

Plant It and They Will Come

**Gardening from a Native Bee's
Perspective**

Which bee is the most effective at pollinating tomatoes?

- 1) Honeybee
- 2) Bumblebee
- 3) I don't know





You are welcome to photograph,
and the talk will be available as a
PDF on the garden club website.



Why am I here today?

Because of a gardening podcast-

- Margaret Roach Podcast: “A Way To Garden” at awaytogarden.com

August 5, 2019 Professor Robert Gegear-
”Beecology: How You Can Help Native Bees”

Another good gardening podcast series:

- Joe Lamp’l hosts The Joe Gardener Show: joegardener.com/podcasts
- Also “Growing A Greener World” TV show

A Way to Garden



robinhoodradio





Generally solitary
(except bumblebees)

Only females sting,
but rarely. Most
species cannot sting.

Nest in holes in
ground made by
other animals or
clumps of grass
(bbees), tunnel in
bare soil or patchy
vegetation, rotting
wood with holes,
hollow stems (etc.
elderberry, brambles,
sumac), beetle holes.

340 Native Bee Species in CT (Dr. Kim Stoner, CT Ag Station)



Bombus variabilis
Eastern Bumblebee

~50 species

Bumblebee in
North America

16 species in CT

Bumblebee=

Humblebee=

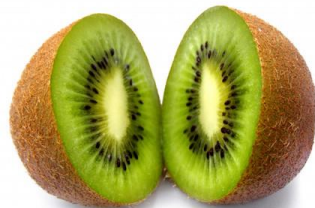
Dumbledore

<https://beecology.wpi.edu>, Visualize the data for Diversity in New Haven, to determine most common bumblebee species, US Geological Survey of Bees Lab for photo of *Bombus variabilis*

Why should we care about bees?



- **One of every third bite of food relies upon bees**
- Economic: Insect pollinators contributed \$29 billion to U.S. Farm Income in 2010, \$19 billion from honeybees, \$10 billion from native bees
- Variety: >75% of top 115 crops require or benefit from pollinators, but not wheat, corn or rice, which are wind pollinated
- Quality: Pollinator Dependent Fruits, Vegetables and Nuts provide over 90% of Vitamin C, 70% of Vitamin A, 55% of Folic Acid and 74% of Lipids



Local dependence on bee pollination-



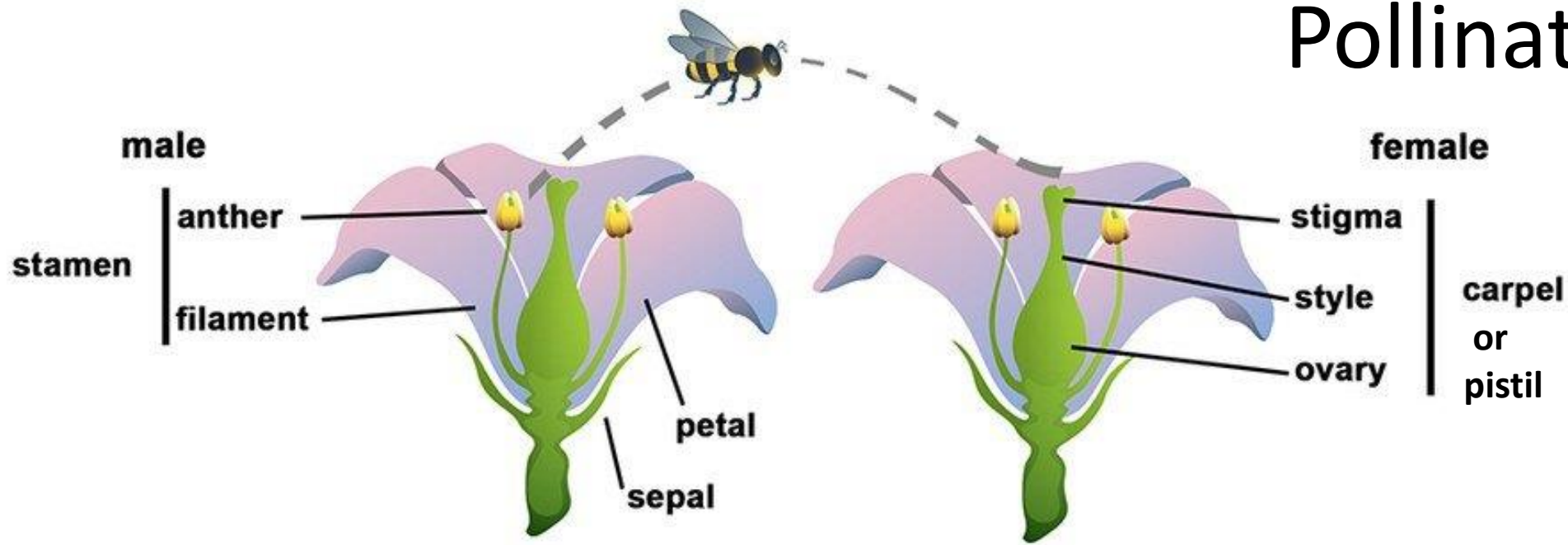
Branford Community Gardens and Branford Garden Club



Plant, Produce and Flower Sales on the Green will be May 16, August 22 and September 19, 2020, Pie sale early October



Pollination 101



Cross Pollination- Pollen goes from male on one plant to female on another plant. Evolutionarily favored -produces genetic mixing.

Self Pollination-Pollen goes from male to female on same plant.
“Back-up” system, a last resort, preferable to no reproduction at all.

