



# Benefits for Beneficials: Habitat Hedges

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August 17, 2022





# Topics

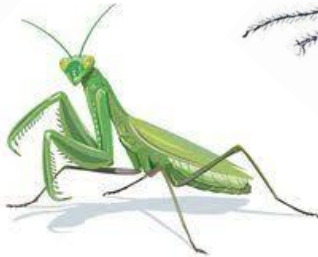
- ❖ What are beneficial insects?
- ❖ What's affecting them?
- ❖ What are habitat plantings?
- ❖ Who visits them and when?

Please review the [recording](#) and/or [slides](#) of the Un-Bee-lievable webinar we provided to EMG volunteers in May—found on the landing page of the Volunteer Portal of our website: <https://www.uvm.edu/node/249627> which provides a great overview of the types of pollinators here in Vermont.

# Un-BEE-lievable Beneficials



Predators (eat pests)



Pollinators (anything that visits and disturbs flowers)



Parasites/Parasitoids  
(lay eggs on or within pests)



Some are pest-fighting  
pollinators.



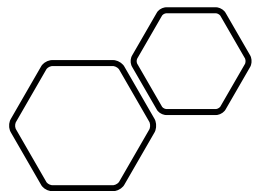


# What's threatening our beneficials?

- ❖ Habitat loss, degradation & fragmentation
- ❖ Pests & Disease
- ❖ Invasion of non-native species
- ❖ Pesticides
- ❖ Pollution
- ❖ Climate change







# How Can You Support Beneficials?



- Get to know your visitors. Identify insects on your plants before taking action against them: They may be a beneficial.
- Use pesticides sparingly or not at all: You never know how long it will persist or when a beneficial will visit. READ THE LABEL.
- Maintain/leave/establish habitat
  - Plant flowers to attract and support beneficials (annuals or perennials)
  - Provide buffer/idle areas between forest/field edges and hedgerows for foraging and nesting.







# Providing Benefits

We are evaluating the effectiveness of annual **habitat hedges/plantings** to attract beneficial insects to growing areas to support pollination & the biological control of common greenhouse, high tunnel, landscape & nursery pests.

Habitat hedges provide sources of food (pollen, nectar, attracted prey to eat or use as host), refuge & reproduction sites for beneficial insects.





A vibrant garden filled with various flowers including sunflowers, zinnias, and purple flowers. The scene is a dense, colorful field of blooms in shades of yellow, orange, red, pink, and purple, set against a backdrop of lush green foliage. The lighting is bright, suggesting a sunny day.

# Habitat is Happiness

What should we be planting to attract beneficial insects?





# Key Considerations

- ❖ Bloom period: spring - fall
- ❖ Color: blue, purple, yellow, white, red
- ❖ Height: ground up
- ❖ Flower shape and size
- ❖ Maintenance (annual vs perennial vs mix)
- ❖ Native plants vs non-native
- ❖ Beneficial species
- ❖ Be patient (can take time to establish)





Wild bergamot (*Monarda fistulosa*) - native



Black-eyed Susan (*Rudbeckia hirta*) - native



Purple coneflower (*Echinacea purpurea*) - non-native to VT



Butterfly weed (*Asclepias tuberosa*) - native

## Perennial Plantings

Many native and non-native perennial plants attract beneficials

- ❖ Northeast Pollinator Plants: <https://www.northeastpollinator.com/>
- ❖ Non-native plants to Attract Pollinators: <http://monroe.cce.cornell.edu/master-gardeners/pollinator-friendly-gardens/non-native-plants-to-attract-pollinators>
- ❖ NRCS Planting Guides for Native Pollinators: [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/plantmaterials/technical/publications/?cid=stelprdb\\_1044847](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/plantmaterials/technical/publications/?cid=stelprdb_1044847)
- ❖ Pollinator-Friendly Plants for the Northeast United States: <http://agriculture.vermont.gov/sites/ag/files/pdf/apiary/wildflower%20picture%20guide%20and%20info.pdf>
- ❖ Pollinator Gardens.org: <https://pollinatorgardens.org/>
- ❖ Selecting Plants for Pollinators (Northeast): <http://pollinator.org/PDFs/Adirondack.rx2.pdf>



