, www.esenvironmental.com/native_seed.htm
- **Hobbs & Hopkins, Ltd.**, 1712 SE Ankeny, Portland, 503-239-7518, www.protimelawnseed.com
- **Native Seed Network** 563 SW Jefferson Ave, Corvallis, OR, 541-753-3099
www.nativeseednetwork.org
- **River Refuge Seed Company**, 26366 Gap Road, Brownsville, OR, www.riverrefugeseed.com

LOCAL PLACES TO SEE NATIVE PLANTS IN NATURAL SETTINGS

- Camassia Natural Area, West Linn
- Cooper Mountain Nature Park, Beaverton
- Forest Park, Portland
- Hoyt Arboretum, Portland
- Jackson Bottom Wetlands Preserve, Hillsboro
- John Inskeep Environmental Learning Center, Clackamas Community College
- Leach Botanical Garden, Portland
- Marquam Nature Park, Portland
- Nob Hill Nature Park, St. Helens
- Oxbow Regional Park, Troutdale
- Portland Community College, Rock Creek Campus, Beaverton
- Powell Butte, Portland
- Ridgefield Wildlife Refuge, Ridgefield, WA
- Sauvie Island Wildlife Refuge, Portland
- Smith & Bybee Lakes, Portland
- Tryon Creek State Park, Portland
- Tualatin Hills Nature Park, Beaverton
- Tualatin River National Wildlife Refuge, Sherwood

Do the Rot Thing Choosing and Using A Composting System

Composting is the art and science of mixing organic materials in a pile and making sure the pile has the right amount of what it needs to do its thing: air, water, nitrogen, carbon. With time, the original materials transform into stable humus.

The composting method you choose depends on:

- Where you live.
- How much material you have to compost.
- What materials you want to compost.
- How much time and energy you have.
- What you plan to do with the product.

Ingredients (plus air and water) for any type of composting can include:

Low Nitrogen “Browns”

autumn leaves
straw
shredded paper
saw dust or chips

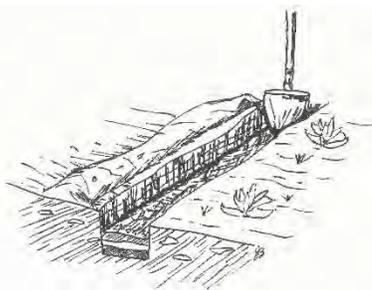
High Nitrogen “Greens”

kitchen scraps
coffee grounds
grass clippings
aged manures
plant trimmings

Do Not Compost

pet or human waste
meat, dairy, oil
diseased plants
pernicious weeds
wood ash

In place composting simply involves burying organic material directly into garden soil. Bury the material at least 12” deep and then cover with at least 8” of soil to discourage dogs, cats or other animals from digging it up. Rotate the site of composting to avoid over-concentration of material in one spot. Optionally, cover the site with black plastic while the material decays. Slugs and snails will be attracted to the decaying material and will cling to the underside of the plastic. Lift the plastic and destroy or remove them. This very effectively reduces the populations prior to planting in the soil.



may be laid in the trench.

Trench composting makes use of the walk space between garden beds. Dig a trench 12-18” deep by 12”-18” wide (or your path width) and pile the soil on top of a garden bed next to the trench. In the fall, pack the trench solidly with leaves, straw, or chopped garden debris up to the surface level of the garden bed. In the spring, turn the decomposed trench material onto the top of the garden beds and use the trench as a pathway during the growing season. Repeat the process each year. You may plant directly into the composted material after turning it onto the bed. To avoid walking in mud in the spring, a layer of bark mulch or more straw

Sheet mulch composting, sometimes known as lasagna composting, is an excellent way to convert grass to vegetable beds, create new or enlarge perennial borders, improve soil texture and structure, and recycle organic material at home.

