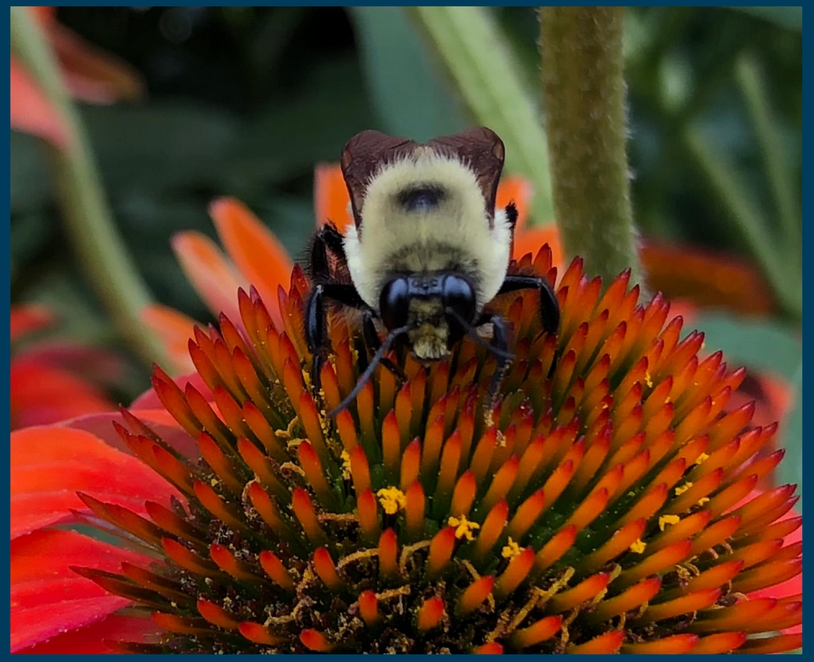
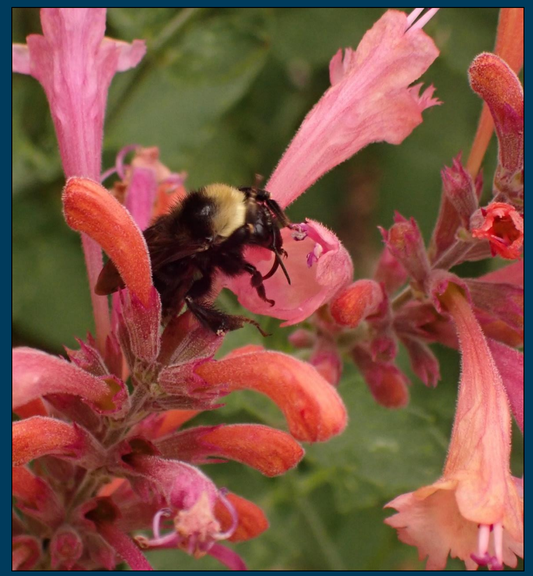
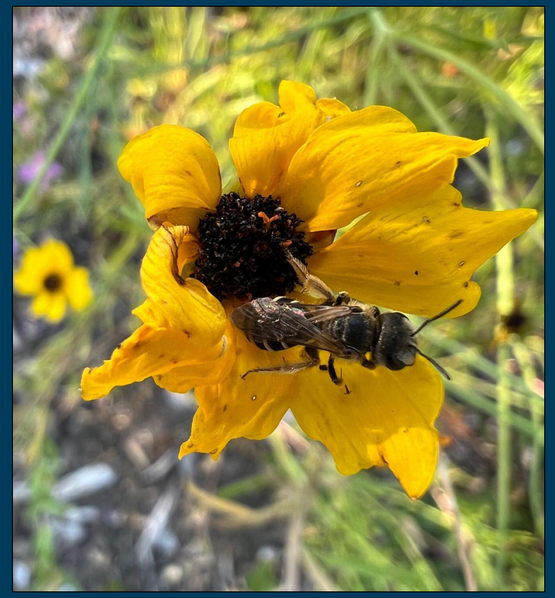


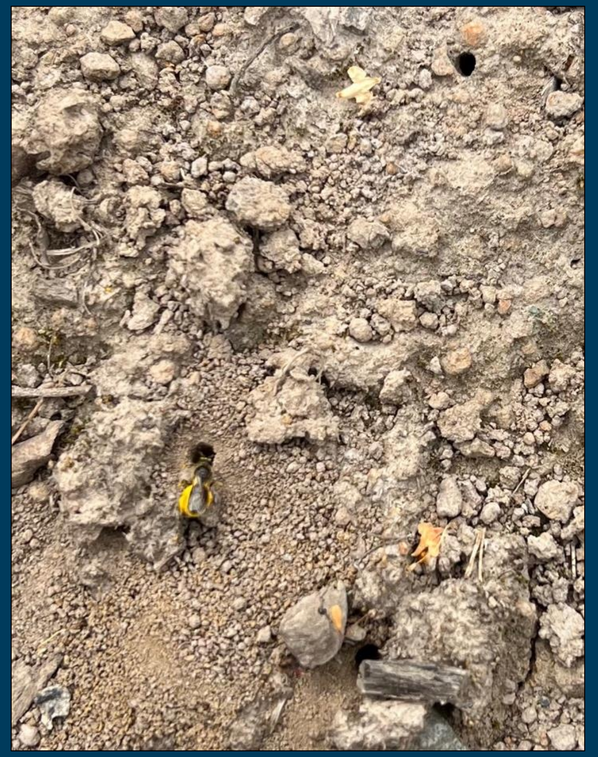
Bees of Oregon Workshop
WELCOME!!

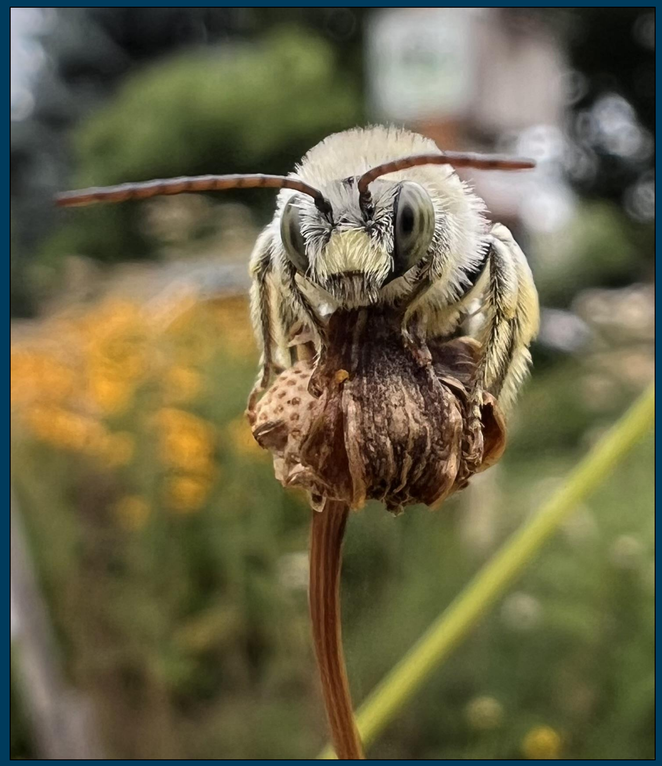
- Sign the attendance roster
- Pick up the handouts
- We’ll begin promptly at 12:30pm

MG Intern Workshop: Bees of Oregon









Susan Albright, Vicki Finn and Ron Spendal
OSU Extension Master Gardener Volunteers
Metro Area - Washington County

Oregon State University
Extension Service

METRO AREA

Master Gardener™ Program

Washington County Master Gardener Association

Photo: Susan Albright

WCMGA

In support of and in collaboration with the OSU Extension Service Master Gardener™ Program

Oregon State University Extension Service

Two WCMGA demonstration gardens

Learning Garden at Jenkins Estate

Education Garden at PCC Rock Creek

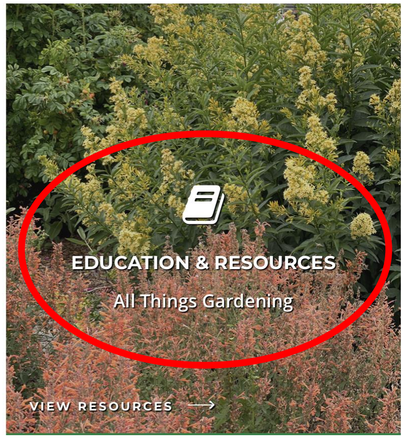
Free gardening-related lectures, classes & events

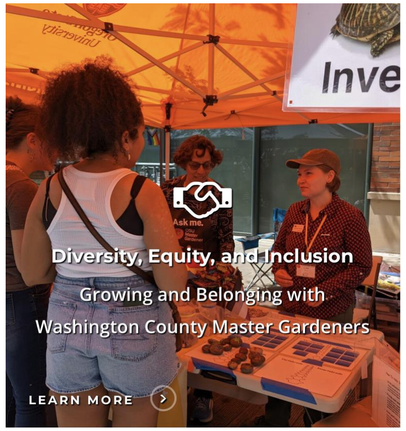
Photo: Missy Martin

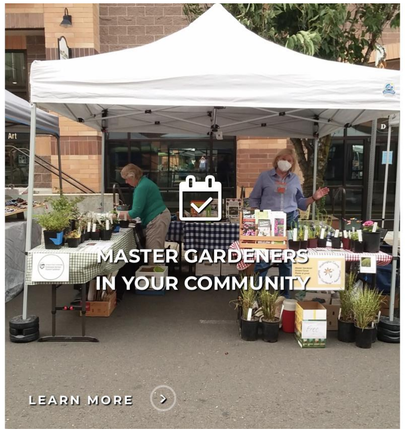

Photo: Susan Albright

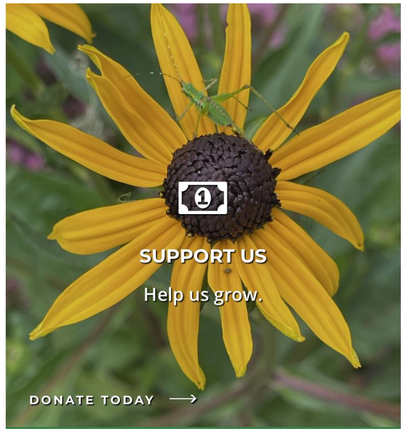
http://washingtoncountymastergardeners.org

Washington County Master Gardener™ Association









www.washingtoncountymastergardeners.org

Public Events

website

in cooperation with
Oregon State University Extension Service

Handy card

EDUCATION & RESOURCES page on our website

- Links to pdfs for this Workshop's PowerPoint and Resource list
- Monthly Chapter Speaker recordings
- Helpful links from OSU, Metro and more!

Workshop Outline

- Introductions & Learning Objectives
- Activity: Bee, Wasp, Fly?
- Mason Bees
- Making a garden bee-friendly for native bees
- Who might visit your garden?
- Q & A
- Activities in WCMGA Education Garden

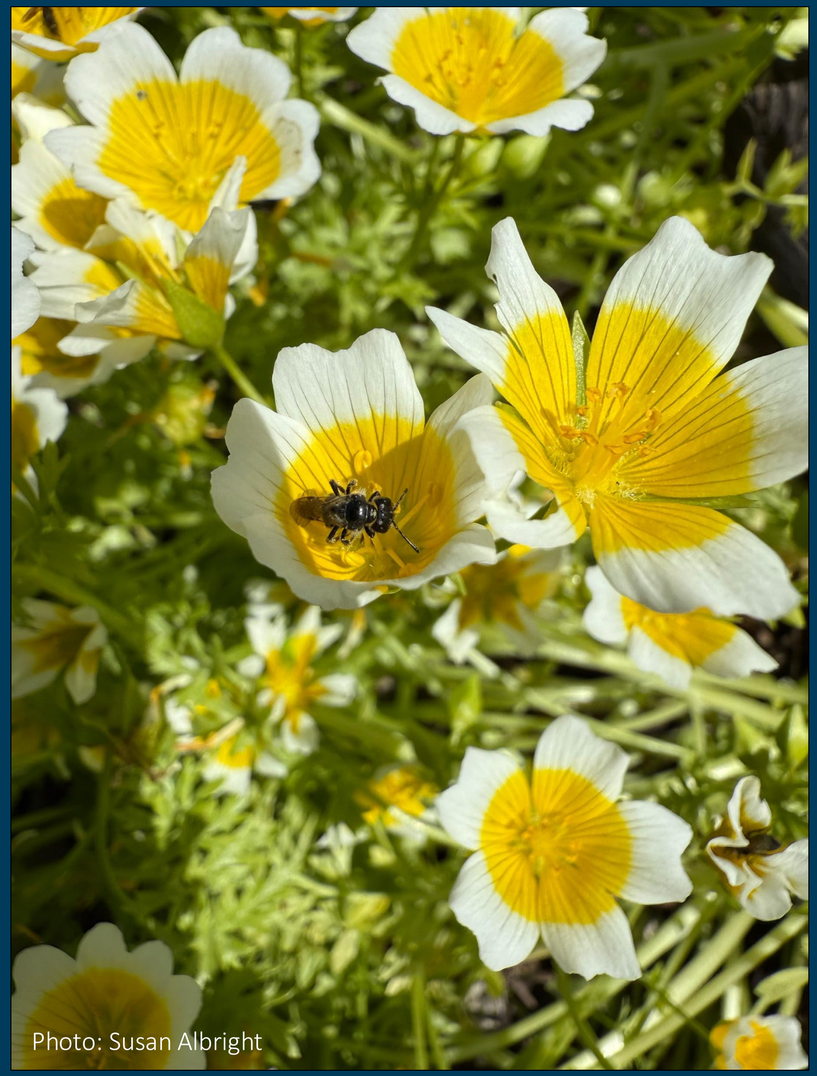


Photo: Susan Albright

Learning Objectives

Objective 1: Demonstrate how to use anatomical features to distinguish bees from wasps and flies.

Objective 2: Explain the difference between 'social bees' and 'solitary bees’.

Objective 3: Describe the general life cycle, nesting behaviors and habitat needs of our native mason bee (*Osmia lignaria)*

Objective 4: List key points of how to make a garden 'bee friendly’ for native bees in terms of habitat needs, ecology, pesticide use.

Objective 5: Develop an awareness and appreciation for our native Oregon bees

A bee or not a bee? That is the question!

Some of the bees, wasps and flies found in Oregon are pictured below. Can you identify the bees?

Photos courtesy of Oregon Department of Agriculture

WCMGA www.washingtoncountymastergardeners.org

Activity: Bee? Wasp? Fly?