Bees See Flowers as a Resource, Flowers See Bees as Tools



Flowers need Pollination

- Produce nectar to entice the bee, but the flower is “rigged”

Bees need Food

- Pollen = Reproduction
 - Bee Larvae eat Pollen (Protein Source)
- Nectar = Survival
 - Energy to fly



Bumblebee with pollen load

Coevolution of Bee and Plant



- Monarch butterflies need *Asclepias* (Milkweed)



15 % of
Northeastern
native bees are
pollen specialists

LIKE



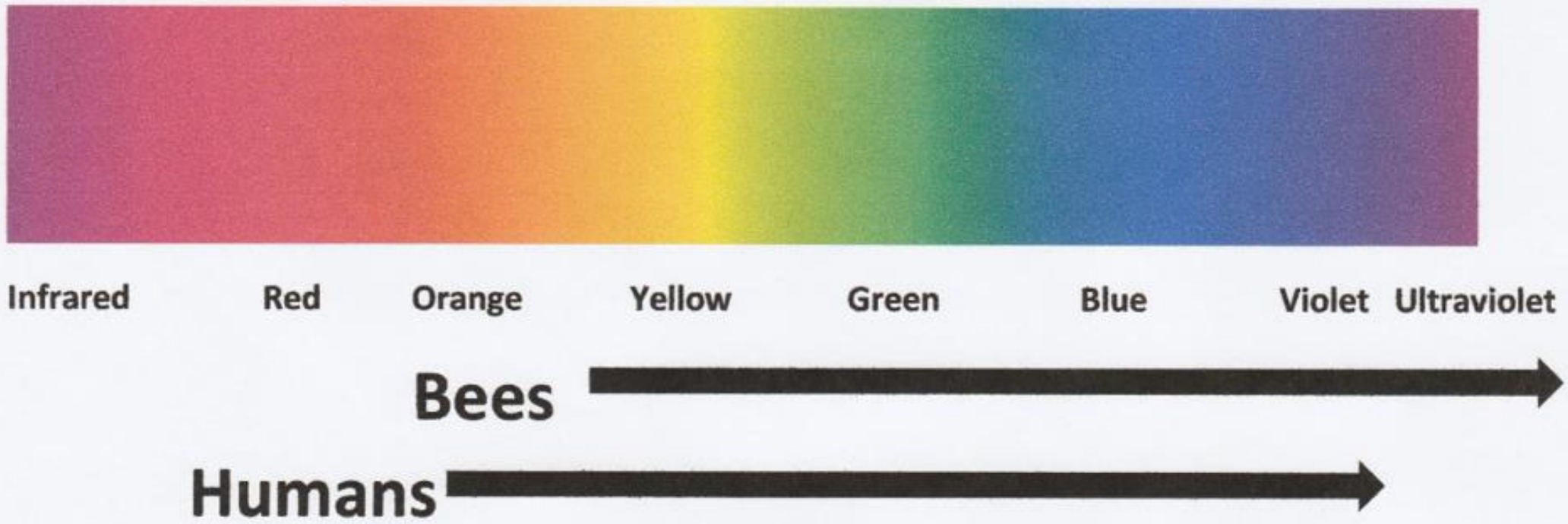
- 11 species of
Northeastern native
bees need *Solidago*
(Goldenrod) pollen



Colletes solidaginis,
Goldenrod Cellophane bee

What does a bee see?

Bee Vision vs. Human Vision



The bee sees...

- Nectar guides in visible spectrum



Visible spectrum

Under UV light

- Nectar guides—Bullseye pattern

Tripleurospermum maritimum



Visible spectrum

Under UV light

Rudbeckia

Honeybee

vs.

Bumblebee

- Nonnative-came with European colonization in 1600's
- Hive size >50,000 bees
- Honey (40-90 pounds, to overwinter)
- Treated as farm livestock- pollination of almonds, apples, blueberries, cherries, cranberries, melons, etc.
- Forage >46°-50°F
- Queen bee may live 4-6 years
- Honeybees are Perennials

- Native species-lived here prior to European colonization
- Hive size ~400-500 bees
- Honey (just for a rainy day)
- Nest in hollow logs, grass clumps or abandoned rodent holes.
- Forage >40°F
- Queen bee lives 1 year.
- Bumblebees and Other Native Bees are Annuals