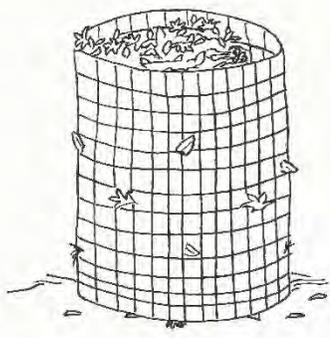
Sheet composting is best started several months before you want to use the planting area. Fall is an excellent time to sheet compost, as the material breaks down slowly over the winter and the area is ready for planting in the spring. However, a bed may be started any time materials are available. The basic technique involves placing alternate layers of low nitrogen materials (browns) and high nitrogen materials (greens) directly on the soil. (Note: Layers should be fairly equal to allow for even decomposition. One inch is recommended although deeper layers can be used.)

1. Begin by mowing or scalping grass or other vegetation down to the lowest possible level to the length and width you would like the finished bed to become. Three feet wide is a good width as this allows the center of the bed to be reached from either side. This method may also be used directly in a constructed raised bed.
2. Make sure there is good drainage by loosening the soil underneath the bed with a spading fork.
3. Remove any pernicious or persistent weeds such as blackberry, bindweed, morning glory or quack grass. Sheet composting may not smother these weeds.
4. Cover the ground with cardboard or 4-6 overlapping layers of newspaper (carbon materials that smother the grass and weeds underneath by keeping light from the plants).
5. Wet the newspaper or cardboard thoroughly and cover with a layer of a high nitrogen material, such as manure or coffee grounds.
6. Top the nitrogen with an inch of leaves, straw, bark or other low nitrogen material.
7. Add a layer of high nitrogen material such as kitchen scraps, produce scraps, manures or fresh green weeds (minus the seed heads), or a combination of all.
8. Cover with another layer of low nitrogen material using straw, shredded paper, leaves, dryer lint, etc.
9. Continue to add alternating layers of greens and browns as materials are available, until the final height is reached (18 inches to three feet).

As the material decomposes, more layers may be added always ending with a carbon layer. This carbon layer is the “blanket” that discourages flies from laying eggs on exposed nitrogen material such as kitchen scraps. The height of a bed may vary depending on the amount of material available. Generally speaking, the greater the volume of material, the longer it will take for decomposition to take place. The final layer may be covered with overlapping burlap coffee sacks to keep the materials neat and in place. The burlap will gradually decompose over time but may be removed when planting the bed.

If a pile becomes too wet, cover it with a sheet of plastic loosely weighted down at the sides. This will help to warm the pile and encourage faster decomposition. This will also help prevent nutrients leaching out during heavy rains.

Sheet composting is a slow process. There is little heat retention from the microorganisms to speed the process along. A sheet compost bed may take 6 months or longer to decompose sufficiently to allow for planting. A bed is “finished” and ready for planting when the layers have decomposed to the point that the original materials are no longer recognizable and it looks and smells like fresh earth. Alternatively, you can get plants started earlier by sifting a 2-3 inch layer of compost or garden soil on top of the newly formed bed and plant directly in the lasagna garden.



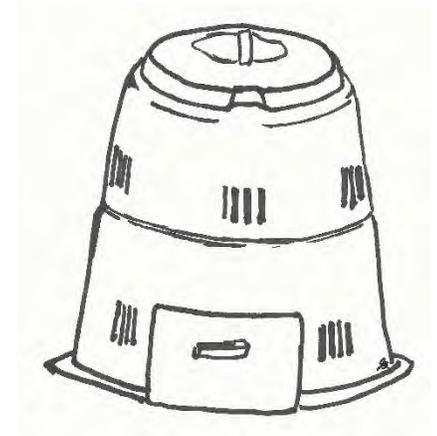
Low-Fuss Composting

Use only leaves and garden trimmings as they become available (no kitchen scraps if discouraging rodents). Chop material and place in a wire bin. Water and mix browns and greens. After a year remove composted material and fill again.

Add-As-You-Go Composting

In most backyard composting, the pile is contained in a wooden or plastic bin with a ¼" hardware cloth on the bottom to deter rats, mice, and raccoons.