Part 1: Look at the insects on the sheet in front of you.

1. Think privately: Which insects do *you* think are bees? Which ones are wasps? Which are flies? Record your responses on the sheet
2. Share with a partner
3. Share whole group

Photos courtesy of Oregon Department of Agriculture

Part 2: Look at the chart on the inside of the folded card.

A bee or not a bee? That is the question!

Some bees, wasps and flies found in Oregon are pictured below. Can you identify the bees?

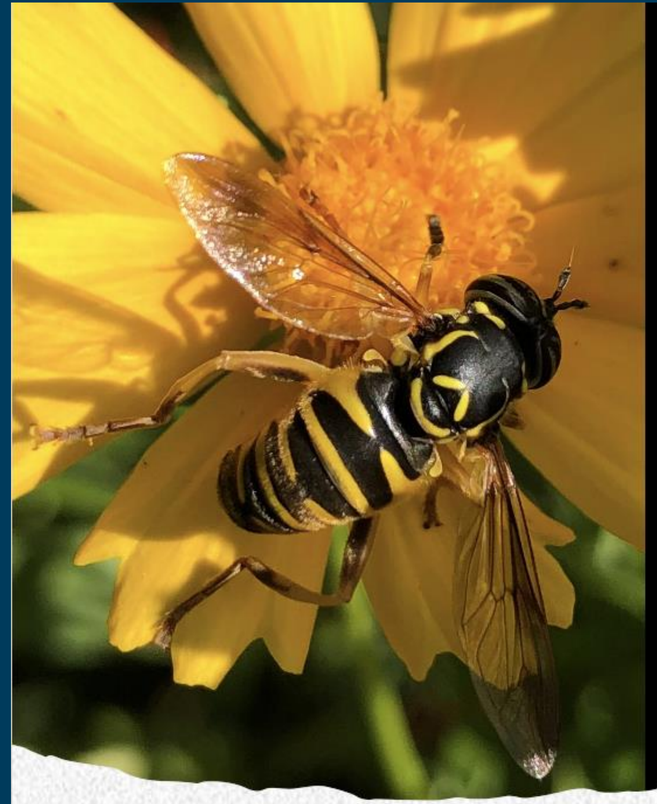
Identifying an insect as a bee, wasp or fly can be tricky because they often look similar. See the chart inside for some hints on ways to tell them apart.

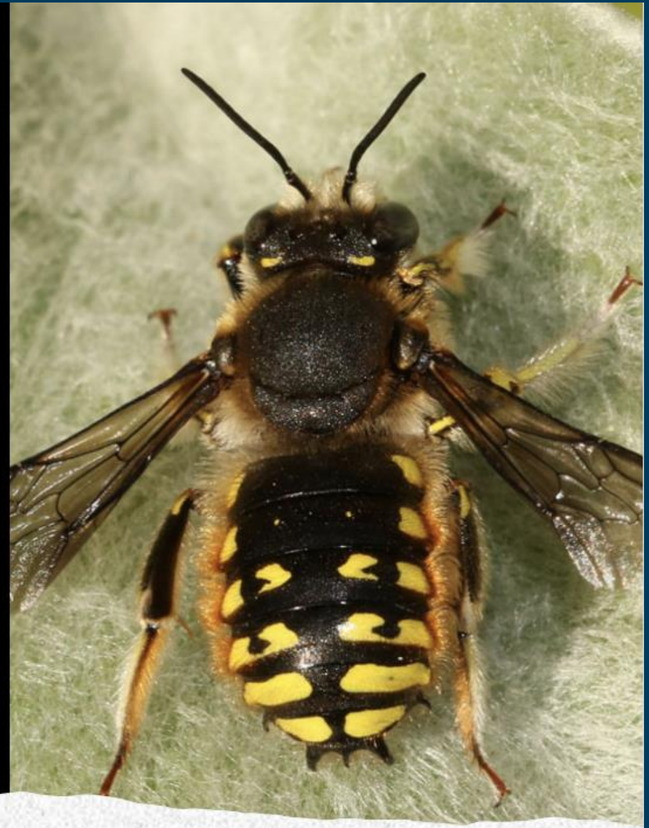
Photos from Oregon Department of Agriculture

Comparing Characteristics of Bees, Wasps and Flies

Characteristic	Bees	Wasps	Flies
Eyes	Oval, on side of face	Oval, on side of face	Round, large, take up most of face
Wings	Four (two pair)	Four (two pair)	Two (one pair)
Antennae	Long, can bend	Long, can bend	Short and stubby (except for primitive flies like mosquitos)
Hind leg	Thick	Skinny	Skinny
Hairs	Generally numerous but can be sparse in some species	Generally sparse	Generally sparse

Do you want to make any changes to your choices? Why?





- Which is the bee?
- Which is the fly?
- Which is the wasp?

Photo courtesy of Oregon Department of Agriculture

Mason Bee

Osmia lignaria

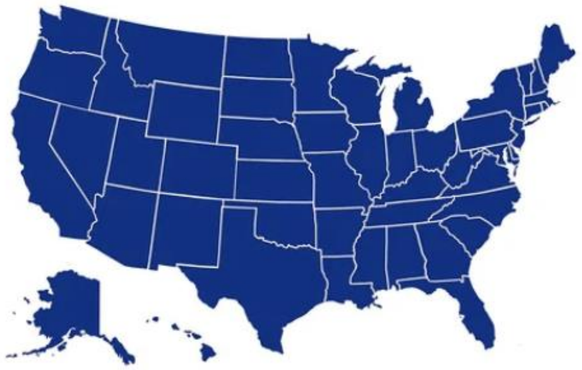
Approximate bee species counts

20,000
species of bees

12 managed species

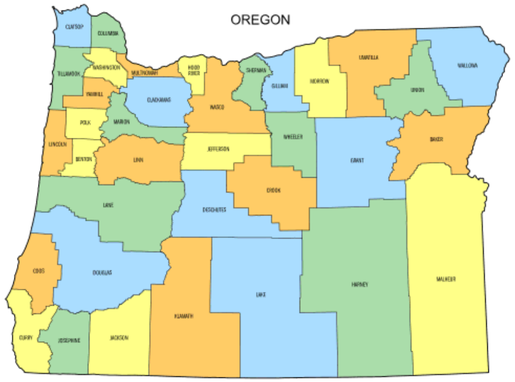
4,000
species of bees

3,500
species of bees



5 managed species

700+
species of bees



4 managed species

- **Honey bees**
- **Leaf cutter bees**
- **Alkali bees**
- **Mason bees**

Social structures

10% of species Social Bees

- Queen, workers, and males
- Live in hives / colonies

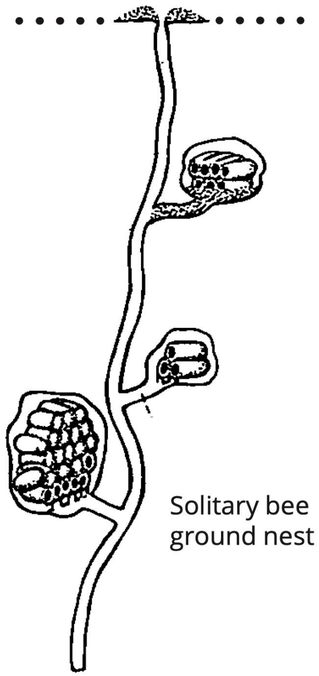
Not native

Photos courtesy of Oregon Department of Agriculture

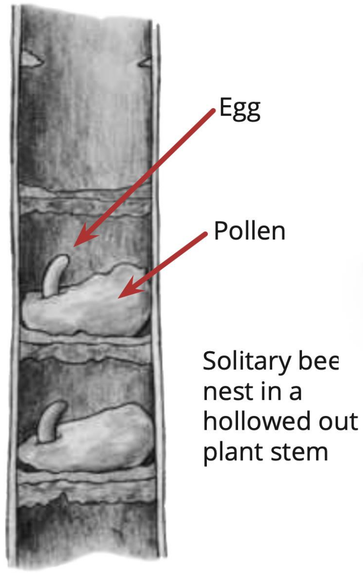
90% of species Solitary Bees

- Female does all the work
- Solitary but gregarious

70% ground nesting



Solitary bee ground nest



Solitary bee nest in a hollowed out plant stem

30% cavity nesting

*images borrowed from "The Biology and External Morphology of Bees"