Bumblebee nest

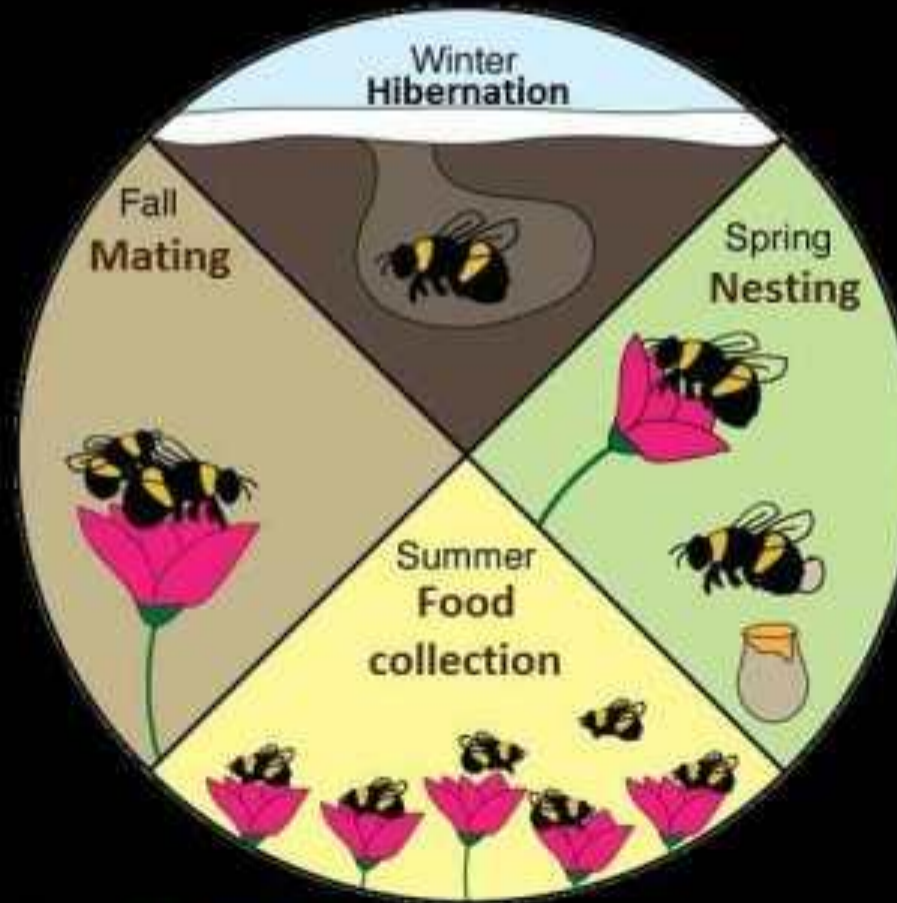


Wild pollinators have to meet a unique set of ecological needs

Managed bees



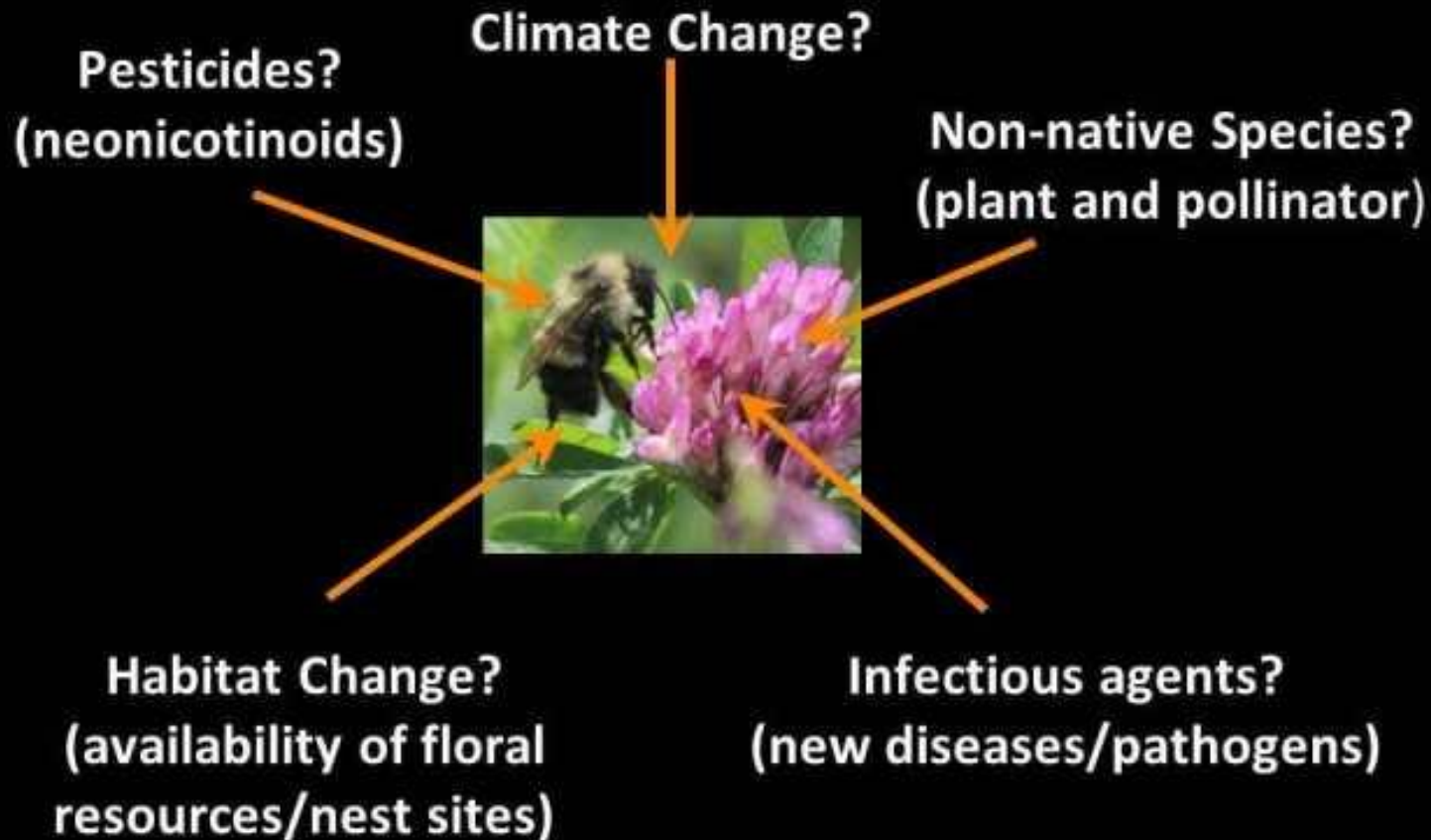
Wild bees



Pollen = reproduction; **Nectar**=survival

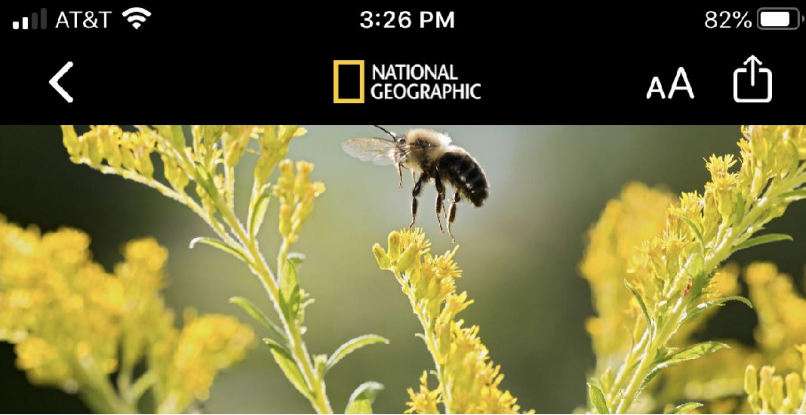
Pollinator Stressors

Why are our native pollinators in decline?