- Begin with sticks and coarse browns in the bottom of the bin to provide air circulation.
- Add to the bin whenever food or yard waste is available.
- Chop or shred browns and greens to increase the surface area for the compost critters to do their work. A variety of particle sizes insure that water and air are distributed throughout the pile.
- The kitchen scraps and yard clippings are greens and need to be covered with a layer of browns to discourage flies from laying eggs.
- If possible, turn the pile periodically to expose all parts to air and to mix the material. If the pile seems dry, add water when turning.

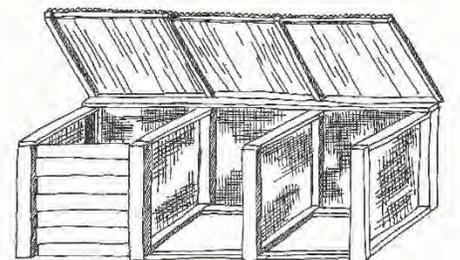


During the rainy season keep the pile covered. If the pile is wetter than a wrung-out sponge, add more dry browns. This type of composting doesn't heat up enough to kill diseases and noxious weeds. Add weeds only if the seed heads have not formed and avoid those that spread by roots and nodules. Dispose of diseased plants and those with thorns in the garbage or yard debris cart. The finished humus from an *Add-As-You-Go* pile takes less work and does not require as much, if any, turning but will not be finished as quickly as a hot pile. High temperatures in a hot compost pile kill off certain fungi and bacteria that help suppress soil-borne diseases in the vegetable garden. These beneficial microbes are left intact in the humus produced by this slower type of composting.

Make-It-Fast / Hot Composting

Most home composters do not have the space or adequate amounts of browns and greens or the time/energy to regularly turn their compost pile. However others do! The same fundamentals apply as in *Add-As-You-Go* Composting.

- Fast (hot) composting occurs when the initial volume of the pile is about 1 cubic yard (3'x3'x3') or more and the pile contains an adequate amount of high nitrogen organic matter.
- Equal amounts of greens and browns are coarsely chopped or shredded and mixed together, adding adequate water.
- After a few days check the temperature in the middle of the pile either with a compost thermometer or by touch. Consistent high temperatures (135° F) in the pile may kill pathogens and weed seeds.
- If the pile doesn't heat up, add grass clippings, manure or coffee grounds.
- When the pile starts to cool (5 to 10 days), pull it apart and restack, putting materials from the outside on the inside and vice versa.



- The compost should always be wet as a wrung out sponge. If the pile is too wet, add dry browns and turn more often. If too dry, add water when turning the pile.
- After about a month, when the pile reaches ambient temperatures (it no longer heats up when turned), allow the pile to cure for an additional 4-6 weeks if the compost is to be used with tender seedlings or in the vegetable garden. If using as mulch around established woody ornamentals, it can be applied sooner.

Your compost is now stable humus and is ready to use.

Food or Pet Waste Digester

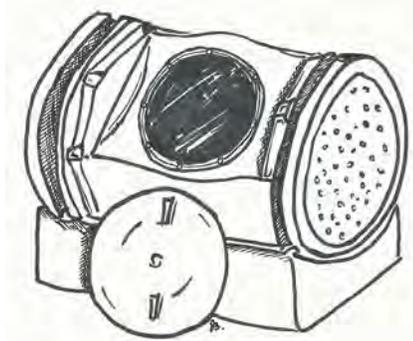
Composting without air is ordinarily not recommended because organisms that thrive in a low oxygen environment can often cause plant diseases.



However, a backyard anaerobic digester is useful for composting pet waste as well as disposing of meat and bones. The compost is not safe for harvesting and should not be used. Do not compost pet waste near vegetable gardens or water supplies or streams. The perforated metal can is buried 18” deep.

Tumbler Turn-Turn-Turn Composting

Commercially available tumblers are popular for composters who want to keep animal pests such as rodents out of the pile.



Types and amounts of materials, air, and water are the same as in any compost set up. Rotate the tumbler daily or, at a minimum, several times per week. If possible have two tumblers, one for accumulating and storing debris and one for actively composting.