Male vs Female

Photos: Ron Spendal

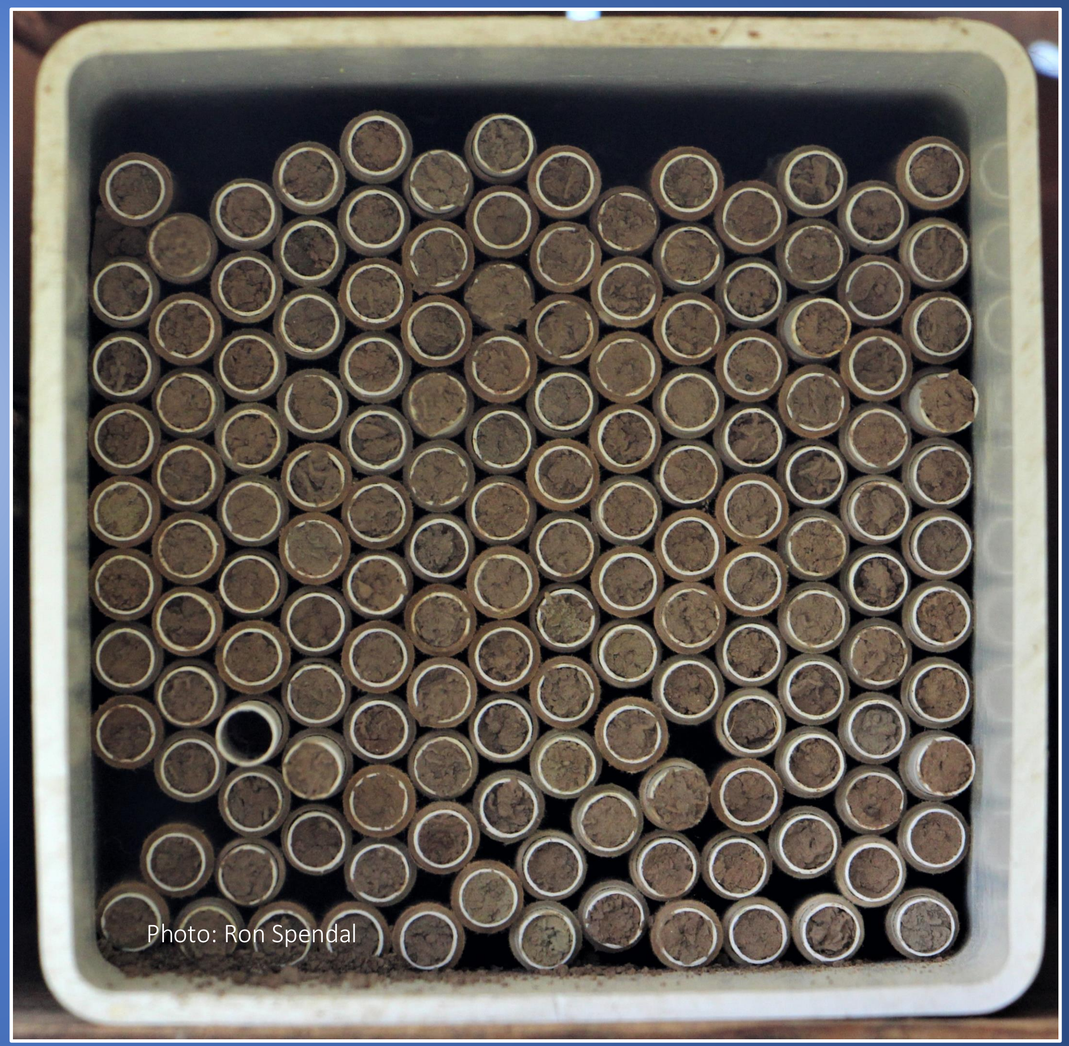
Male vs Female

Photo: Ron Spendal

Housing

Photo: Ron Spendal

Cardboard tubes with paper liners



Wooden trays with plexiglass

Mud walls, bee bread, and eggs

Photo: Ron Spendal

Pollen and nectar

Photo: Ron Spendal

Honey bees vs Mason Bees


Photo: Ron Spendal


Photo: Ron Spendal

Mud source for building cell walls

Building, provisioning and egg laying


Photo: Ron Spendal

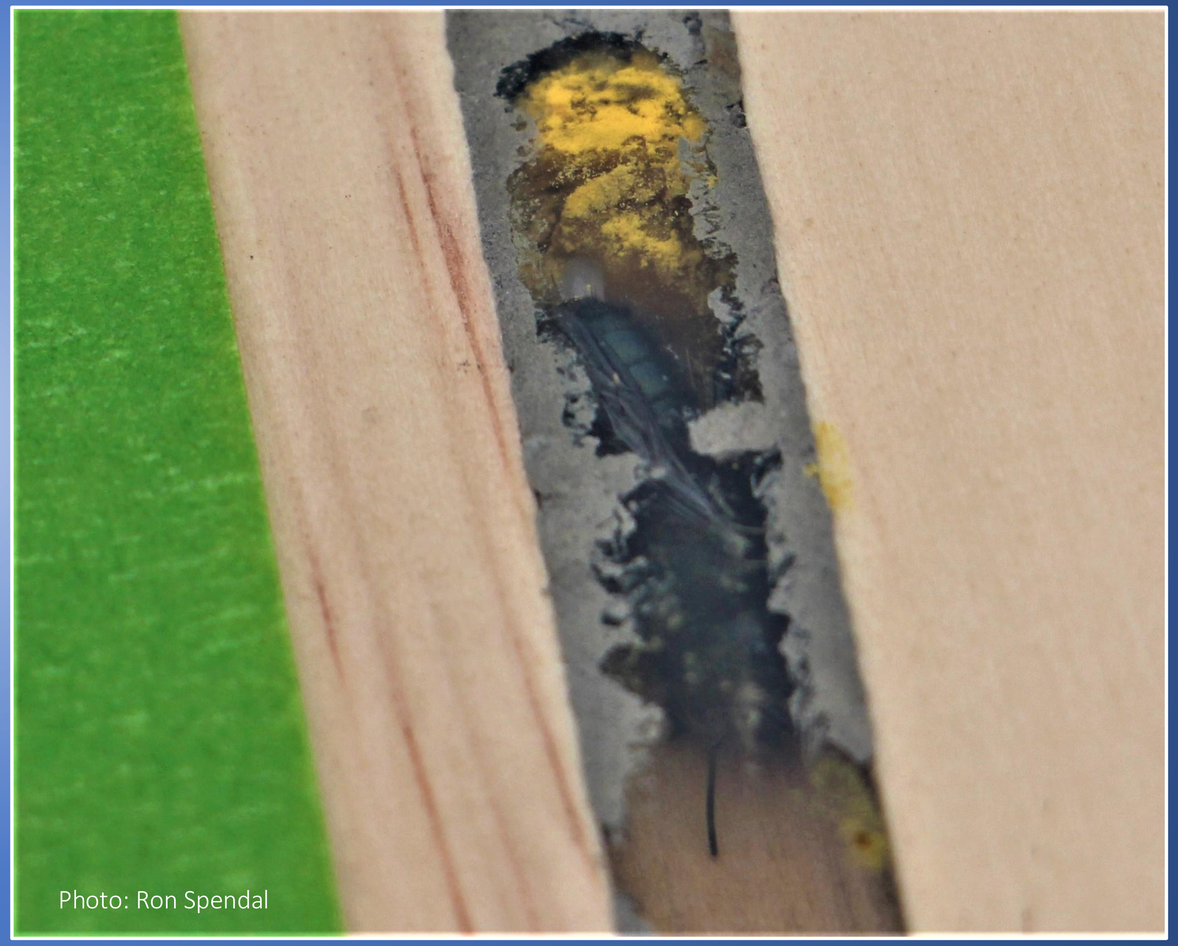


Photo: Ron Spendal

Larva to cocoon

Photo: Ron Spendal

Filled nesting trays

Cocoon cleaning

Photo: Susan Albright

Photo: Susan Albright

Clean cocoons

Photo: Ron Spendal

Emergence in Spring

Photo: Ron Spendal

Making a garden bee-friendly for native bees

Photo: Susan Albright

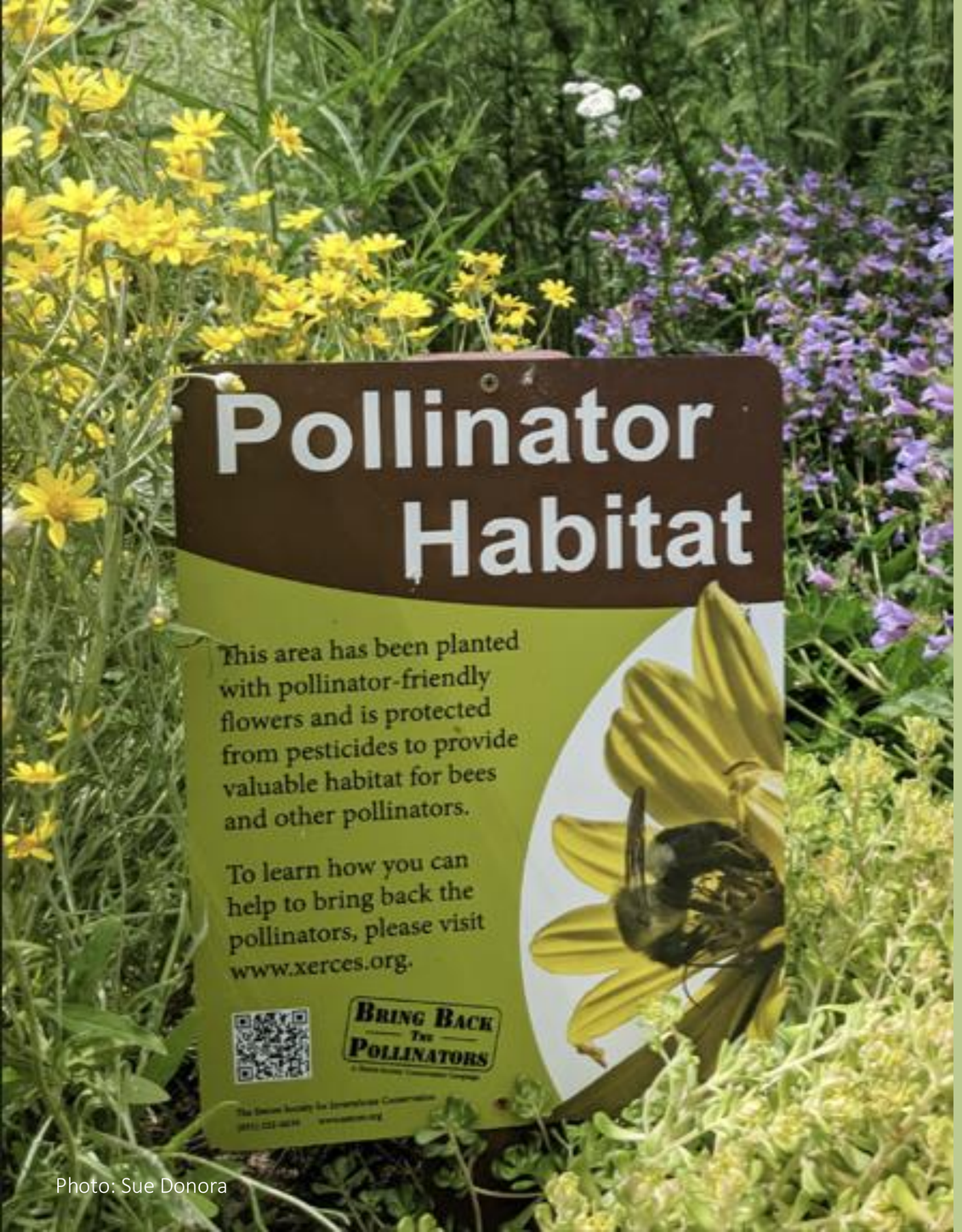


Photo: Sue Donora

Bee friendly gardens focus on:

- Safe Nesting and Overwintering Habitat
- Floral resources for pollen and nectar from late winter to late fall
- Pesticide-free

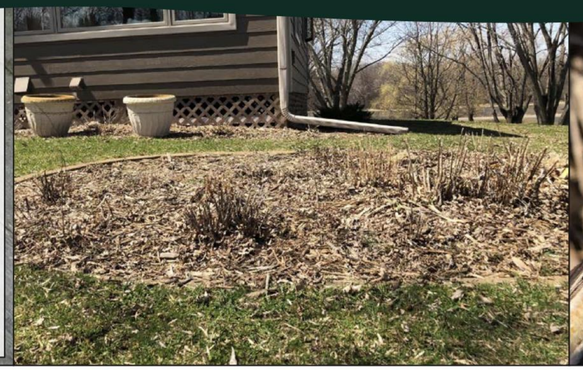
9 Steps to Creating Safe Nesting and Overwintering Habitat

Nesting & Overwintering Habitat

for Pollinators & Other Beneficial Insects

STEPS TO CREATE NESTING & OVERWINTING HABITAT:

- Save the stems
- Leave the leaves
- Redefine the "perfect" lawn
- Rethink how you use mulch
- Save a snag and "plant" a log
- Build a brush pile
- Build a rock pile or rock wall
- Provide a safe water source
- Install a habitat sign



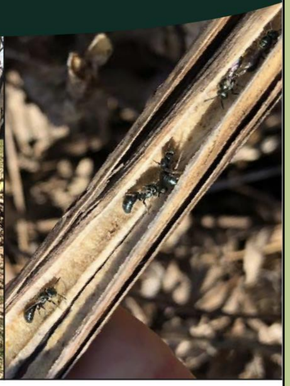


Figure 1: By selecting native plants and managing habitat purposefully, even small wildflower plots (left) can provide high-quality overwintering habitat for pollinators and beneficial insects, like these small carpenter bees hibernating in a pithy stem (right).

Moving Beyond Flowers

While flowering plants provide pollinators with food, insects also require suitable shelter for nesting and overwintering. Most bees and wasps create small nests beneath the soil or within dead plant stems or cavities in wood. Other beneficial insects such as butterflies, wasps, moths, fireflies, lady beetles, and ground beetles seek shelter in places that offer protection from predators and the elements, such as leaf litter and brush piles.

The More, The Better

The primary habitat features used by pollinators and other insects for shelter include stems and branches of trees, shrubs, and wildflowers; leaf litter; undisturbed ground; bare ground; dead wood; brush piles; and rock piles. Retaining and incorporating as many of these features as possible into your landscape (rather than "cleaning" them away) will help attract and support a diversity of bees and other beneficial insects.

Why Natural Is Best

The availability of nesting and overwintering habitat is one of the most important factors influencing populations of native bees and other beneficial insects. Yet, traditional landscaping practices rarely leave enough natural resources to support pollinators and other wildlife. This guide focuses on a variety of natural nesting habitat features that can be readily incorporated into most landscapes. Compared to artificial nesting options such as bee blocks and bee hotels, natural nesting habitat features often better mimic the natural nest site density of insects, and also break down naturally with time, limiting disease and parasite issues. Moreover, natural nesting features often provide multiple conservation benefits. An appropriately managed wildflower planting, for example, can provide nesting sites, pollen, and nectar for bees; host plants and overwintering habitat for butterflies; and abundant food for songbirds.

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.

Bring Back the Pollinators
A Xerces Society Conservation Campaign

Xerces Society for Invertebrate Conservation

1. Mimic Nature & Save the Stems

How to Create Habitat for Stem-Nesting Bees

WINTER

Leave dead flower stalks intact over the winter

SPRING

Cut back dead flower stalks leaving stem stubble of varying height, 8 to 24 inches, to provide nest cavities.

Female bees find cut or naturally occuring open stems, start a nest, then lay an egg on the pollen balls. Larvae eat the pollen.

SUMMER

New growth of the perennial hides the stem stubble.

Bee larvae develop in cut dead stems during the growing season.

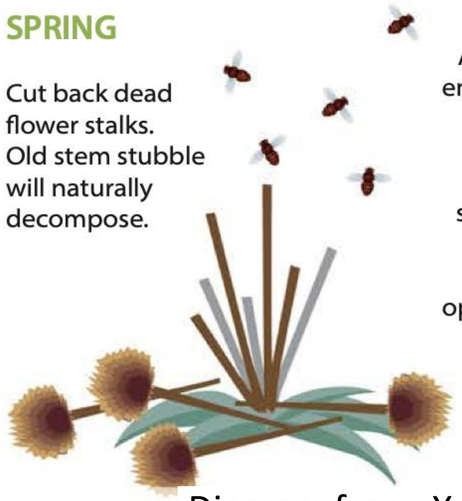
FALL

WINTER

Bees hibernate in stems during the winter

SPRING

Cut back dead flower stalks. Old stem stubble will naturally decompose.



Adult bees emerge and start nests in newly cut dead stems or in naturally occurring open stems.

Diagram from Xerces Society

2. Leave the leaves

Photo: The Xerces Society Leave the Leaves campaign

Poster photos: The Xerces Society Leave the Leaves campaign

3. Rethink How You Use Mulch

Keep mulch thickness under 1”

This is too thick for bees!!

Use leaves or light layer of compost

Avoid
plastic mulch,
weed cloth
landscape fabric

4. Provide Safe Access to Bare Ground

- Offer undisturbed bare ground in well drained and sunny location

Photo: Mace Vaughan, The Xerces Society

”Tickle Bee” nests at Sabin Elementary School - NE Portland

”Tickle Bee” coming home loaded with pollen

Photo: Matthew Shepherd, The Xerces Society

You don’t need a baseball field ...

Photo: Andony Melathopoulos, Oregon State University

... a 2’ x 3’ patch of bare ground or a shallow layer of rock will do!

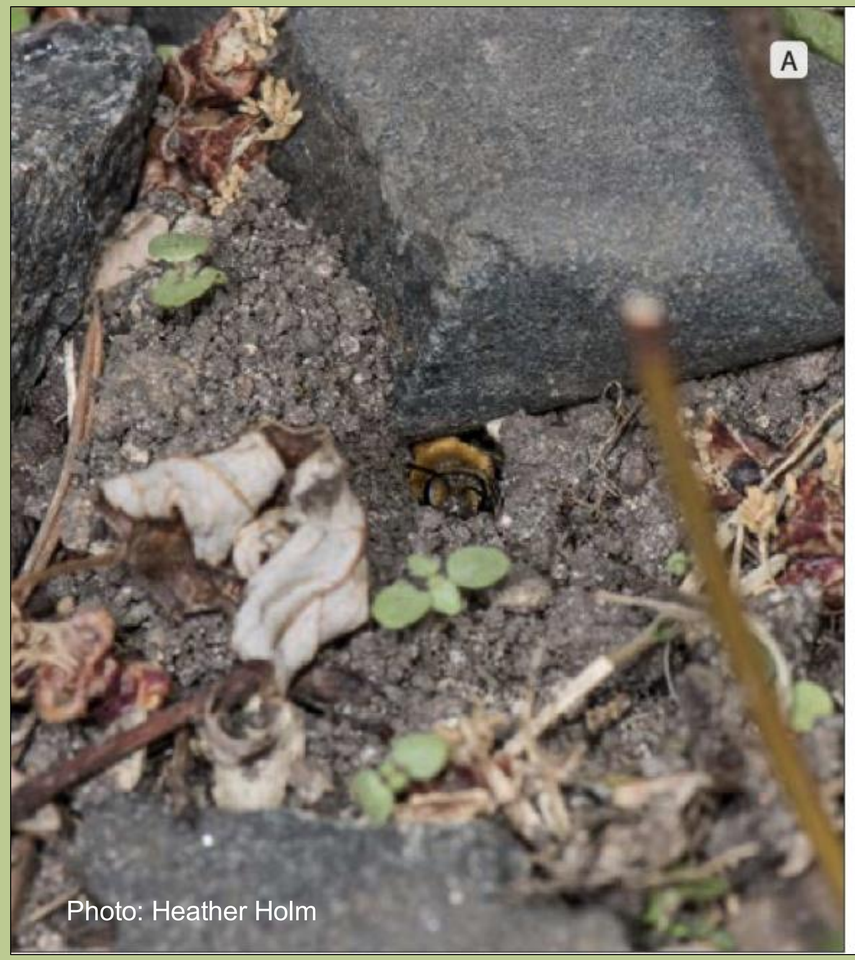
Photo: Andony Melathopoulos, Oregon State University