In 2006 Colony Collapse Disorder for Honeybees

- Native bees are affected by same stressors
- **Non-native species**-Do not provide necessary pollen for young.
- **Infectious agents**- Mites, many viruses, fungal pathogens
- **Habitat Change**- Tidy landscapes don't leave places for them to live in our yards or farms. Loss of floral abundance (monocultures) and diversity due to increased land-use.



PHOTOGRAPH BY CLAY BOLT, MINDEN PICTURES

Bumblebees are going extinct in a time of 'climate chaos'

Loss of the vital pollinators, due in part to temperature extremes and fluctuations, could have dire consequences for ecosystems and agriculture.

BY DOUGLAS MAIN
PUBLISHED FEBRUARY 06, 2020

Science, February, 7, 2020: Climate change contributes to widespread declines among bumble bees across continents.

Some of the bumble bee species may be extinct in a few decades.

In North America you are 46% less likely to see a bumble in any given area than you were in 1974. In Europe, 17% less likely.

**Ecological pollinator conservation
in your own backyard!**



YOU
CAN
DO
THIS!

ACTION PLAN- Provide Food and Safe Habitat for Native Bees

- Pick something(s) that resonate with you.
- This is an opportunity to “go plant stuff”, like, how fun is that!
- Focus on
 - Where to plant
 - What to plant
 - How to plant



Does your property provide food and habitat for bees?



Lawn = Food Desert and Homelessness for Native Bees

- Our lawns in US currently occupy area >the size of New England and we add 500 square miles every year.
- Where to plant? The Solution-- Shrink the Lawn (by 50%)



Something like...



From Michael Nadeau, Wholistic Land Care Consultant, Connecticut

What to Plant?

- Native Species- Plants that the bees have evolved with, but do “right plant, right place.”

What Aren't Native Species?

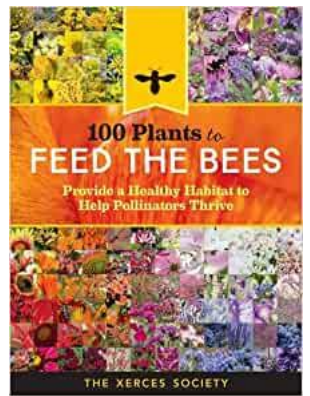
If the plant name includes:

- **Oriental** Bittersweet
- **Japanese** Barberry
- **Siberian** Iris
- **Norway** Maple
- **Russian** Olive
- **English** Holly
- **European** Birch
- **Chinese** Wisteria

An exception??: **Russian** Mammoth or **Mongolian** Sunflower (???)

Then it's not native, and it may or may not be an invasive species.

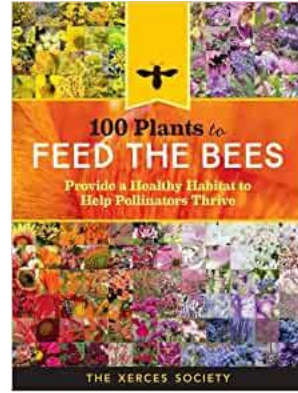
Wildflowers from 100 Plants to Feed the Bees, Xerces Society



- Anise hyssop/Giant Hyssop (*Agastache* spp)
- **Aster (*Symphotrichum*)**
- Beebalm (*Monarda*)
- Black-eyed Susan (*Rudbeckia*)
- Blazing Star (*Liatris*)
- Blue Vervain (*Verbena hastata*)
- **Goldenrod (*Solidago* spp)**
- Joe Pye weed (*Eutrochium* spp)
- Boneset (*Eupatorium perfoliatum*)
- Wild Indigo (*Baptisia*)
- Ironweed (*Veronia* spp.)
- Mountain mint (*Pycnanthemum*)
- Lupine (*Lupinus* spp.)
- Milkweed (*Asclepias* spp)
- Penstemon (*Penstemon* spp)
- Purple Coneflower (*Echinacea* spp)
- Sneezeweed (*Helenium* spp)
- Spiderwort (*Tradescantia*)
- **Sunflower (*Helianthus*) annual & perennial**
- Wild Geranium (*G. bicknellii* and *G. maculatum*)

Some pollinator plants are better than others (from Doug Tallamy)

Native Trees and Shrubs provide a cooling effect for bumblebees

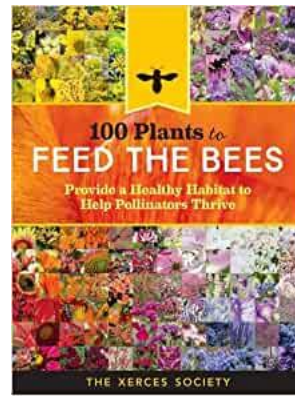


- Basswood (*Tilia americana*)
- Blackberry and Raspberry (*Rubus* spp)
- **Blueberry (*Vaccinium* spp.)**
- Buttonbush (*Cephalanthus occidentalis*)
- Inkberry (*Ilex glabra*)
- Redbud (*Cercis* spp)
- Rhododendron (*R. arborescens*, *R. minus*, *R. prinophyllum*, *R. maximum*, *R. viscosum*)
- Rose (*Rosa* spp.)
- Serviceberry (*Amelanchier* spp.)
- Steeplebush (*Spirea alba* and *S. tomentosa*)
- Tulip Tree (*Liriodendron tulipifera*)
- Tupelo (*Nyssa* spp.)
- Wild lilac (*Ceanothus americanus*-white-flowered Jersey tea)
- **Willow (*Salix discolor*—Pussy Willow)**

Some pollinator plants are better than others (from Doug Tallamy)

Nonnative Plants that Serve Another Purpose

- Basil
- Borage
- Catnip
- Coriander
- Cosmos
- Hyssop (*Hyssopus officinalis*)
- Lavendar
- Mint
- Oregano
- Plum, Cherry, Peach (*Prunus* spp.)
- Rosemary
- Russian Sage
- Thyme
- Alfalfa
- Buckwheat
- Clover
- Cowpea (Chinese yard-long bean, black-eyed pea, etc. of *Vigna unguiculata*)
- Phacelia
- Radish, especially daikon, let bloom
- Scarlet Runner Bean



Where to buy native plants/seeds?