*Penstemon albidus* (White Beardtongue) - native



Joe Pye weed (*Eupatorium spp.*) - native

# Pollinator Habitat Enhancement Tables - VT

VT Pollinator Habitat Enhancement - Mostly Native Plants

Developed by Jane Sorensen,  
Northeast Pollinator Plants/River Berry Farm, VT

Plant Name	May	June	July	Aug.	Sept.	Sun/S	Value	Bee	But	Hun	Host	Notes
<i>Info. Source: Xerces, Lady Bird Johnson Wildflower Center, USDA Plants Database</i>												
<b>PERENNIALS for Gardens long-lasting, minimal spreading and reseeding</b>												
Asarum canadense	5'-1'	wild ginger				sun/part	X	X	X			ground cover
Fragaria virginiana	4"-6"		fruit	wild strawberry		sun/pa	X	X	X			tasty ground cov.
Potentilla canadensis	2'-4" short!!	cinquefoil				sun/pa	X	X	X			short, vining stem
Penstemon digitalis	3'-5'	beardtongue				sun	X	X	X			clump, butt mag.
Geranium maculatum	1'-1.5'	cranesbill				sun/pa	X	X				some self-seeding
Tradescantia virginiana		1.5'-3'	virginia spiderwort			par/sha	X	X				moist, shade
Coreopsis lanceolata		1'-2'	coreopsis			sun	X	X				a bit short-lived
Hedysarum alpinum		1.5'-2'	alpine sweetvetch			sun/sha	X	X				toxic seeds, fix.N
Monarda punctata		1.5'-2'	spotted beebalm			sun/pa	X	X	X			spreads but value
Oenothera pilosella		1'-2'	meadow evening primro			sun	X					mat-form, spread
Penstemon hirsutus		1.5'-2'	hairy beardtongue			sun/sha	X	X	X			some self-seeding
Ratibida pinnata		3'-5'	yellow coneflower			sun	X	X				some self-seeding
Echinacea purpurea		2'-5'	purple coneflower			sun/pa	X	X	X			a bit short-lived
Baptisia australis		4.5'-5.5'	blue wild indigo			sun/pa	X					love this
Asclepias tuberosa		2.5'-3'	butterflywee			sun/pa	X	X	X			bright color
Dalea purpurea		1'-3'	prairie clove			sun	X					some self-seeding
Veronicastrum virginicum		culver's root	4'-7'			sun	X	X				long flowering
Hypericum ascyron		greatst. Johnswort	3'-5'			sun	X			X		spreading..
Liatris spicata		blazing star	2'-4'			sun	X	X	X			nice cut too
Lobelia siphilitica		great blue lobelia	2'-3'			sun/pa	X	X	X			hard to germ?
Monarda didyma		scarlet beebalm	2'-4'			sun/pa	X	X	X			spreads but value
Oenothera perennis		little evening primrose	.5'-2'			sun	X	X	X	X		spreads, easy pull
Eupatiadelphus maculatum		joe-pye weed	3'-6'			sun/pa	X	X				common, valuable
Eutrochium purpureum		sweet joe-pye weed	5'-7'			sun/pa	X	X				tolerates moister
Agastache foeniculum		anise hyssop	3'-5'			sun/pa	X	X	X			great plant
Monarda fistulosa		wild bergamot	2'-4'			sun/pa	X	X	X			spreads but value
Pycnanthemum tenuifolium		slender mountain mint	2'-3'			sun/pa	X	X				spreads but value
Senna hebecarpa		wild senna	3'-7'			sun/pa	X	X	X	X		some self-seeding
Helenium autumnale		sneezeweed	3'-5'			sun	X	X				statuesque
Helianthus giganteus		giant sunflower	5'-10'			sun	X					loose, tall
Liatris aspera		rough blazing star	2'-3'			sun	X	X	X	X		slow spreading
Vernonia noveboracensis		new york ironweed	4'-6'			sun	X	X				borderline hardy
Chelone glabra		white turtlehead	2'-3'			sun/sha	X	X	X			can do shade
Eupatorium perfoliatum		common boneset	4'-6'			sun/pa	X	X				common, valuable
Symphotrichum novae-angliae		new england aster	3'-6'			sun	X	X		X		great late color
Symphotrichum laeve		smooth blue aster	2'-4'			sun	X	X				great late color
Symphotrichum novi-belgii		new york aster	3'-4'			sun	X	X		X		great late color
Gentiana andrewsii		bottle gentian	1'-2'			part su	X					part-shade

Information focused on natives with bloom time, color, height, sun vs. shade

<https://www.uvm.edu/sites/default/files/Extension-Master-Gardener/HandoutVermontPollinatorPalettewcommonnames.pdf>



# Habitat Hedges of Annuals



Firewheel



Zinnia



Sunflower



Marigold



Plains Coreopsis



Wild Cosmos



Sweet Alyssum



Royal Carpet Alyssum



Blue Cornflower



Purpletop vervain



Provide a diversity of colors, structures (floral shapes/sizes & vertical heights) targeting mid-summer – fall bloom period & suitable for cut flowers.