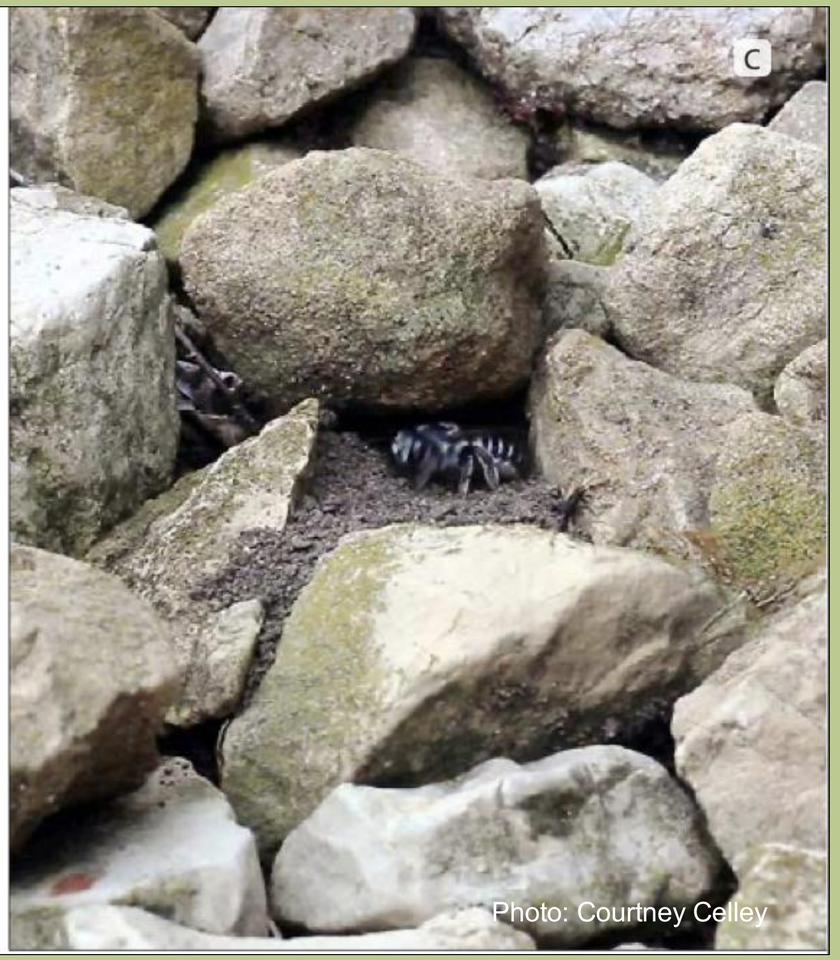
5. Build a Brush Pile

Photo: thespruce.com

6. Save Dead Wood and “Plant” a Log

7. Build a Rock Pile or Rock Wall





8. Provide Clean Water Source

- often overlooked, many pollinators need access to clean water for survival


Photo: honeyandbeekeeping.com


Photo: garden.com


Photo: pintrest


Photo: floridamuseum.ufl.edu

9. Use signs to Inform and Educate

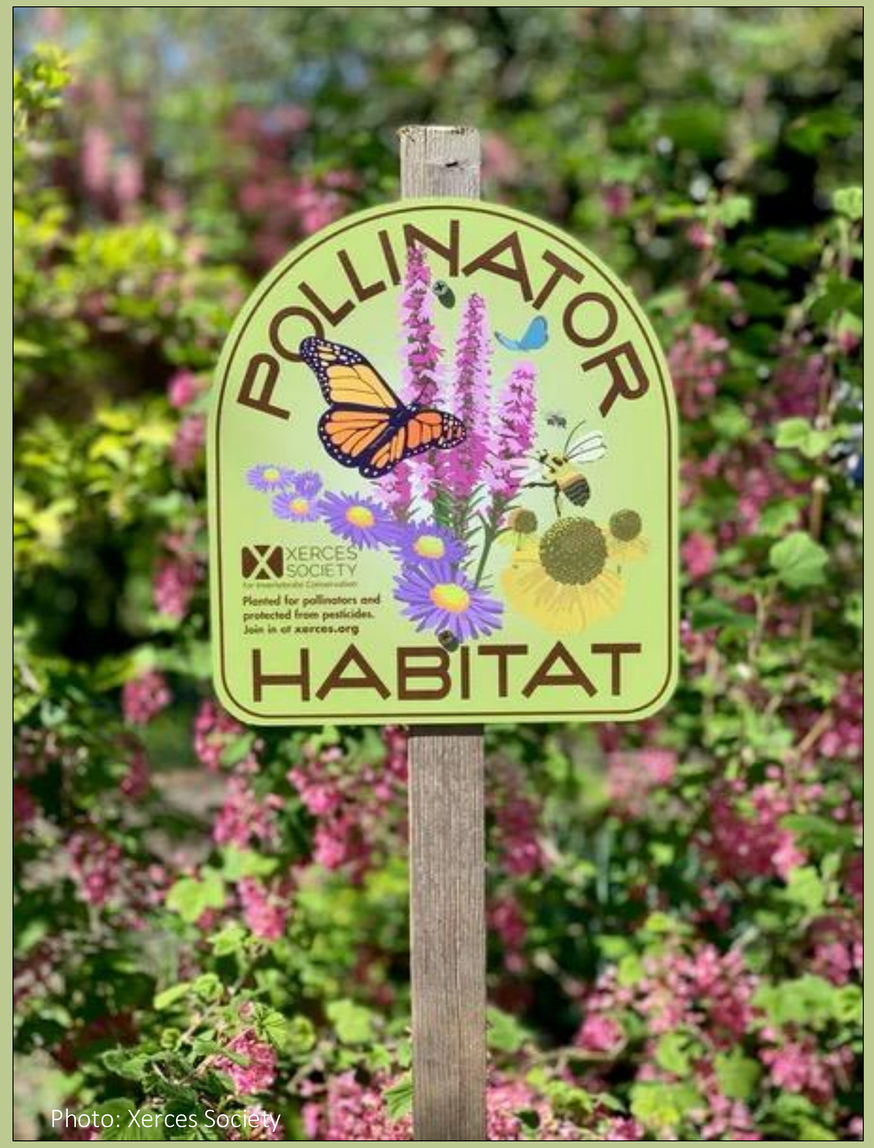


Photo: Xerces Society

Photo: Xerces Society

Pollen = Protein
Nectar = Carbs

Bees and flowers have co-evolved for millennia to fit each other's needs

Native flowers		***Bees***
Shape	→	**mouth parts for nectar sipping**
pollen size & texture	→	**body parts for pollen collection**
bloom time	→	**nest building near flowers**

What to plant for Native Bees?

- Variety of Flowers – color, shape and size
  - White, yellow, blue flower colors (reds less attractive)
  - Simple, composite, disk-shaped, urn-shaped, tubular
  - Avoid showy, double petaled
- Native plants better food source than cultivars
- Big patches (min 3 ft diameter; 30-300sq ft blocks best)

Spring

Crocus

Summer

Beardtongues (*Penstemon)*

Fall

St John’s Wort
(Hypericum perforatum)

Meadowfoam (*Limanthes)*

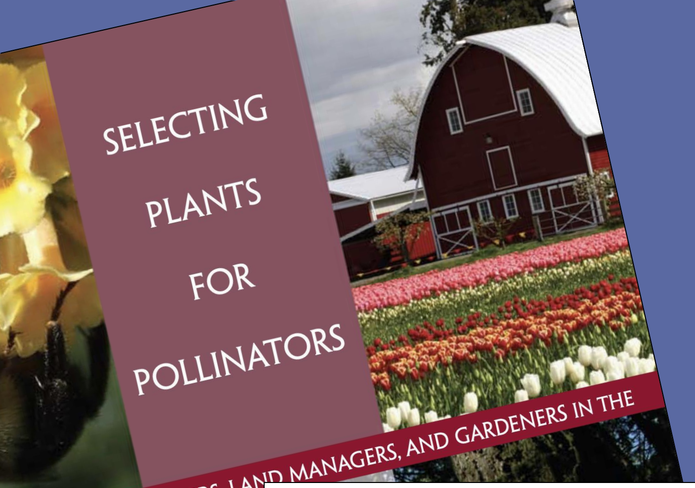
Coneflower (*Echinacea purpurea)*

Hyssop *(Agastache)*

Adapt to your situation

- Right Plant Right Place
  - most pollinator plants like full sun (6-8 hours of sun)
  - many native bees cannot travel far
- Containers can work if in sizeable patches and well-watered
- Shady gardens more challenging
  - focus on trees, shrubs and overwinter/nesting instead
- Determine best role for your garden in your neighborhood
  - Provide what your neighbors cannot
  - Promote connectivity to natural areas where possible

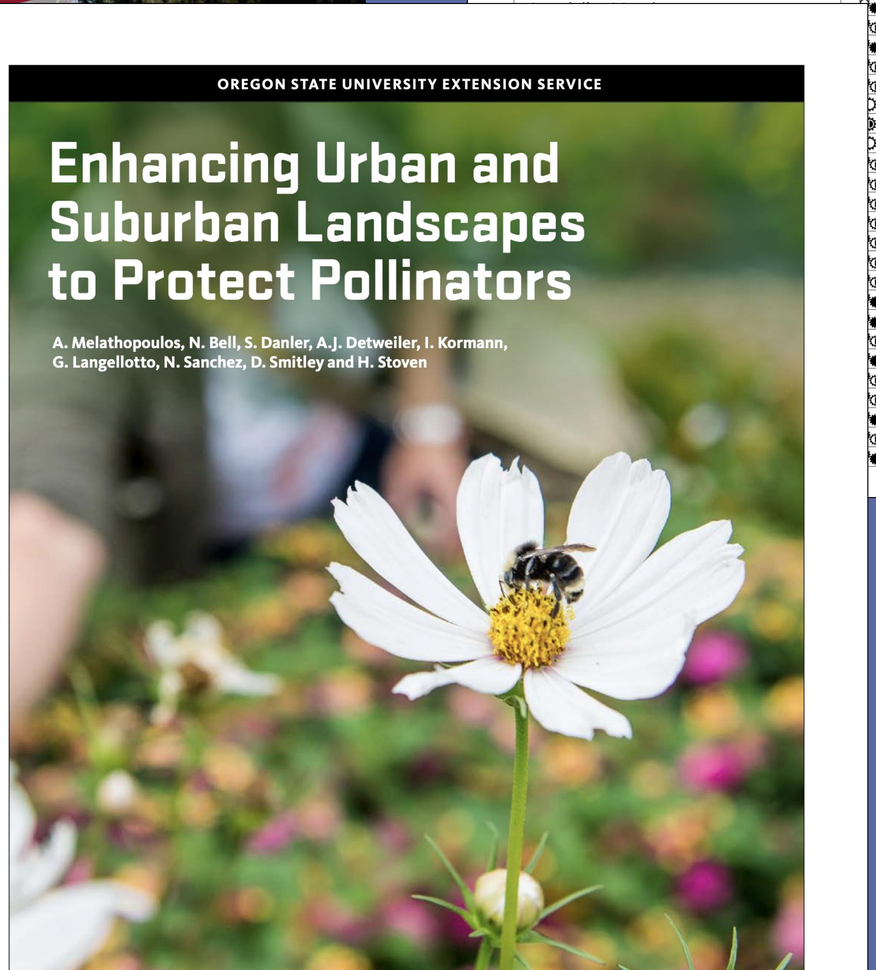
Choosing Your Plants

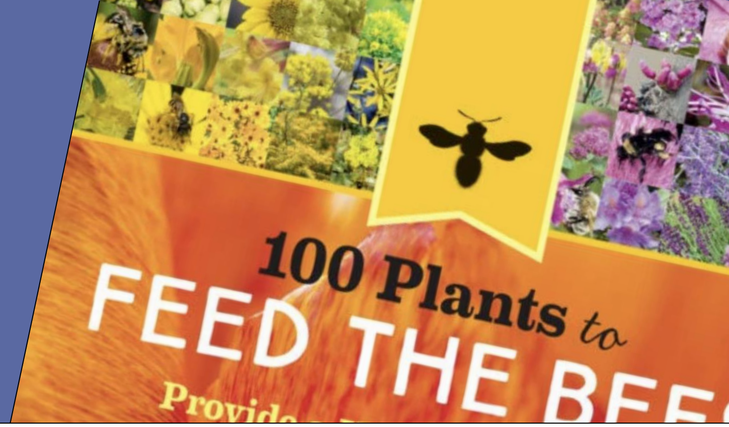


WEST MULTNOMAH
Soil & Water Conservation District

Pollinator Plants & Bloom Periods
for West Multnomah & Portland Metro Area

TREE/SHRUB SPECIES - common name (*scientific name*)	NEEDS	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG
California hazelnut (*Corylus cornuta*)		(color of flower) yellow						
native willow species (*Salix lucida, sitchensis,* and *hookeriana*)*			yellow					
Scouler's willow (*Salix scouleriana*)*								
osoberry/Indian-plum (*Oemleria cerasiformis*)								
tall Oregon-grape (*Mahonia aquifolium*) aka *Berberis*								
salmonberry (*Rubus spectabilis*)								
kinnikinnick (*Arctostaphylos uva-ursi*)*								
red elderberry (*Sambucus racemosa*)								





NATIVE PLANTS FOR POLLINATORS & BENEFICIAL INSECTS:

Maritime Northwest

LEFT— Black-tailed bumble bee (*Bombus melanopygus*) visiting *Ribes sanguineum* blossoms. RIGHT—Red admiral butterfly (*Vanessa atalanta*) on *Plectritis congesta*.

Plant Selection

These plants are attractive to a diversity of pollinators, providing pollen and nectar to bees, butterflies, flies, beetles, wasps, and moths. Some plants provide additional resources as caterpillar host plants or nesting sites and nesting materials for above-ground nesting bees. Many support specialist bees that require pollen from specific plants to survive and supplement beneficial insects that can help control pests of ornamental and crop plants. These plants are native to this region—determine if a species is native in your area at plants.usda.gov—and can be used to create or enhance pollinator habitat across rural and urban landscapes.

When purchasing plants, let your local garden center or nursery know you want plant material free of pesticides that may harm pollinators.