- Prairie Moon Nursery (<https://www.prairiemoon.com/>)
Seeds, bare root plants and potted plants.
- CT River Coastal Conservation District Native Plant Sale at Chester Fairgrounds, April 24-25 2020. Native trees, shrubs, grasses, perennials. Order on-line by April 6 (www.conservect.org/product-category/crccd/) then pick up plants, but usually some available to purchase too.
- Branford Community Garden and Garden Club Plant sale on Branford Green, May 16.
- Garden Centers-Look for NATIVE. Natureworks (Northford) and Gilbertie's Herbs (Westport) might carry Ecoregion 59 natives this summer.



How to Plant?

- Create a massing of plants, groups of 3's, 5's, 7's at least 3"x3".
- Create a diversity of blooms over the season. 12-20 species of flowering plants, ≥ 3 blooming at any given time



From The Know Maintenance Perennial Garden by Roy Diblik



Sample List of Native Trees and Shrubs for Bees Through the Season

Kimberly Stoner, Connecticut Agricultural Experiment Station

Tree or Shrub	Mar	April	May	June	July	Aug			
American hazelnut, <i>Corylus americana</i> (pollen only)	■								
Pussy willow, <i>Salix discolor</i>	■	■							
Red maple, <i>Acer rubrum</i>	■	■							
Black Willow, <i>Salix nigra</i>		■	■						
Canadian serviceberry, <i>Amelanchier canadensis</i>		■	■						
Bearberry, <i>Arctostaphylos uva-ursi</i>			■	■					
Eastern Redbud, <i>Cercis canadensis</i>			■	■					
Highbush Blueberry, <i>Vaccinium corymbosum</i>				■	■				
Winterberry, <i>Ilex verticillata</i>					■				
Inkberry, <i>Ilex glabra</i>					■	■			
Buttonbush, <i>Cephalanthus occidentalis</i>					■	■	■	■	
Shining sumac, <i>Rhus copallinum</i>						■	■		
Sweet pepperbush, <i>Clethra alnifolia</i>							■	■	■



Sample List of Native Wildflowers for Bees Through the Season

Kimberly Stoner, Connecticut Agricultural Experiment Station

Wildflower	May	June	July	Aug	Sept	Oct
Golden Alexanders, <i>Zizia aurea</i>	■	■	■			
Ohio Spiderwort, <i>Tradescantia ohiensis</i>		■	■	■	■	
Culver's root, <i>Veronicastrum virginicum</i>			■	■	■	■
Butterfly milkweed, <i>Asclepias tuberosa</i>			■	■	■	■
Wild bergamot, <i>Monarda fistulosa</i>			■	■	■	■
Mountain mint, <i>Pycnanthemum tenuifolium</i>			■	■	■	■
Partridge pea, <i>Chamaecrista fasciculata</i>			■	■	■	■
Spotted Joe Pye weed, <i>Eutrochium maculatum</i>				■	■	■
New York ironweed, <i>Vernonia noveboracensis</i>					■	■
Fall sneezeweed, <i>Helenium autumnale</i>					■	■
Gray goldenrod, <i>Solidago nemoralis</i>					■	■
New England aster, <i>Symphotrichum novae-angliae</i>					■	■



- CAES Home >
- Programs and Services >
- Departments and Directories >
- Publications >
- Events >

Search The Connecticut Agricultural Experiment Station

pollinator

Search Results

15 of 51 Results for pollinator

[Pollinator Information](#)

[Cucumber Beetles](#)

[Disease Control for Home Plum Orchards](#)

[Disease Control for Home Peach Orchards](#)

[Disease Control for Home Apple Orchards](#)

Type "Pollinator" in Question box, then click on Pollinator Information on next page –Dr. Kim Stoner’s work-



What is the name for Bee Scientist?

- 1) Melittologist
- 2) Mycologist
- 3) Teuthologist
- 4) Herpetologist

What is the name for Bee Scientist?

- 1) **Melittologist** –Greek for Entomologist that studies bees
- 2) Mycologist- Fungi
- 3) Teuthologist- Mollusks
- 4) Herpetologist –Reptiles and Amphibians

What is an Invasive Species?

A plant that is BOTH

- 1) Non-native (arrived here after European colonization)
 - 2) Able to establish on many sites, grow quickly and spread to the point of disrupting native plant communities.
- 85% of invasive woody plant species in US are escapees from our gardens.
 - Remove invasive species. They are crowding out native plants that provide nectar and pollen for native bees.



Burning Bush
(*Euonymous alatus*)

Rip 'em Out!

Offenders that you might have planted in your garden

- Japanese Barberry (*Berberis thunbergii*), Burning Bush (*Euonymus alatus*), Privet hedges, Norway Maple, Double File Viburnum (?), Butterfly Bush(?), etc.

Other offenders that just “showed up”.

- Multiflora rose, Oriental bittersweet, Tree of Heaven, Porcelainberry, Mugwort, Autumn Olive, Russian Olive, Japanese knotweed, Black swallow-wort etc.

CT List of Invasive Species:

https://cipwg.uconn.edu/invasive_plant_list/

Photos of Invasive and Native Species:

<https://cipwg.uconn.edu/photo-notebook/>



Black Swallow-wort

Is It Invasive?

- [Missouribotanicalgarden.org](https://www.missouribotanicalgarden.org)
 - Plant Finder feature – Use Search box in upper right hand corner.

Has plant descriptions, native range, cultivation facts, pest issues, invasive maps.