# Field Crops



**HONEY FIELD**  
**FARM** NORWICH  
VERMONT 

<https://www.honeyfieldfarmvt.com/>

Examples





**High  
Tunnel  
Crops**



**Examples**





**Examples**





## Roadsides



# Quinlan's Covered Bridge Monkton Rd, Charlotte, VT

Examples



# Raised Beds

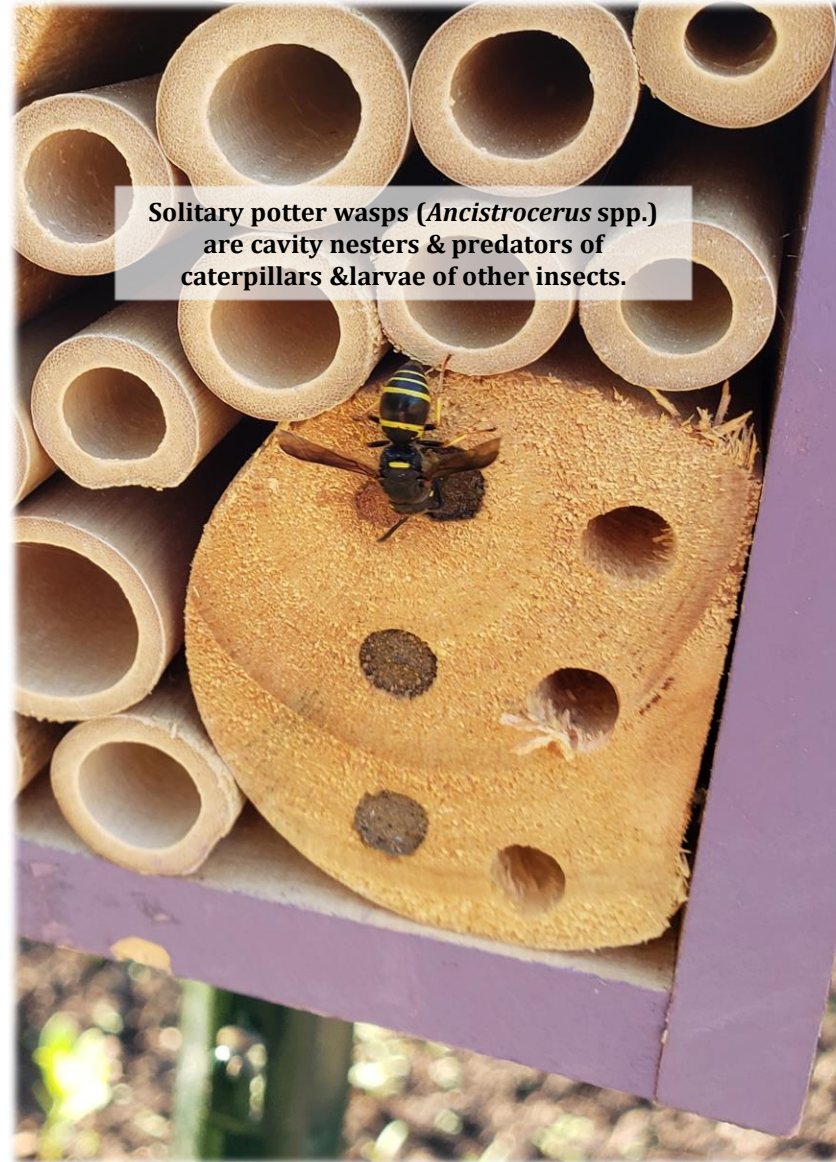


Examples

Blue Vane Trap for Flying Beneficials







Solitary potter wasps (*Ancistrocerus* spp.) are cavity nesters & predators of caterpillars & larvae of other insects.