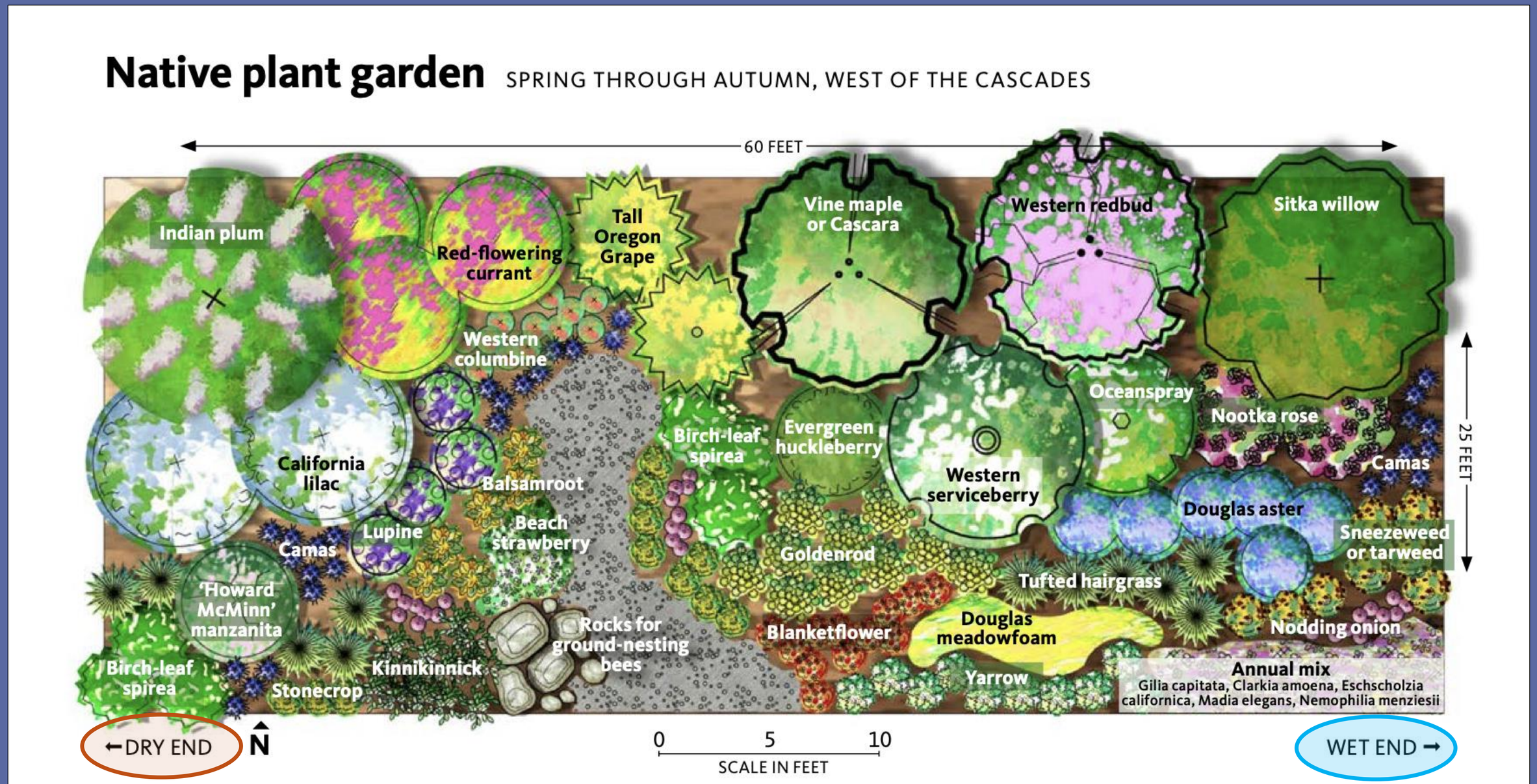
Resources

- Pollinator Conservation Resource Center: xerces.org/pollinator-resource-center
- Bring Back The Pollinators: BringBackthePollinators.org
- Reducing Pesticide Use & Impacts: xerces.org/pesticides

SCIENTIFIC NAME	COMMON NAME	BLOOM	LIFE	FORM	SUN	SOIL	ADDITIONAL DETAILS
Acer circinatum	Vine maple	Apr–May	P			D–M	
Acer macrophyllum	Bigleaf maple	Apr–May	P			D–M	
Achillea millefolium	Common yarrow	May–Jul	P			D–M	
Amelanchier alnifolia	Saskatoon serviceberry	Jun–Jul	P			D–M	
Asclepias speciosa*	Showy milkweed	May–Sep	P			D–M	
Berberis aquifolium	Oregon grape	Mar–May	P			D	
Brodiaea coronaria	Crown brodiaea	Jul–Sep	P			D–M	
Camassia leichtlinii	Large camas	Mar–May	P			M	
Camassia quamash*	Small camas	Apr–Jun	P			M–W	
Ceanothus integerrimus	Deerbrush	May–Jul	P			D	
Chamerion a. ssp. angustifolium*	Fireweed	Jul–Sep	P			D–M	
Clarkia amoena	Farewell-to-spring	Jun–Jul	A			D–M	

KEY — Life: Annual, Biennial, Perennial · Soil: Dry, Moist, Wet · ★ Staff favorite · Form: Forb, Cactus, Grass, Sedge, Shrub, Tree, Vine · Sun: Full sun, Partial sun, Full shade · Add'l. Details: Larval host (butterfly, moth), Supports specialist bee, Attracts beneficial insects, Bumble bee plant, Nest site, Nest materials, Nest thatch, Deer resistant

XERCES SOCIETY
for Invertebrate Conservation



From *Enhancing Urban and Suburban Landscapes to Protect Pollinators* – EM 9289, June 2020. OSU Extension Service publication

Plant list for each garden plan (ex: native plant garden)

- Common name
- Genus/species
- Type
- Pollinators
- Growing
- Bloom season and color

Pollinator profile: native plant garden

Three seasons of native plants attractive to pollinators

Common name	Genus/species
Osoberry, Indian-plum	*Oemleria (Osmaronia) cerasiformis*
Kinnikinnick, bearberry	*Arctostaphylos uva-ursi*
Tall Oregon grape	*Mahonia (Berberis) aquifolium*
Red-flowering currant	*Ribes sanguineum*
Sitka willow	*Salix sitchensis*
Western serviceberry	*Amelanchier alnifolia*, spp.
Douglas meadowfoam	*Limnanthes douglasii*
Manzanita	*Arctostaphylos 'Howard McMinn'*
Vine maple	*Acer circinatum*
Cascara	*Rhamnus (Frangula) purshiana*
Large camas	*Camassia leichtlinii or quamash*
Beach or woods strawberry	*Fragaria chiloensis or vesca*
Evergreen huckleberry	*Vaccinium ovatum*
Baby blue eyes	*Nemophila menziesii*
Balsamroot, mule's ears	*Balsamorhiza deltoidea*
California lilac	*Ceanothus 'Victoria', 'Julia Phelps'*
California poppy	*Eschscholzia californica*
Western redbud	*Cercis occidentalis*
Globe gilia	*Gilia capitata*
Nootka rose	*Rosa nutkana*
Blanketflower	*Gaillardia aristata*
Western columbine	*Aquilegia formosa*
Godetia, farewell to spring	*Clarkia amoena*
'Capo Blanco' broadleaf stonecrop	*Sedum spathulifolium 'Cape Blanco'*
Birchleaf spirea	*Spirea betulifolia*
Summer lupine	*Lupinus formosus*, spp.
Phacelia	*Phacelia* spp.
Oceanspray	*Holodiscus discolor*
Tufted hairgrass	*Deschampsia cespitosa*
Common yarrow	*Achillea millefolium*
Sneezeweed	*Helenium autumnale*
Nodding onion	*Allium cernuum*
California goldenrod	*Solidago californica*
Showy tarweed	*Madia elegans*
Pacific aster	*Symphyotrichum/Aster chilensis*
Douglas aster	*Symphyotrichum/Aster subspicatum*

Large camas: © Signe Danler, Oregon State University
Red columbine: © Signe Danler, Oregon State University
California goldenrod: John Rusk, *CC2.0.*

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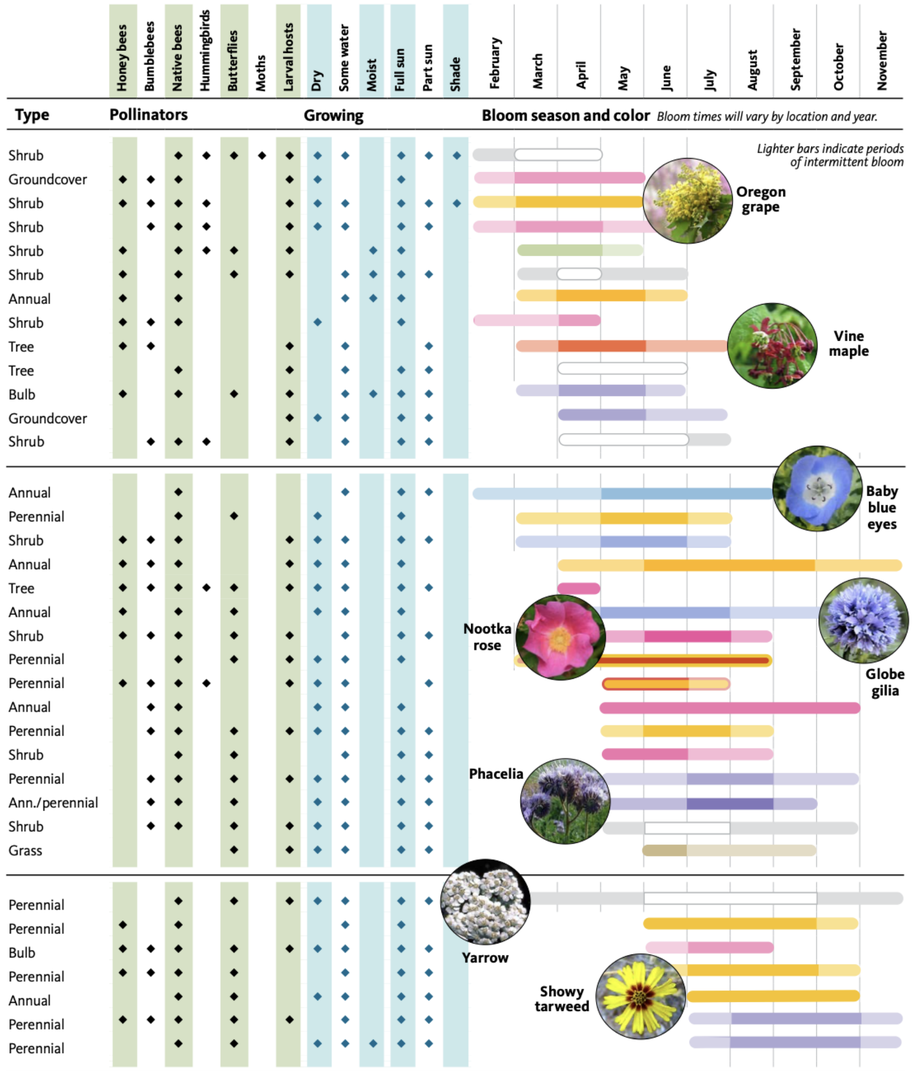

Oregon grape: Copyright 2016 © The Wild Garden: Hansen's Northwest Native Plant Database. *Vine maple:* Swallowtail Garden Seeds, *CC 2.0. Baby blue eyes:* Sureshbup, *CC BY-SA 3.0. Globe gilia:* Parande, *CC BY-SA 3.0.* Nootka rose: © The Wild Garden: Hansen's Northwest Native Plant Database. *Phacelia*: AnemoneProjectors, *CC BY-SA 2.0.* Yarrow: Dave Powell, USDA Forest Service (retired), Bugwood.org. *Showy tarweed:* © Jason Matthias Mills, *CC BY-NC-ND 3.0.*

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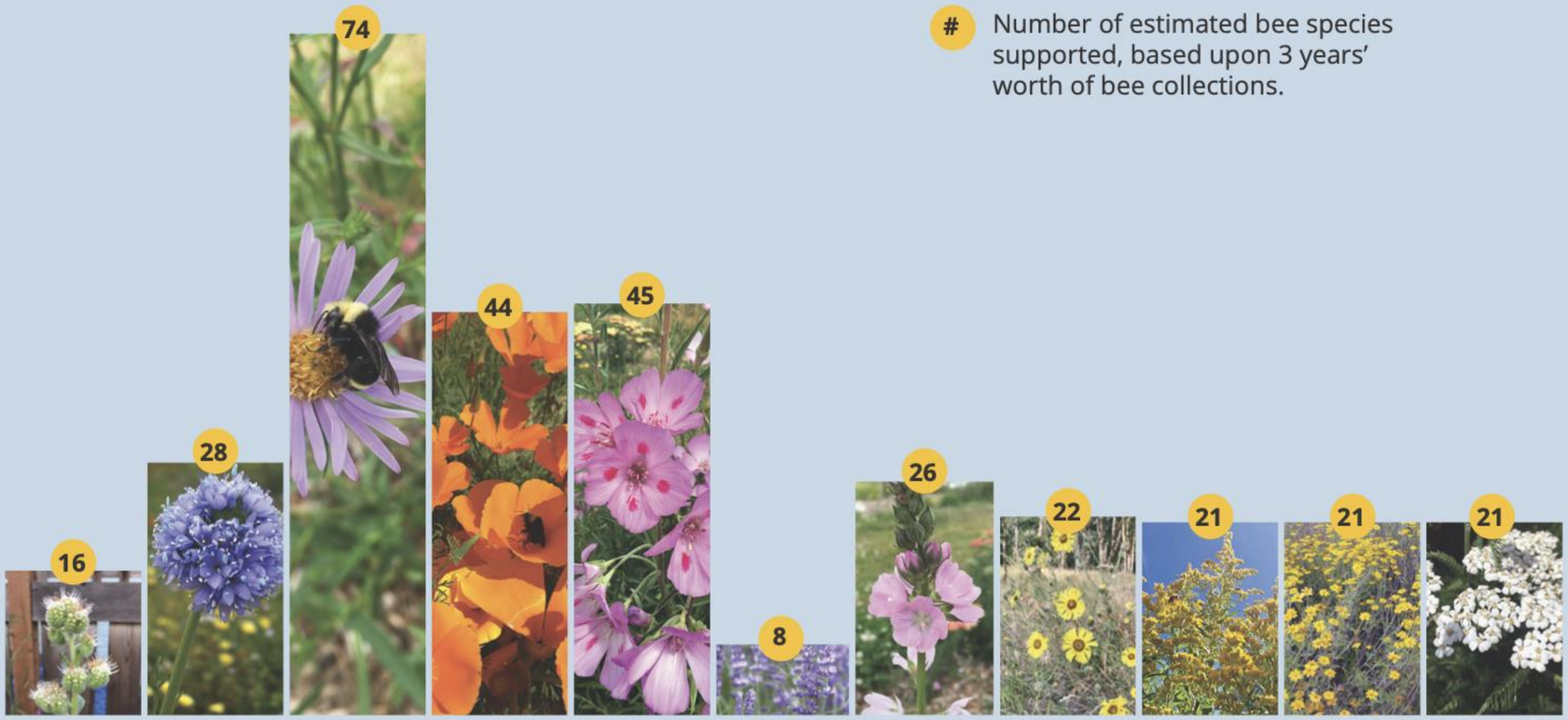
From *Enhancing Urban and Suburban Landscapes to Protect Pollinators* – EM 9289, June 2020. OSU Extension Service publication