Troubleshooting

Symptom	Problem	Solution
Smells bad or is too wet	Not enough air or too much moisture	Turn and add dry brown materials
Pile is too dry	Not enough water and/or too many browns	Turn and moisten, add more greens
Pests around bin (dogs and/or rodents)	Unsuitable materials in pile (see <i>Do Not Compost</i> list)	Avoid meat, dairy & fatty foods Bury food waste in pile
	Pile is an attractive nesting place for rodents	Consider using a rodent proof bin
Flies and insects	Food waste on top	Bury food and keep covered with browns
Pile not breaking down fast enough	Pile too small	Make pile at least 1 cubic yard
	Not enough green material	Maintain equal browns and greens

Books:

Let It Rot! The Gardener's Guide to Composting by Stu Campbell. Storey Publishing, 1975.

Compost, Vermicompost and Compost Tea by Grace Gershuny. Chelsea Green Publishing, 2011.

The Rodale Book of Composting Edited by Deborah L. Martin, Grace Gershuny. Rodale Press, 1992.

Publications available on-line:

Composting with Worms – OSU EM 9034 by Sam Angima, Michael Noack, and Sally Noack.

<http://bit.ly/2iLmDeg>

Backyard Composting – WSU EB1784E by Craig Cogger, Dan Sullivan, Andy Bary.

<http://bit.ly/2gm3uLg>

Whatcom County Compost Fundamentals---Washington State University, Whatcom County Extension

<http://bit.ly/2gu7wF9>

More information on composting as well as the OSU Compost Demo Schedule can be found at:

<http://extension.oregonstate.edu/lane/gardens/compost>

The Compost Specialist Program is a volunteer program at OSU Extension Service-Lane County.

Oregon State University Extension Service prohibits discrimination in all its programs, services, activities, and materials on the basis of race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, familial/parental status, income derived from a public assistance program, political beliefs, genetic information, veteran's status, reprisal or retaliation for prior civil rights activity.

August, 2017



Oregon State University
Extension Service
Lane County



Sheet Mulch - Lasagna Composting

Sheet composting is an ancient technique that has many practical applications today. Also referred to as lasagna composting or sheet mulching, sheet composting is a cold composting method that has been used by people around the world for generations. It is an excellent way to convert grass to vegetable beds, create new or enlarge perennial borders, improve soil and soil structure and recycle organic material at home. As with all compost, sheet composting needs carbon, nitrogen, oxygen and water in proper proportions to break down the organic materials into a good growing medium.

To build any good compost you need to plan ahead. Sheet composting is best started several months before you want to use the planting area. Fall is an excellent time to sheet compost as the material breaks down slowly over the winter and is ready for planting in the spring. But a bed may be started any time materials are available. The basic technique involves placing alternate layers of carbon materials and nitrogen materials directly on the soil. (Note: Layers should be fairly equal to allow for even decomposition. One inch is recommended although deeper layers can be used.)

There are several advantages to sheet composting

- ❖ It is an easy and uncomplicated method of composting
- ❖ It can be done a little at a time as materials are available
- ❖ It can be done on a large or small scale
- ❖ It can be used to improve soil or add to existing beds and borders
- ❖ It is an easy way to expand a garden with a minimum amount of equipment, material and time.