Building and Managing Bee Hotels for Wild Bees (Michigan State Univ.):

<https://pollinators.msu.edu/publications/building-and-managing-bee-hotels-for-wild-bees/>

Build a nesting Block (USDA-ARS):

<https://www.ars.usda.gov/pacific-west-area/logan-ut/pollinating-insect-biology-management-systematics-research/docs/build-a-nesting-block/>

Emergence box & Nests: <https://beediverse.com/emergence-box-and-nests/>

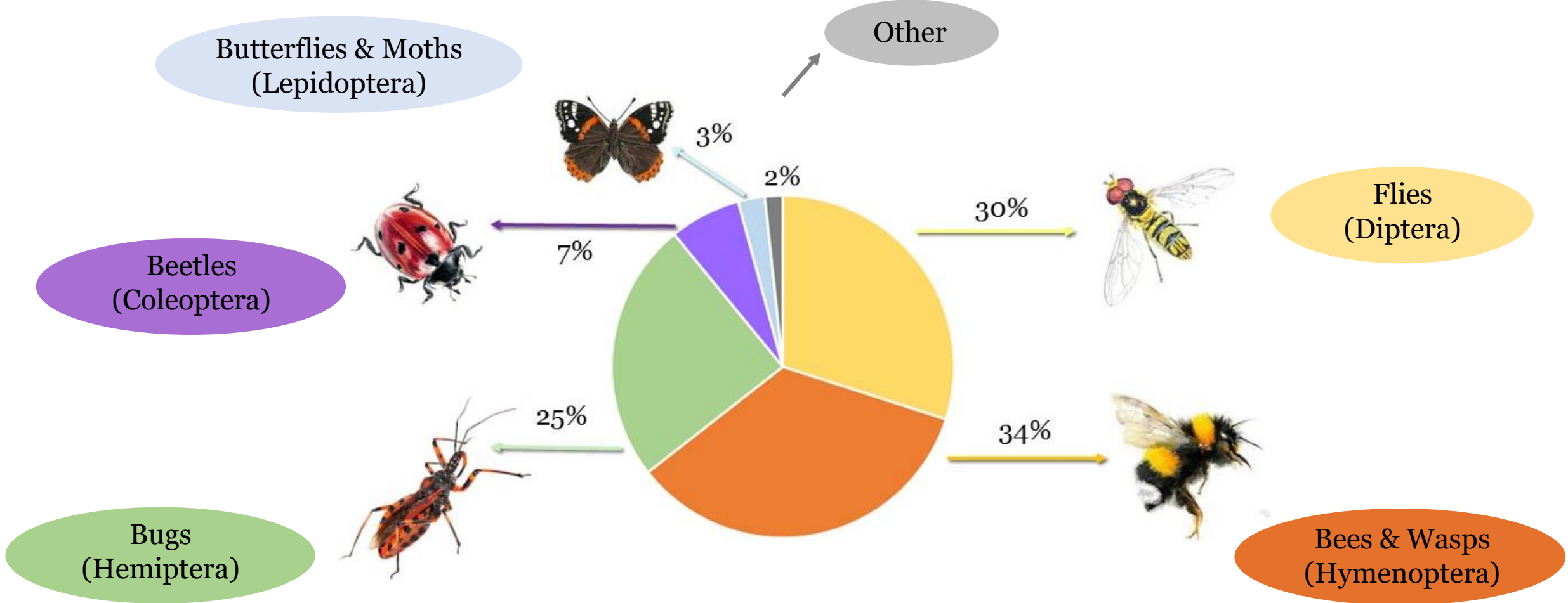
Wild Bees and Building Wild Bee Houses (NCDA&CS):