Richness of Bee Species compared to Lavender

OSU Garden Ecology Lab study

What we found



Photos, left to right: Aaron Anderson; Creative Commons license, The Marmot; Jen Hayes; Jen Hayes; Jen Hayes; Adobe; Jen Hayes; Izzy Messer; LeAnn Locher; Gail Langellotto; Jen Hayes

Eliminate Pesticides

Environmental Effects of 30 Commonly Used Lawn Pesticides

Pesticides		Health Effects					
		Detected in Groundwater	Potential Leacher	Toxic to Birds	Toxic to Fish/ Aquatic Organisms	Toxic to Bees	Toxic to Mammals
	Herbicides						
	2,4-D*	X[1,2,3,4,7]	X[3,4]	X[1,2,3,11]	X[1,2,3,11]	X[1,11]	X[3,4,12]
	Benfluralin	X[7]		X[3,11]	X[3,11]	X[5,11]	
	Clopyralid	X[2,7]	X[2,11]	X[11]	X[11]	X[11]	
	Dicamba	X[2,7]	X[1,2,3]	X[10,11]	X[1,2,3,11]	X[3,10,11]	
	Diquat Dibromide		X[5]	X[1,3,11]	X[1,3,11]	X[5,11]	X[1]
	Dithiopyr				X[5,6,11]	X[5,11]	
	Fluazipop-p-butyl				X[1,4,6,11]	X[1,4]	
	Glyphosate*	X[8]	X[5]	X[1,3,11]	X[1,2,11]	X[11]	X[4]
	Imazapyr	X[2]	X[2,3]		X[2,5,11]	X[5,11]	
	Isoxaben		X[11]	X[11]	X[3,11]	X[11]	
	MCPA	X[4,7]	X[1,4,11]	X[1,3,11]	X[1,3,11]	X[5]	X[3]
	Mecoprop (MCPP)*	X[4]	X[1,2,3,11]	X[3,11]	X[2]	X[11]	X[3]
	Pelargonic Acid*			X[3 §]	X[3 §]	X[5]	
	Pendimethalin*	X[3,7]		X[1,3,11]	X[1,3,11]	X[5,11]	X[3]
	Triclopyr	X[2,7]	X[1,2,3,11]	X[2,3,11]	X[2,3,11]	X[5,11]	
	Trifluralin*	X[4,7]			X[3,11]	X[5,11,12]	
	Insecticides						
	Acephate		X[1]	X[1,3,10,11]	X[3,11]	X[1,3,10,11]	X[3]
	Bifenthrin*†			X[1,10,11]	X[1,10,11]	X[1,10,11]	X[1,4]
	Carbaryl	X[1,3,7]	X[11]	X[2,11]	X[1,2,3,11]	X[1,2,3,11]	X[3,11]
	Fipronil	X[7]	X[5,11]	X[2,4,10,11]	X[2,4,10,11]	X[2,4,10,11]	X[4]
	Imidacloprid ‡	X[7]	X[1,2,10,11]	X[1,2,11]	X[1,2,11]	X[1,2,10,11]	
	Malathion*	X[1,2,3,7]	X[1,3,5]	X[1,2,3,10,11]	X[1,2,3,10,11]	X[1,3,10,11]	X[3]
	Permethrin*†	X[2,7]			X[1,2,3,11]	X[1,2,3,11]	
	Trichlorfon		X[1,3,11]	X[1,3,11]	X[1,3,11]	X[1,11]	X[4 ‖]
	Fungicides						
	Azoxystrobin	X[9]	X[3,4,11]	X[11]	X[3,11]	X[11]	
	Myclobutanil	X[7]			X[5]		
	Propiconazole	X[7]	X[3]		X[3,11]	X[5,11]	X[11]
	Sulfur		X[1]	X[11]	X[11]	X[11]	
	Thiophanate methyl		X[3]		X[3,11]	X[11]	
	Ziram		X[3,4]	X[1,3,11]	X[1,3,11]	X[11]	X[3]
	Totals:	19	20	22	30	29	14

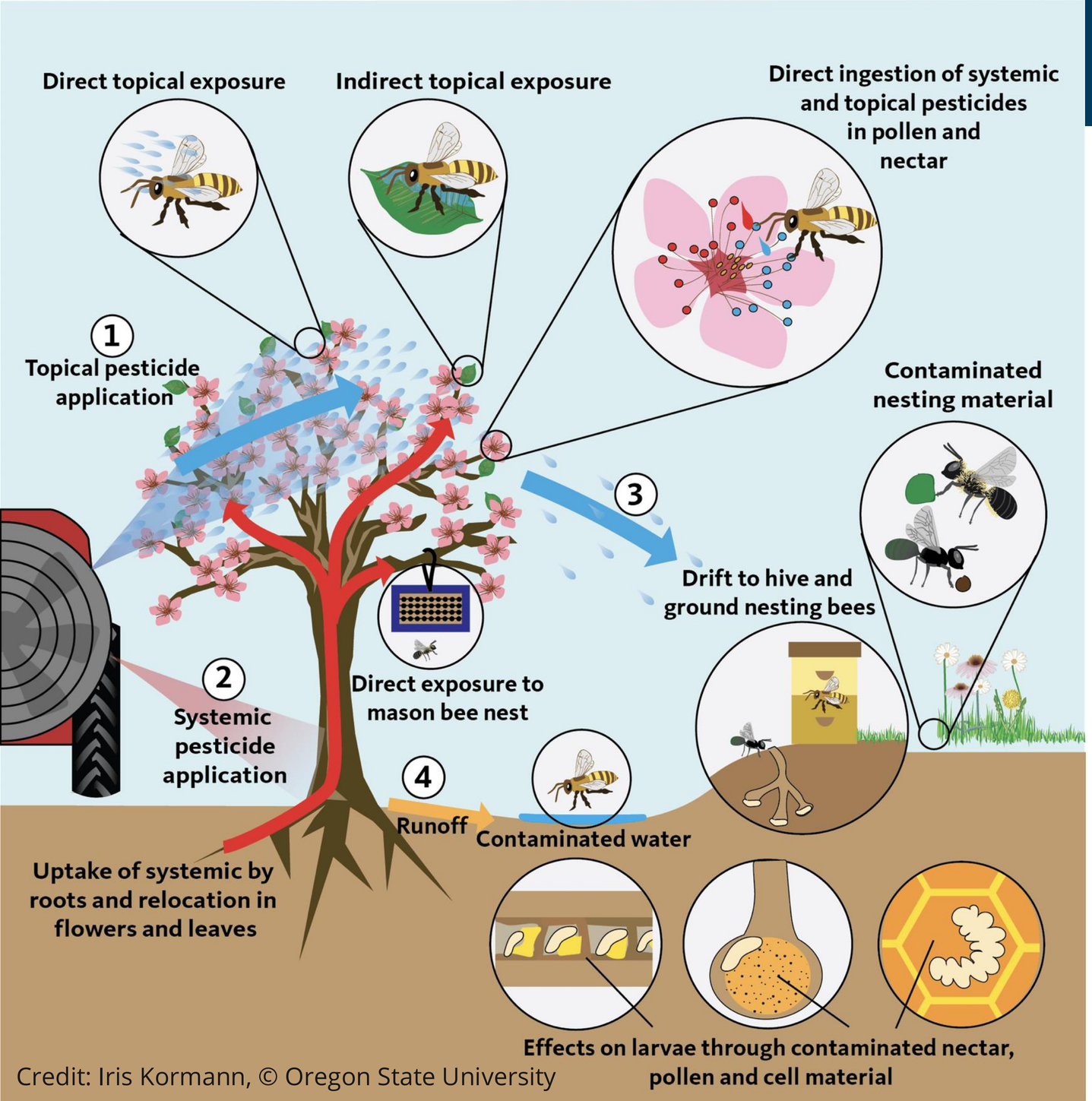
*These pesticides are among the top 10 most heavily used pesticides in the home and garden sector from 2006-2007, according to the latest sales and usage data available from EPA (2011), available at http://www.epa.gov/opp00001/pestsales/07pestsales/market_estimates2007.pdf.
† EPA lists all synthetic pyrethroids under the same category. While all synthetic pyrethroids have similar toxicological profiles, some may be more or less toxic in certain categories than others. See Beyond Pesticides' synthetic pyrethroid fact sheet at bit.ly/TLBuP8 for additional information.
‡ Imidacloprid is a systemic insecticide in the neonicotinoid chemical class, which is linked to bee decline.
§ Based on soap salts.
‖ Based on in-vitro mammalian cell study.

Source: Beyond Pesticides Fact Sheet, 2015

Pesticide Type	Common Brands	Active Ingredients	Classifications	Non-Targeted Organisms and Systems Affected
Insecticide	Spectracide Triazicide Insect Killer	Gamma-cyhalothrin	Pyrethroid	Highly toxic to mammals, bees, and aquatic organisms. Moderately toxic to birds.
Insecticide	Bonide Insect & Grub Control Granules	Imidacloprid, Lambda-cyhalothrin	Neonicotinoid, Pyrethroid	Birds, aquatic organisms, bees, and fish.
Insecticide	BioAdvanced Complete Insect Killer	Imidacloprid, Beta-cyfluthrin	Neonicotinoid, Pyrethroid	Birds, aquatic organisms, bees, and fish.
Insecticide	Ortho Bug B Gon	Bifenthrin	Pyrethroid	Fish, aquatic organisms, birds, and mammals
Herbicide	Roundup	Glyphosate, POEA surfactant	Glyphosate	Aquatic organisms and bees.
Herbicide	Roundup for Lawns (Northern version)	MCPA, Dicamba, Sulfentrazone, Quinclorac	Benzoic Acid, Aryl Trianone, Acetolactate Synthase Inhibitor	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater.
Herbicide	Roundup for Lawns (Southern version)	Sulfentrazone, Dicamba, 2,4-D, Penoxsulam	Benzoic Acid, Aryl Trianone, Phenoxy Acid, Acetolactate Synthase Inhibitor	Birds, aquatic organisms, bees, and mammals. Slightly toxic to crustaceans
Herbicide	Ortho Weed B Gon	Dicamba, 2,4-D	Benzoic Acid, Phenoxy Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Herbicide	Bayer Advanced Weed Killer for Lawns	MCPA, Dicamba	Phenoxy Acid, Benzoic Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Herbicide	Bonide Weed Beater Plus	Dicamba, 2,4-D	Benzoic Acid, Phenoxy Acid	Birds, aquatic organisms, bees, and mammals. Leaches into groundwater
Fungicide	BioAdvanced Fungus Control	Propiconazole	Triazole	Fish. Has synergistic effects with neonicotinoids harming bees
Fungicide	Spectracide Immunox Multi-purpose Fungicide	Myclobutanil	Triazole	Toxic to aquatic organisms. Leaches into groundwater

Source: Braelei Hardt, NWF blog, updated 2024

Pesticide Exposure



Credit: Iris Kormann, © Oregon State University

- agriculture
- forestry
- mosquito control
- landscape management

Type of pesticide → target

- Insecticide → insect pests
- Herbicide → weedy plants
- Fungicide → plant disease

Avoid Plants and Seeds Treated with Systemic Pesticides like Neonicotinoids

Nursery plants can contain pesticides

When purchasing plants, ask for pesticide free plants and accept cosmetic imperfections!

Examples of Neonics:

Acetamiprid, Clothianidin, Dinotefuran, Imidacloprid, Thiacloprid, Thiamethoxam

Photo: Sharon Selvaggio, Xerces Society

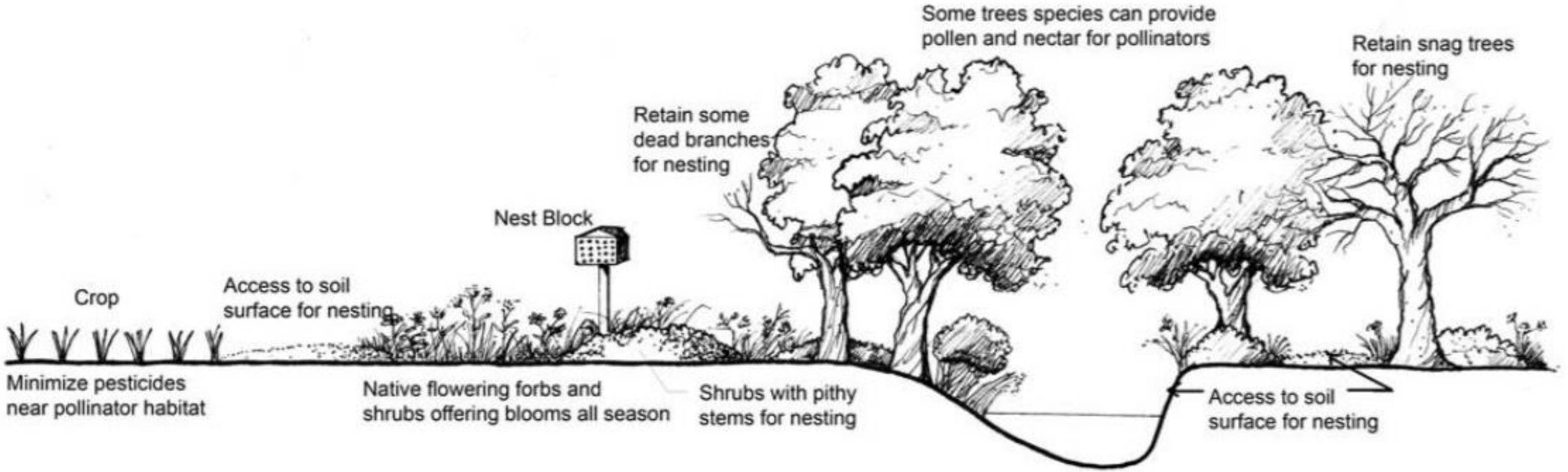
Other Actions to Take

- Practice IPM
- Learn to ID insects
- Pay attention to active ingredients not marketing labels
- Reduce lawn & plant natives
- Buy disease-resistant plants
- Take the Metro Pledge
- Display Pesticide Free sign

Figure 15. Pesticide labeling. These insecticide products contain the same ingredient and are equally toxic to bees.