- Another site: www.invasiveplantatlas.org/

The screenshot shows the Missouri Botanical Garden website. At the top, there is a navigation menu with links for Home, Support the Garden, Members, Shop, Volunteer, Jobs, Media, and Contact. Below this is the Missouri Botanical Garden logo and a search box. A secondary navigation bar includes links for Visit, Things To Do, Learn & Discover, Gardens & Gardening, Sustainability, Plant Conservation, Plant Science, and About. The main content area is titled "Gardening Help" and "Buddleja davidii 'Black Knight'". On the left, there is a "Plant Finder" sidebar with categories like Lawn, Landscape & Garden Design, Edible Gardening, etc. The main content area features a photograph of the plant and a list of characteristics: Common Name: butterfly bush, Type: Deciduous shrub, Family: Scrophulariaceae, Zone: 5 to 9, Height: 6.00 to 8.00 feet, Spread: 3.00 to 5.00 feet, Bloom Time: June to September, Bloom Description: Very dark purple, Sun: Full sun, Water: Medium, Maintenance: Low, Flower: Showy, Fragrant, Good Cut, Attracts: Butterflies, Tolerate: Rabbit, Clay Soil, Invasive: Where is this species invasive in the US? Garden locations. A "Back to Previous Page" link is also visible.

The screenshot shows the EDDMapS Distribution page for butterflybush (*Buddleja davidii*). The page includes a title "EDDMapS Distribution:" and a disclaimer: "This map is incomplete and is based only on current site and county level reports made by experts and records obtained from USDA Plants Database. For more information, visit www.eddmaps.org". Below this is a map of the eastern United States with green squares indicating where the species has been reported. A large black arrow points from the Missouri Botanical Garden website to this map. To the right of the map is a section titled "Contribute Plant Distribution Data to EDDMapS" with the subtitle "Early Detection & Distribution Mapping System". Below this is a section titled "State(s) Where Reported Invasive." with the text: "Based on state level agency and organization lists of invasive plants from WeedUS database." and a small map of the United States with red and orange squares indicating where the species is reported as invasive. A legend at the bottom of the map shows "No Data" as a white square and "Species Reported" as a green square. The date "11/2/2018" is visible in the bottom right corner.

What do you replace your invasives with?

- Photo album of Invasive Species and their alternatives:
September 2004 The Connecticut Agriculture
Experiment Station for the Connecticut Invasive Plant
Working Group-Alternatives for Invasive Ornamental
Plant Species-[https://portal.ct.gov/-
/media/CAES/DOCUMENTS/Special_Features/NativeAlt
ernativespdf.pdf?la=en](https://portal.ct.gov/-/media/CAES/DOCUMENTS/Special_Features/NativeAlternativespdf.pdf?la=en)
- Compares native with invasive:
[https://www.nybg.org/files/scientists/rnaczy/Mistaken
Identity_Final.pdf](https://www.nybg.org/files/scientists/rnaczy/MistakenIdentity_Final.pdf)

How do I figure out what is growing in my yard?



Take photo



Observe

Then “What did you see?”>

Take a specimen of the plant to the Connecticut Agricultural Experiment Station

[123 Huntington St, New Haven](https://www.ct.gov/ces)

Or to

New Haven County Master Gardener Office (UConn)

[305 Skiff Street, North Haven](https://www.ct.gov/nhcmgo)

Phone: (203) 407-3168

Bee-friendly Gardening Practices

- Don't clean up the garden in the fall. Plants with hollow or pithy branches (eg. brambles, elderberries and sumac) are nesting spaces, wait at least until a week of 50 degree days in the spring before cutting them down.
- Leave the leaves on perennial beds! They provide safe haven for nesting bees and haven for caterpillars.
- If you are a vegetable gardener, don't immediately get rid of bolting plants-they provide nectar for bees. Let biennial vegetables like carrots, kale and parsnips overwinter for early flowers in the spring. Let annuals, like basil, radishes, broccoli and lettuces flower.



Radish Flowering (Bolting)



Safe Habitat Means No Insecticides

Neonicotinoids – Systemic Insecticides



Lethal Dose

Even sublethal doses are harmful

- Impaired navigation
- Impaired immune function
- Impaired reproduction
- Lower queen survival

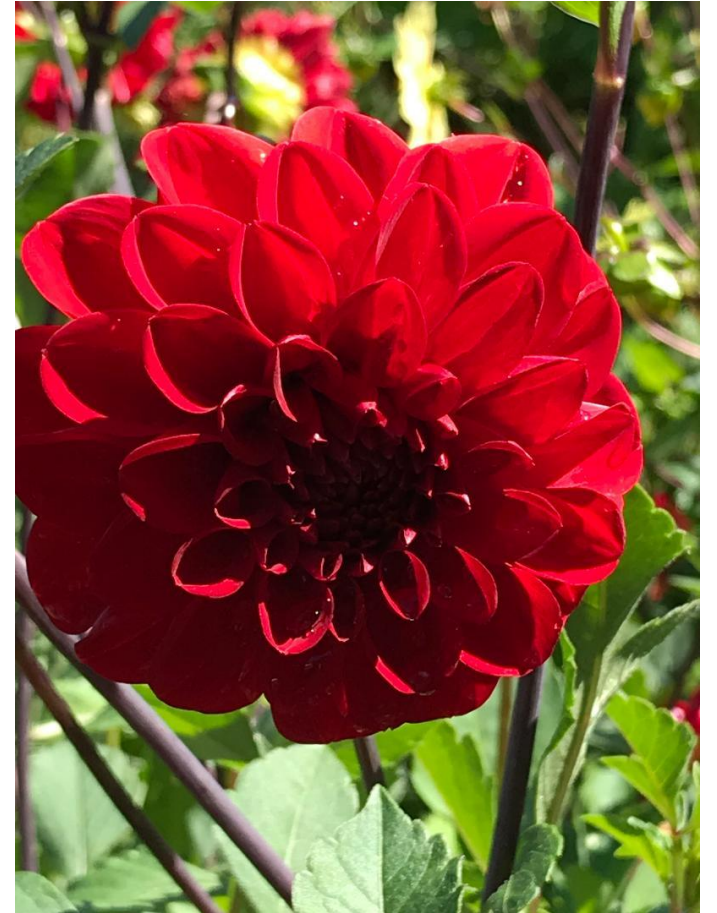
Avoid doubled or ruffled flowers-what looks good to us, may not look good to a bee



Dahlia variabilis



Dahlia variabilis



Friend's Mom's Dahlia

Beware the Pollenless Flowers!