<https://www.ncagr.gov/spcap/bee/documents/BuildingWildBeeHouses.pdf>

# Bee Houses



# Maintaining Order



*Insect orders observed within habitat plantings*

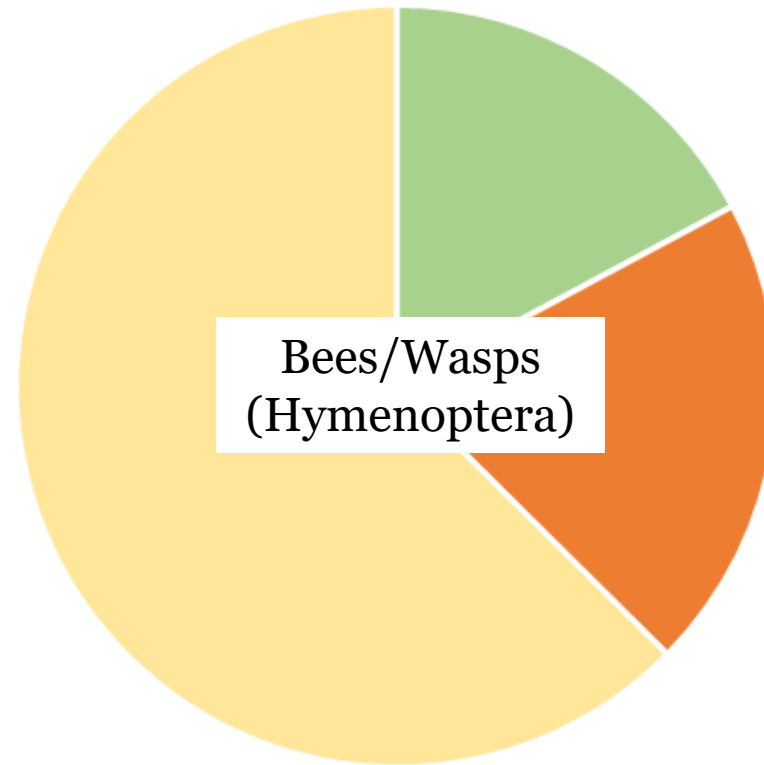


# Beneficial Break Down



Bees 83%

Pollination



Small wasps <math>< 0.5\text{cm}</math>  
(23%)



Pest management  
(aphid parasites)

Large wasps/hornets  
(27%)



Pollination & pest  
management (caterpillars,  
beetle larvae)