Credit: Iris Kormann, © Oregon State University

Bringing it all together



USDA *National Agroforestry Illustration*

Strive to buy pesticide free plants and seeds!

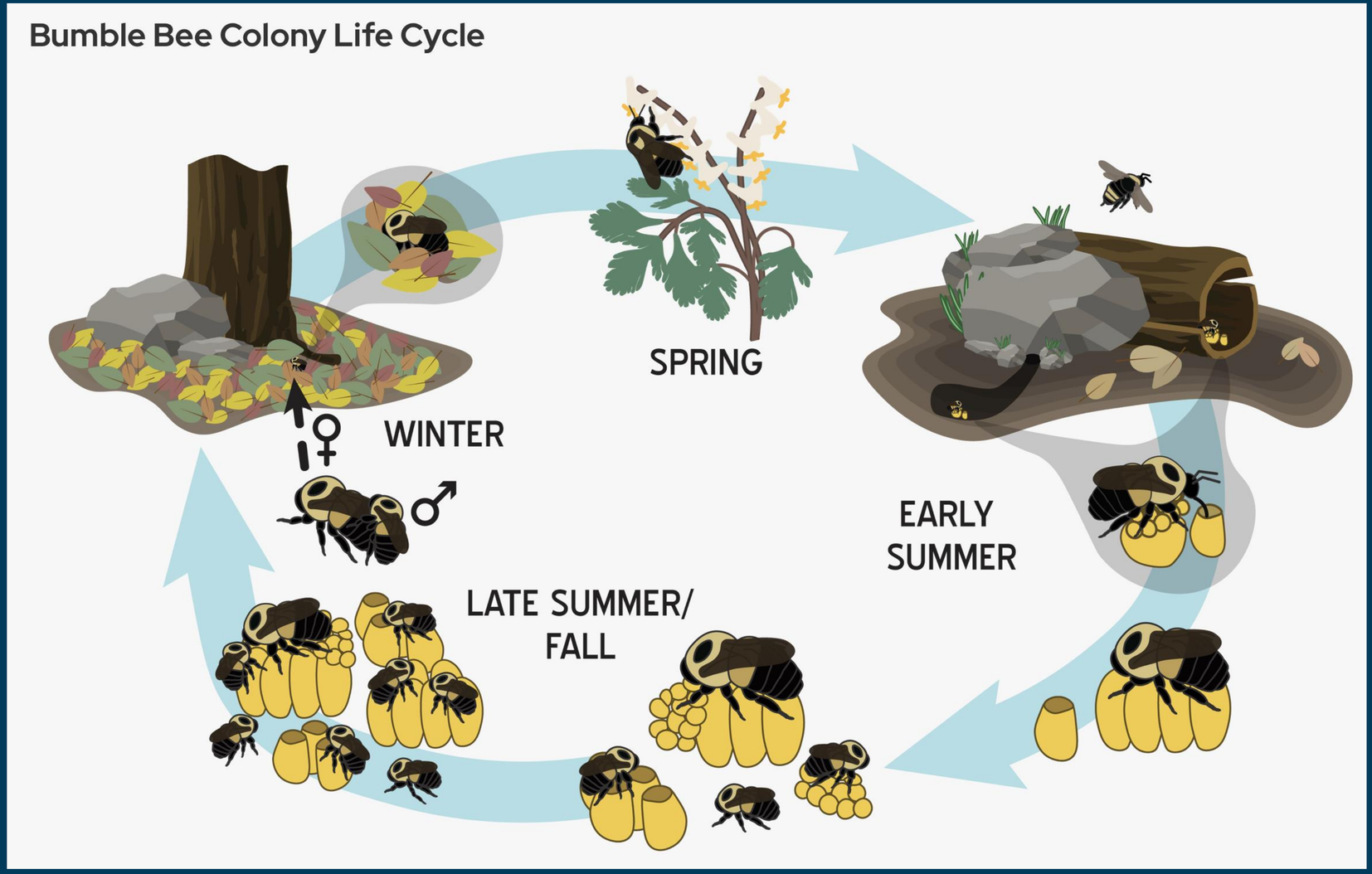
Photo: Susan Albright

Who might visit your garden?

Social bees (10%)

- includes honey bees and bumble bees
- Queen, worker, drones
- live in colonies or hives
- nest below ground or above ground

Bumble bee colony life cycle



https://wisconsinbumblebees.entomology.wisc.edu/about-bumble-bees/life-cycle-and-development/

Honey bee
Apis mellifera

Photo courtesy of Oregon Department of Agriculture

Active: all year
Nest: cavity below or above ground; large colonies of 60,000 to 80,000
Pollen: carried as moist lump on rear leg (corbicula)

- not native
- only bee that produces honey consumed by humans

Native blanketflower
(*Galliardia aristata*)

Bumble bee
Bombus

Active: late winter to late fall

Nest: abandoned rodent nest, irrigation boxes, empty bird houses

Pollen: carried as moist lump on rear leg (corbicula)

Photo courtesy of Oregon Department of Agriculture

Yellow-faced bumble bee – *Bombus vosnesenskii*

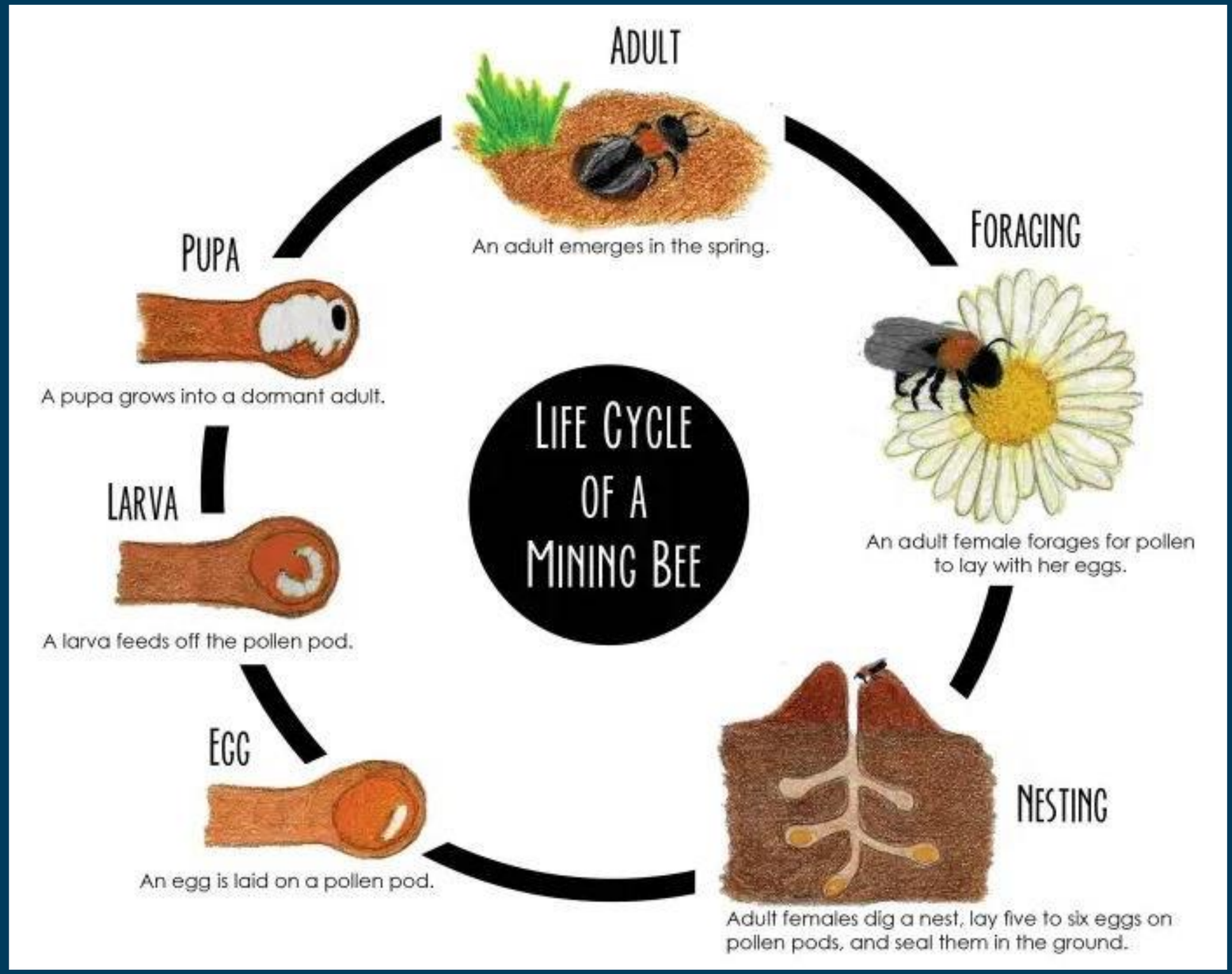
Black-tailed bumble bee - *Bombus melanopygus* on Crocus

Video: Susan Albright

Solitary bees (90%)

- solitary or eusocial
- nest above or below ground
- live about one year
- only active as adults for 3-8 weeks
- forage about 300 yards from nest

life cycle



The life cycle of a mining bee, (c)G. M. Cottrill

70% of solitary bees are ground nesters

- bare, undisturbed ground
- sunny, sloped location
- areas with leaf layers or small rocks

Long-horned bee
Melissodes

Active: summer and fall
Nest: in ground
Pollen: carried dry on rear legs; huge pollen brushes

males 9:30AM

Photos and video: Susan Albright

female 9:30AM

Black-eyed Susan
(*Rudbeckia*)

female

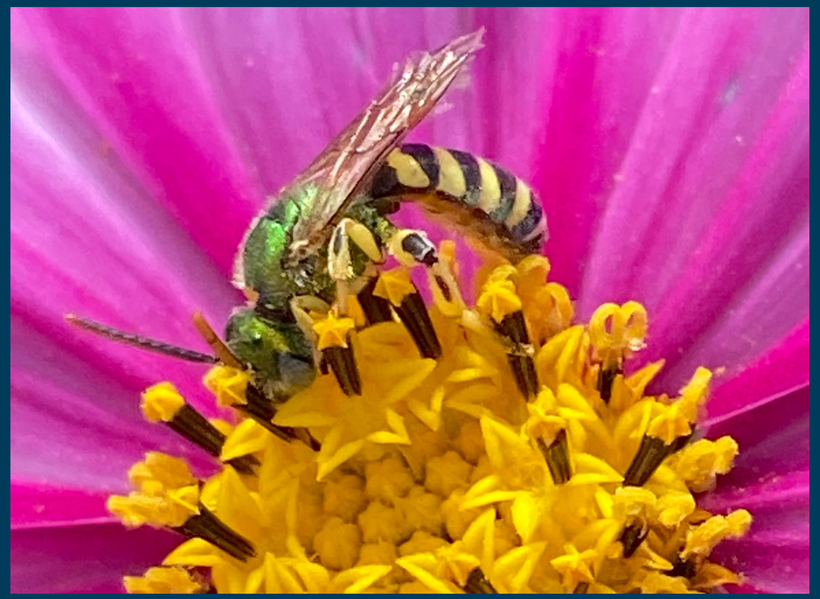
male

Douglas Aster ‘Sauvie Snow’)
(*Symphyotrichum subspicatum* ‘Sauvie Snow’)

Native tickseed
(*Coreopsis tinctoria*)

Green metallic sweat bee
Agapostemon

Active: summer and early fall
Nest: in ground; some species in communal nests (one front door, several apartments)
Pollen: carried dry on rear legs

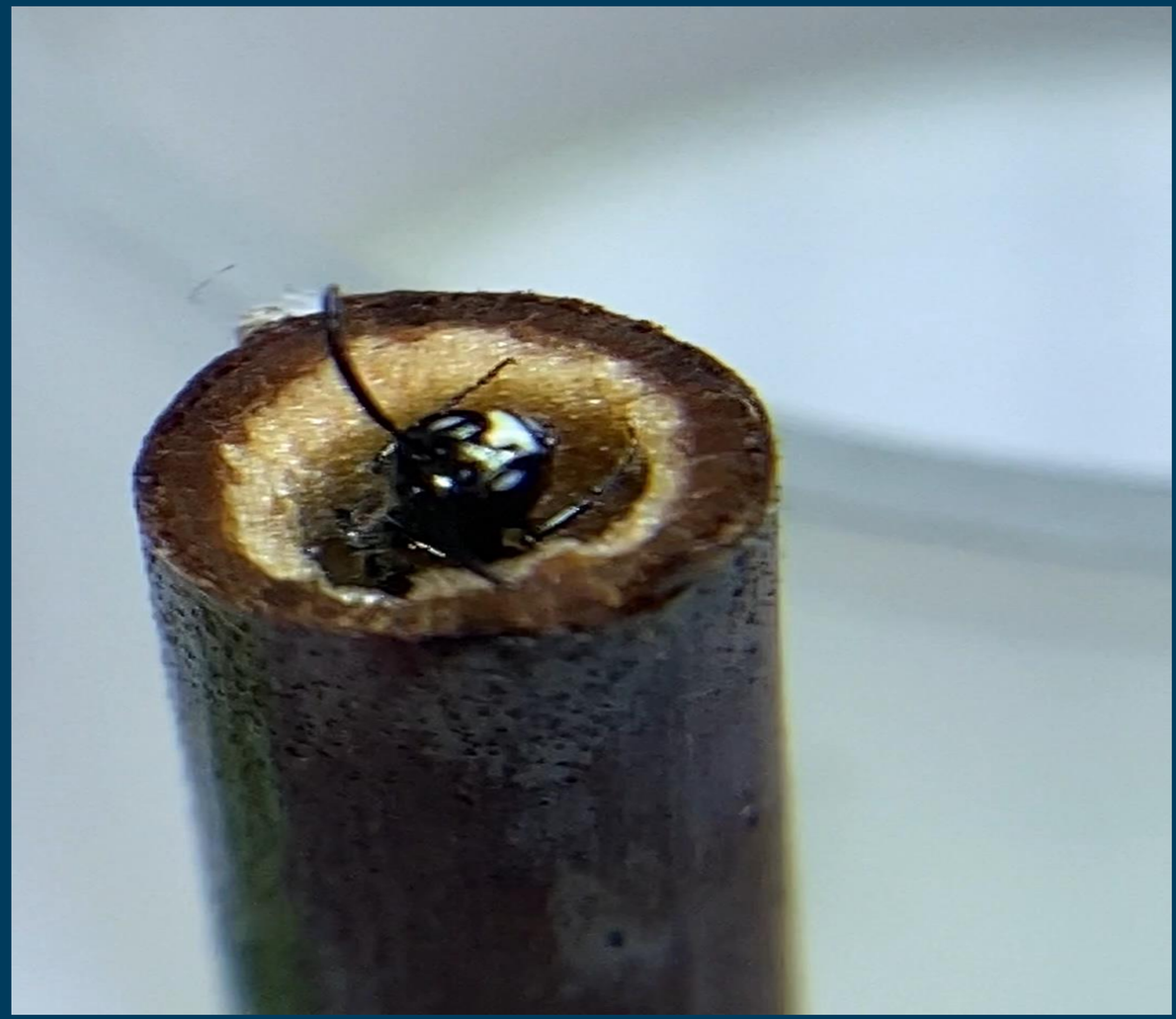


The ‘Bling’ Bee

Agapostemon on native blanketflower (*Galliardia aristata*)