1. Begin by mowing or scalping grass or other vegetation down to the lowest possible level to the length and width you would like the finished bed to become. Three feet wide is a good width as this allows the center of the bed to be reached from either side. This may also be done directly in a constructed raised bed.
2. Make sure there is good drainage by ‘popping’ or loosening the soil underneath the bed with a spading fork.
3. Removed any pernicious or persistent weeds such as blackberry, bindweed, morning glory or quackgrass. Sheet composting may not smother these weeds.
4. Cover the ground with 4-6 overlapping layers of newspaper or cardboard (carbon material that smothers the grass and weeds underneath by preventing light from allowing photosynthesis of the plants.)
5. Wet the newspaper or cardboard thoroughly and cover with a one-inch layer of a nitrogen source such as manure.
6. Top the nitrogen with an inch of leaves, straw, bark or other carbon material.
7. Add an inch layer of nitrogen; kitchen scraps, green produce scraps, manures or fresh green weeds (minus the seed heads) or a combination of all.
8. Cover with another layer of carbon material; straw, shredded paper, leaves, dryer lint, etc.
9. Continue to add alternating layers of carbon and nitrogen until the final height is reached (18 inches to three feet.)
10. Continue to add alternating layers of carbon and nitrogen, as materials are available. As the material decomposes more layers may be added always ending with a carbon layer. This is the “blanket” that discourages flies from laying eggs on exposed nitrogen material such as kitchen scraps. The height of a bed may vary depending on the amount of material and when the bed will be planted. Generally speaking the greater the volume of material the longer it will take for decomposition to take place. The final layer may be covered with overlapping burlap coffee sacks to keep the materials neat and in place. The burlap will gradually decompose over time but may be removed when planting the bed.

If a pile becomes too wet, cover it with a sheet of black plastic loosely weighted down at the sides. This will help to warm the pile and encourage faster decomposition. This will also help prevent nutrients leaching during heavy rains.

Sheet composting is a slow process. There is little or no heat reaction from the microorganisms to speed the process along. A sheet compost bed may take 6 months or longer to decompose sufficiently to allow for planting. A bed is “finished” and ready for planting when the layers have decomposed to the point that the original materials are no longer recognizable and it looks and smells like fresh earth. Or you can get plants started by sifting a 2-3 inch layer of compost or garden soil on top of the newly formed bed and plant directly in the lasagna garden.

The following are commonly used materials for sheet mulch/lasagna gardening. Almost any garden debris may be used.

Nitrogen sources

Used coffee grounds
Composted manures
Alfalfa pellets
Fresh weeds
Vegetable scraps
Fresh grass clippings
Cottonseed meal
Soybean meal/blood meal

Carbon Sources

Sawdust
Leaves
Corn stalks
Pine needles
Peat moss
Newspaper/cardboard
Straw/Hay
Wood Chips

Costs to build a raised bed sheet mulch/lasagna compost garden: \$35 for wood (untreated fir) and screws, and about \$15 for the cloche. Six mil plastic with clips for covering the PVC pipe will cost about \$20.



Photos courtesy of Anne Donahue

Box materials:

Two pieces 2x12x12 untreated fir
One-piece 2x12x8 (cut in half)
One-piece 4x4x8 (cut four 11 ½ inch lengths for corner braces)
40 - 2½ inch galvanized wood screws (ten per corner)

Cloche materials

Seven pieces of ten-foot ½" PVC pipe
One piece of ten-foot roll galvanized plumbers metal stripping to attach PVC to sideboards every two feet.
28 one-inch roofing nails

Tools needed

Hammer
Drill, drill bit to pre-drill holes, Phillips drill bit for screws
Tape measure (to evenly space PVC)
Slide/level/square (to make sure the bed is level and square)

Steps

1. Have the lumber store cut wood for you. Screw together corner braces and 4 foot 2 x12's. Add on 12 - foot 2 x12's.
2. Easy method: Lay newspaper on the grass where the bed is to go. Fill with leaves, coffee grounds, grass clippings and straw in layers. Top with 4-6 inches of garden soil and plant
3. More labor intensive method: Dig out sod under area to be covered by the bed. Cover the bare soil with wood chips or overlapping newspaper. Turn sod upside down to form the first layer in the bed. Cover with two sheets of newspaper, and layer with coffee grounds, leaves and other material. Add lime and organic fertilizer on top of this level. Top with 4 inches of garden soil or good compost and plant.

Information is provided by OSU Extension in Lane County Compost Specialists. Compost Specialists are trained by OSU Extension Service. Updated April 2014

Oregon State University Extension Service offers educational programs, activities, and materials—*without discrimination based on race, color, religion, sex, sexual orientation, national origin, age, marital status*—as required by Title VI of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Section 504 of the Rehabilitation Act of 1973. Oregon State University Extension Service is an Equal Opportunity Employer.