## Bees on Sunflowers





## Bees visiting habitat planting





# Basic Bees



**Honey (Family Apidae)**



**Bumble (Family Apidae)**



**Carpenter (Family Apidae)**



**Sweat (Family Halictidae)**



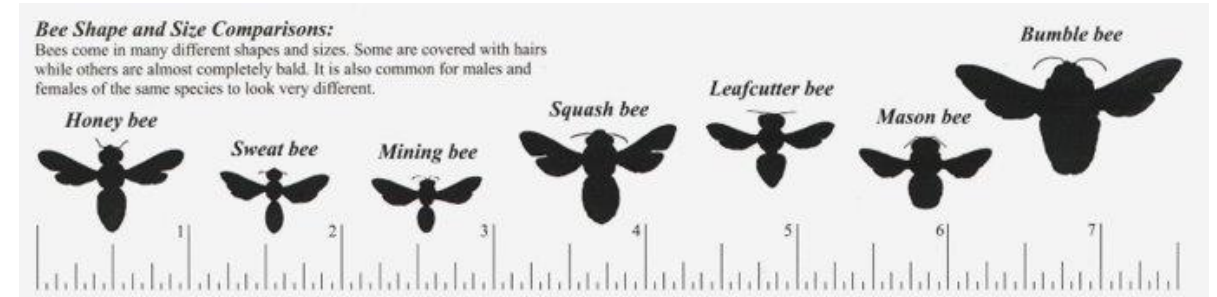
**Mining (Family Andrenidae)**



**Mason (Family Megachilidae)**



**Leafcutter (Family Megachilidae)**





# Bringing In the Bees

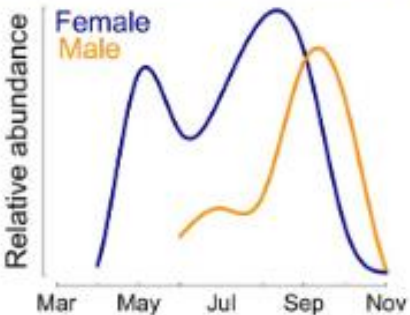
## Common Eastern Bumble Bee

*Bombus impatiens*



Smudge-like shield

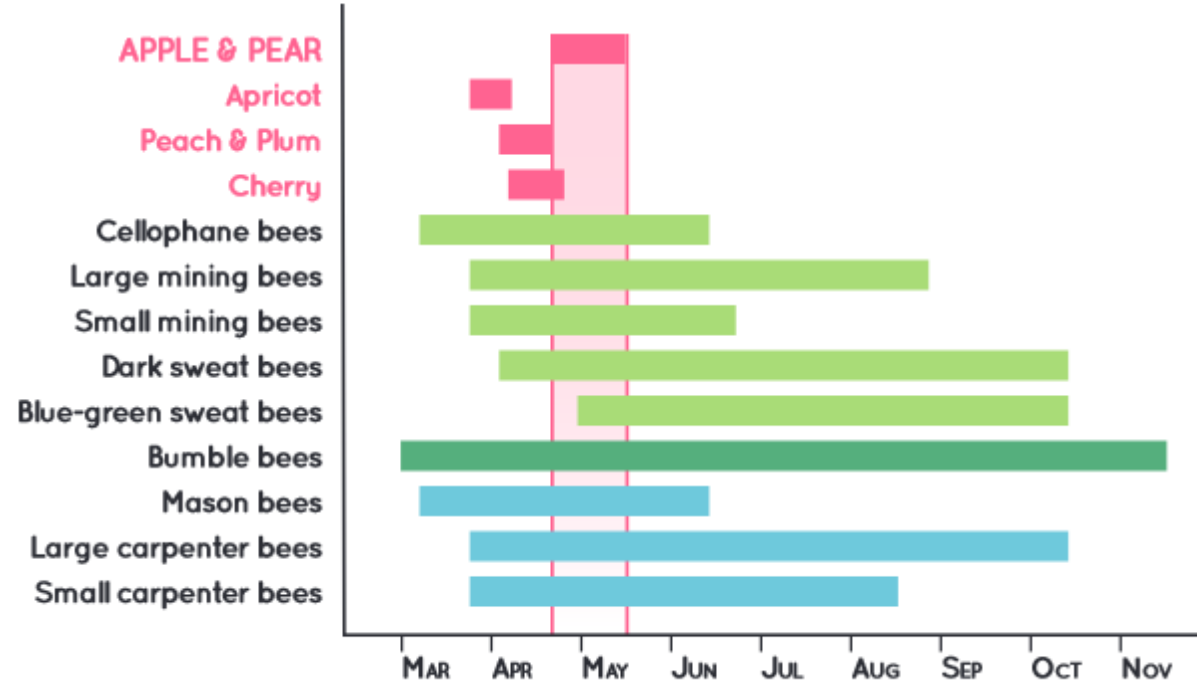
Only species in the North-east with no yellow on T2



Most abundant and widespread bumble bee in New England

## NATIVE BEE & ORCHARD BLOOM PHENOLOGY\*

■ BLOOM ■ GROUND-NESTERS ■ CAVITY-NESTERS ■ TUNNEL-NESTERS



VT Bumble Bee Atlas (VT Center for Ecostudies): <http://val.vtecostudies.org/projects/bumble-bee-atlas/>

Guide to the Bumble Bees of New England (VT Center for Ecostudies): [https://figshare.com/articles/online\\_resource/Guide\\_to\\_the\\_Bumble\\_Bees\\_of\\_New\\_England/19585852](https://figshare.com/articles/online_resource/Guide_to_the_Bumble_Bees_of_New_England/19585852)

The Bees of Vermont (VT Center for Ecostudies) \*ID Guide & Habitat Guide: <https://val.vtecostudies.org/projects/vtbees/bees-of-vt/>

Wild Pollinators of Eastern Apple Orchards and How to Conserve Them. 2nd ed. Cornell University, Penn State University, and The Xerces Society: [https://xerces.org/sites/default/files/2018-05/15-036\\_02\\_XercesSoc\\_Wild-Pollinators-Eastern-Apple-Orchards-2nd-Ed\\_web.pdf](https://xerces.org/sites/default/files/2018-05/15-036_02_XercesSoc_Wild-Pollinators-Eastern-Apple-Orchards-2nd-Ed_web.pdf)