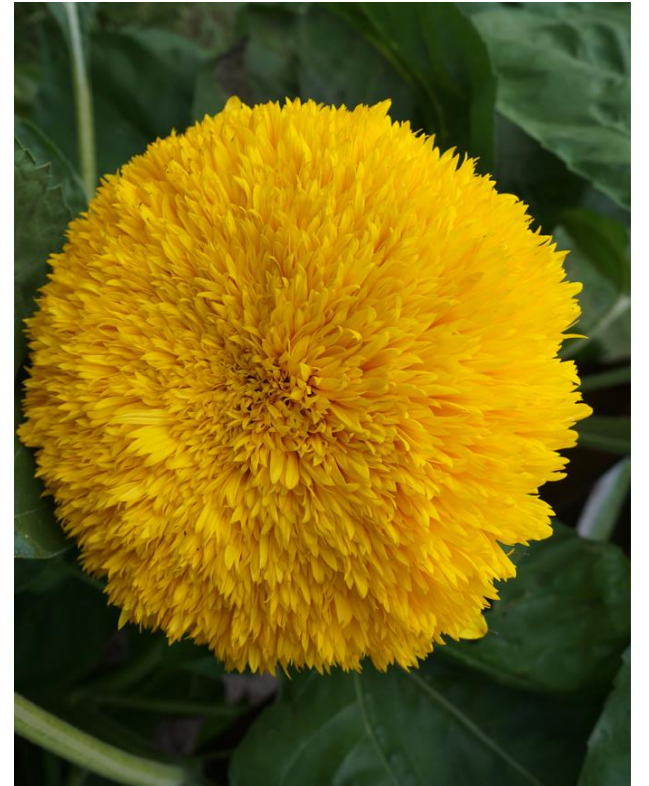


Pollen-Lemon
Queen



Pollenless- Zohar

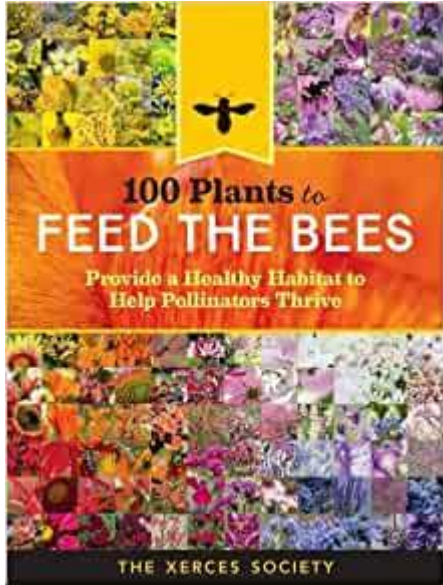
Annual sunflower
Helianthus annuus



Teddy Bear

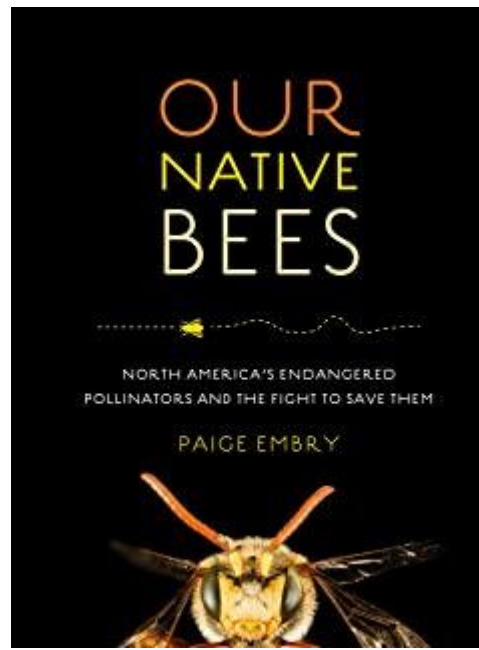
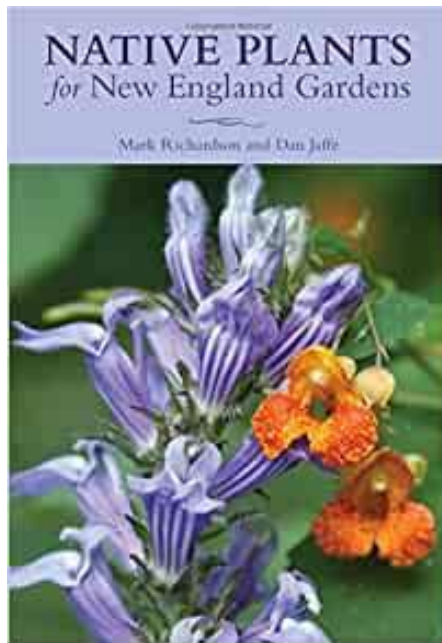
Golden yellow fully
double 6 in. blooms
Minimal Pollen

Resources



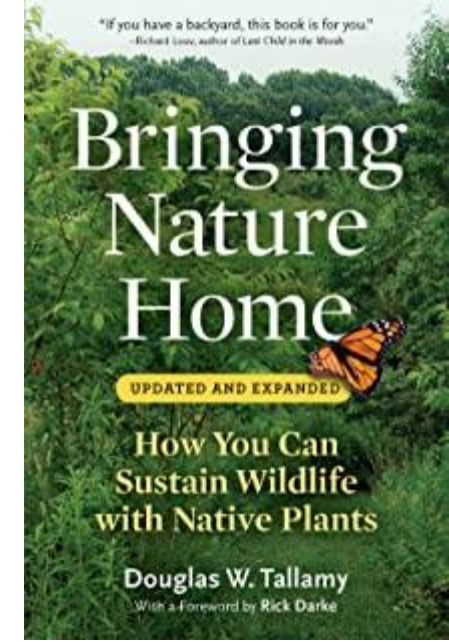
100 Plants to Feed the Bees, Xerces Society- All of USA

Native Plants for New England Gardens by Mark Richardson and Dan Jaffe.