30% of solitary bees are cavity nesters

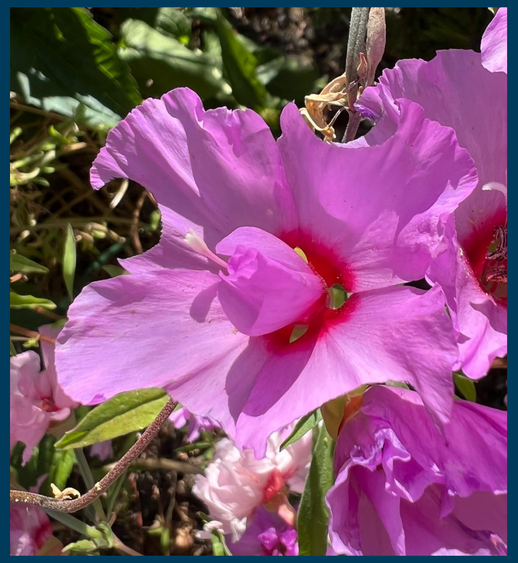
- plants with pithy stems like blackberries and sunflowers
- holes in stumps made by beetles
- man-made structures



Leafcutter bee
Megachile

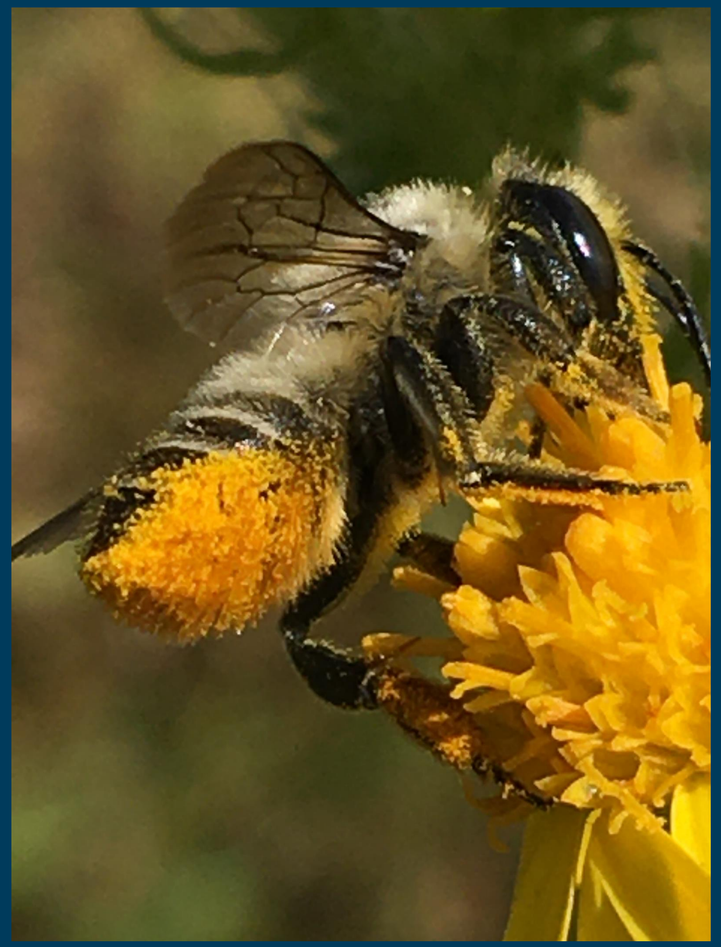
Active: spring, summer
Nest: in cavity, nesting cells lined with leaf or petal discs.
Pollen: carried dry on special hairs (scopa) on underside of abdomen


Milkweed (*Asclepias)*




Farewell-to-spring
(*Clarkia amoena)*

Photos and video: Susan Albright



Bishop’s hat (*Epimedium)*

Photo: Susan Albright

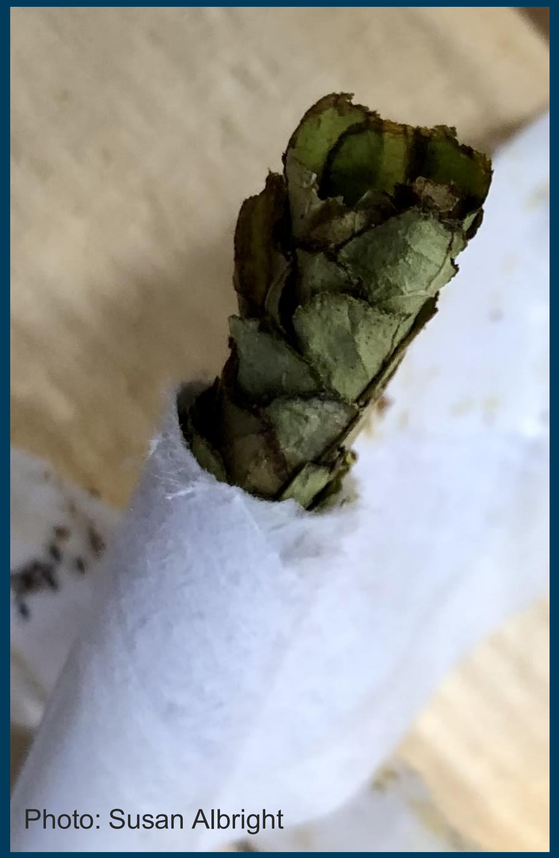


Photo: Susan Albright

Something cutting holes on leaves?
Celebrate!!

Wool Carder bee
Anthidium manicatum

Active: summer to fall

Nest: in cavity, nesting cells lined with plant hairs

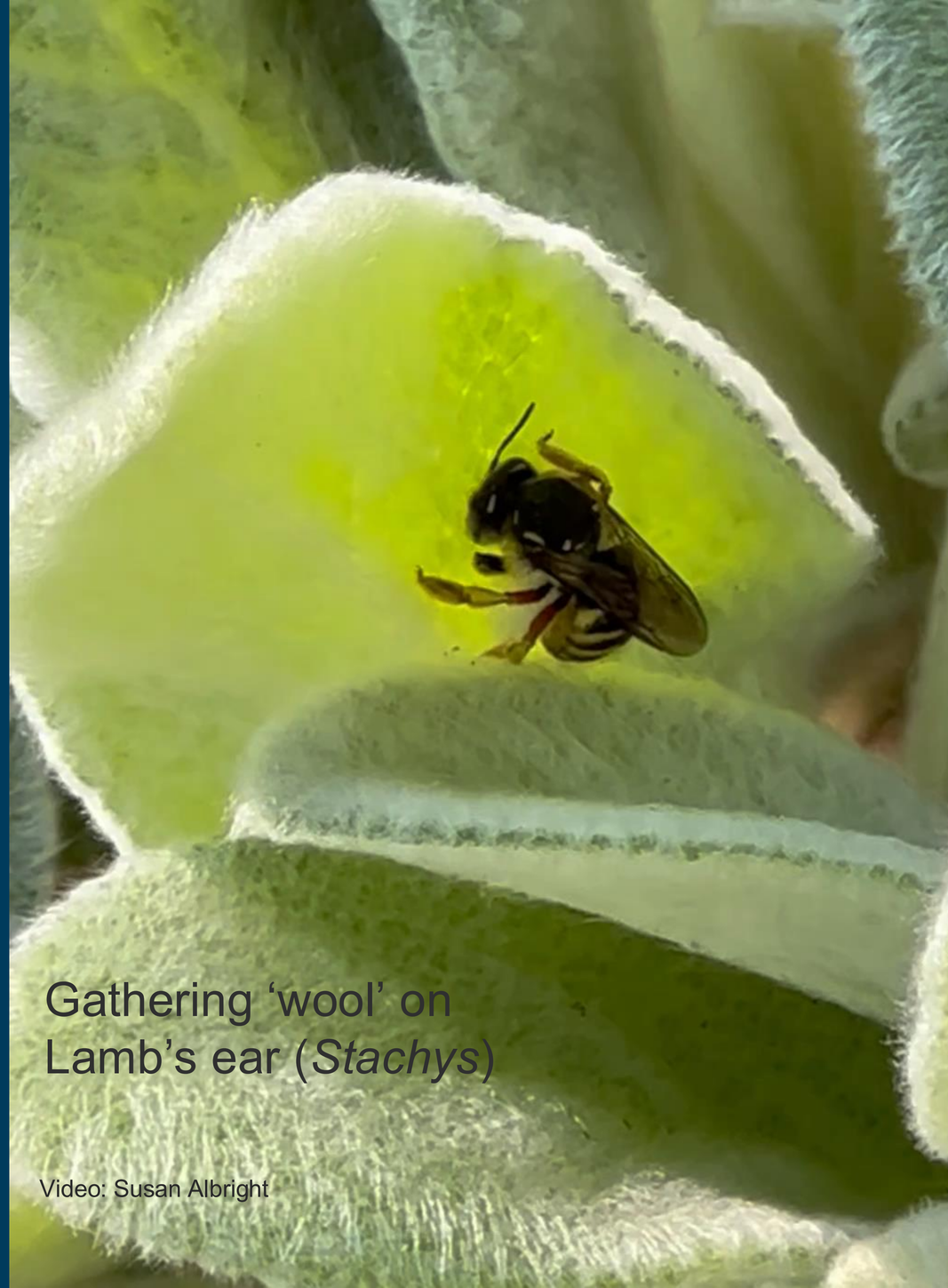
Pollen: carried dry on special hairs (scopa) on underside of abdomen

Photo courtesy of Oregon Department of Agriculture

Most commonly seen are non-native

nest

Photo: Susan Albright



Gathering ‘wool’ on Lamb’s ear (*Stachys*)

Video: Susan Albright

And then there's Cuckoo bees (*Kleptoparisitic*)

Active: summer
Nest: use host's nest to lay eggs
Pollen: no pollen carrying features

Unlike other bees, this group is united by behavior rather than physical characteristics

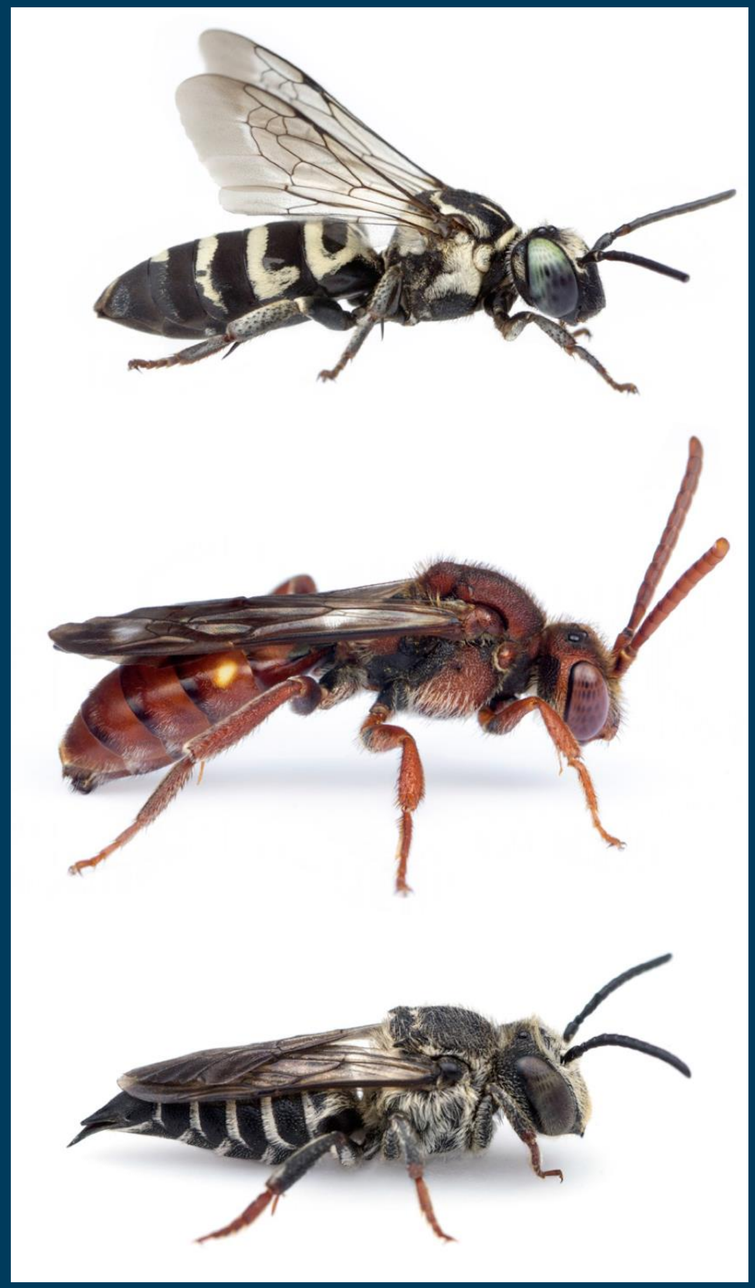


Photo Courtesy of Oregon Department of Agriculture

"We have to raise the bar on our landscapes. In the past, we have asked one thing of our gardens: that they be pretty. Now they have to support life, sequester carbon, feed pollinators and manage water."

Douglas W. Tallamy, PhD
Professor of Entomology and Wildlife Ecology
University of Delaware, 2015

“The beauty of a plant is not just the plant itself, but all of the other organisms it can bring into your garden.”

Gail Langellotto, PhD
Professor of Horticulture and
Director, Garden Ecology Lab
Oregon State University

What questions do you have?

Metro area Master Gardener™ Program

Oregon State University
Extension Service

Remainder of Workshop

2:10-2:25pm	Break and walk to Education Garden
2:30-2:50pm	WCMGA Education Garden at PCC Rock Creek • Observe Mason Bees • Look for bees / pollinators in the garden
2:50-3:00pm	Walk back to classroom. Complete evaluations.

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Metro area Master Gardener™ Program

Oregon State University
Extension Service