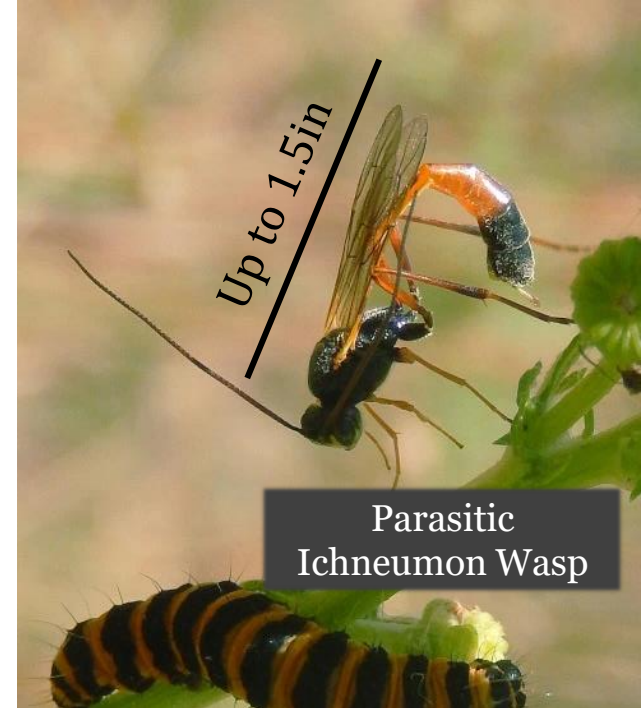
*Aphidius* attacking aphids (wasp pupa in aphid mummies)



*Cotesia* pupae on hornworm (after feeding within)



3mm



Up to 1.5in

Parasitic Ichneumon Wasp



1mm

*Trichogramma* on moth eggs



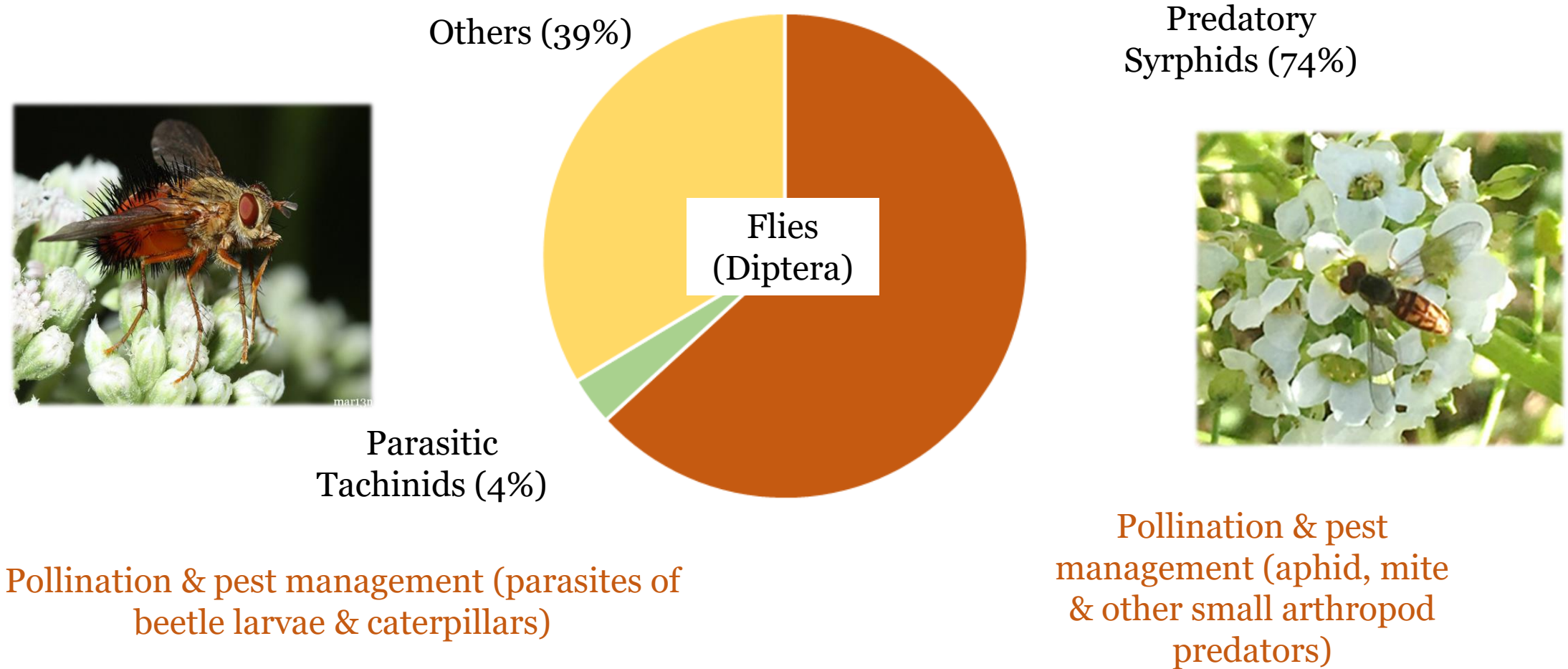
*Praon* mummy

# Parasitic Wasps

- ❖ Most tiny (1-3mm)
- ❖ Many families (Aphelinidae Chalcidae, Ichneumonoidea)
- ❖ Adults lay eggs within/on host
- ❖ Larvae are predatory killing host
- ❖ Adults mostly feed on nectars