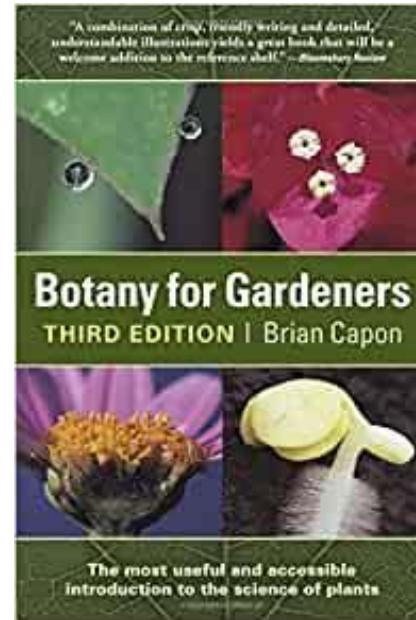
Our Native Bees: North America's Endangered Pollinators and the Fight to Save Them by Paige Embry

Buzz: The Nature and Necessity of Bees by Thor Hanson



PLEASE READ

Nature's Best Hope-A New Approach to Conservation That Starts in Your Yard (2020) and Bringing Nature Home (2007) by Doug Tallamy

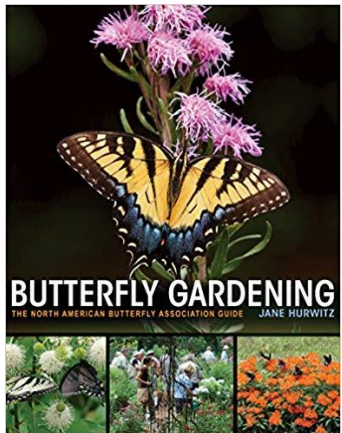


Botany for Gardeners (3rd Ed.) by Brian Capon



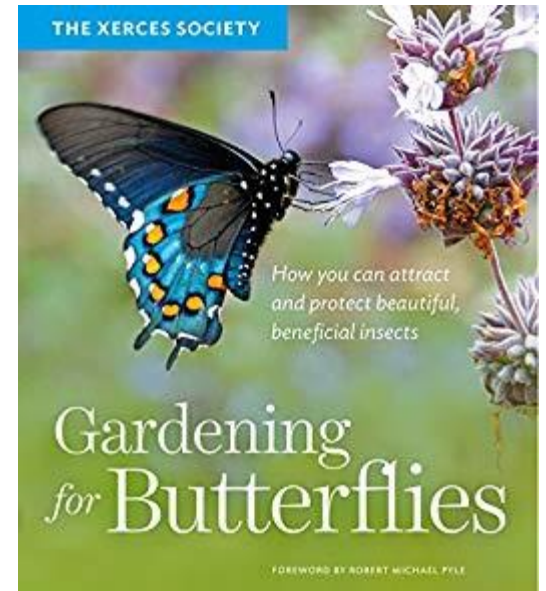
Food for Birds, Butterflies and Moths Too!

- For Butterflies/Moths: Plants native to our county-
www.nwf.org/nativeplantfinder ranked in order for effectiveness—NATIVE Trees: **Oaks, Beach Plum, Cherry, Willows**, etc. NATIVE Flowers and Grasses: **Goldenrod, Aster, Strawberry**, etc.
- For Birds: Audubon Society Plants for birds:
www.Audubon.org/plantsforbirds



Butterfly Gardening,
Jane Hurwitz (2018)

Gardening for Butterflies,
The Xerces Society (2016)





Plant It and They Will Come



- Don't throw out all plants you love, but switch over to native species.
- **Goal 70% native species in your yard.** The problem isn't so much what we do have in our yards, but what we don't. We lack native plants that support the wildlife, from infancy to adulthood.
- We don't need to be perfect, but we do need to be "gooder".
- No matter how small your garden, be part of Branford's Pollinator Pathway Initiative



<https://branfordlandtrust.org/pollinator-pathways-initiative/>

Comparisons of Natives and Nativars

- Penn State Center for Pollinator Research
 - Comparison of nativars and natives:
<https://ento.psu.edu/pollinators/resources-and-outreach/bees-bugs-blooms-2013-a-pollinator-trial>
- Mt Cuba Center (Delaware) with Doug Tallamy
 - Do leaf-eating insects eat nativars? <https://mtcubacenter.org/do-leaf-eating-insects-eat-nativars/> The traits: changed growth habit, enhanced fruit size, enhanced fall color, disease resistance, leaf variegation, and leaf color changes from green to red/purple/blue, the only trait that deterred insect herbivores was leaf color change from green to red/purple/blue. One other problem with nativars—they are cloned—no genetic diversity to adapt to climate change.

Bee Diversity in Connecticut

- Bee species recorded in CT to date ~ 349
- 9 species are nonnative, rest are native
- 1 species of honeybee (nonnative)
- 16 species of bumblebee (social)
- 10 species of cellophane bee (solitary)
- 20 species of mason bees (solitary)
- 84 species of digger bees
- >91 species of sweat bees
- Many other species, mostly solitary

From Dr. Kim Stoner, CT Ag Station talk at SALT conference,
November 9, 2019