# Beneficial Break Down





# Flies

## Order Diptera

(Di = two; ptera = wings)

Flies



Bees - Wasps



# Hover/Drone/Flower Flies (Family Syrphidae)

- ❖ Adults tend to hover over flowers & feed on pollen & nectars
- ❖ Mimic bees/wasps to scare off predators
- ❖ Mostly short bristle-like antennae (bees have long)
- ❖ Larvae of many species voracious predators of aphids & other soft bodied arthropods. Others consume decaying organic matter.
- ❖ Important pollinators (more so than bees in some systems – high latitudes, elevations)



Predatory  
Maggots



Adults



Fly



Bee



# Syrphid (Hover) Flies of Vermont



Transverse Banded Drone Fly  
*Eristalis transversa*  
Photo by: Judy Gallagher



Bald-faced Hornet Fly  
*Spilomyia fusca*  
Photo by: Will Stuart



Thick-legged Hoverfly  
*Syritta pipiens*  
Photo by: Heather Holm



Common Drone Fly  
*Eristalis tenax*  
Photo by: Rob Curtis



Orange-legged Drone Fly  
*Eristalis flavipes*  
Photo by: Denis Doucet



Margined Calligrapher  
*Toxomerus marginatus*  
Photo by: Denis Doucet



Black-horned Smoothtail  
*Epistrophe grossulariae*  
Photo by: Denis Doucet



Common Flower Fly  
*Syrphus ribesii*  
Photo by: Walwyn



Confusing Wood Fly  
*Blera confusa*  
Photo by: Denis Doucet



Eastern Hornet Fly  
*Spilomyia longicornis*  
Photo by: Paweł Pieluszyński



Variable Duskyface Fly  
*Melanostoma mellinum*  
Photo by: Denis Doucet



Eastern Calligrapher  
*Toxomerus geminatus*  
Photo by: Ryan Hodnett



Oblique Streaktail  
*Allograpta obliqua*  
Photo by: Jeff O'Connell



Eastern Band-winged Hover Fly  
*Hypocritanus fascipennis*  
Photo by: Tracey Fandre



Canadian Potter Fly  
*Doros aequalis*  
Photo by: Christian Beck

★ larvae are predators of various small pests (aphids, mites, etc.)

Prepared from iNaturalist - Hover Flies - Vermont.  
[https://www.inaturalist.org/observations?place\\_id=47&taxon\\_id=49995](https://www.inaturalist.org/observations?place_id=47&taxon_id=49995)



# Tachinid Flies (Family Tachinidae)

- ❖ Adults lay eggs on or near hosts (caterpillars, beetle larvae) for larvae to burrow into or ingest.
- ❖ Larvae (maggots) develop within.
- ❖ After consuming host, larvae burrow out to pupate on the ground.



Pupae



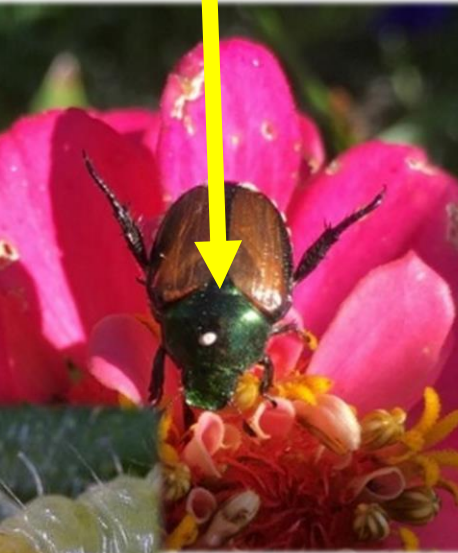
Larva



Eggs on caterpillar



Resemble houseflies but have stout bristles on tips of abdomen





# *Orius insidiosus* “The insidious flower bug” (Hemiptera)

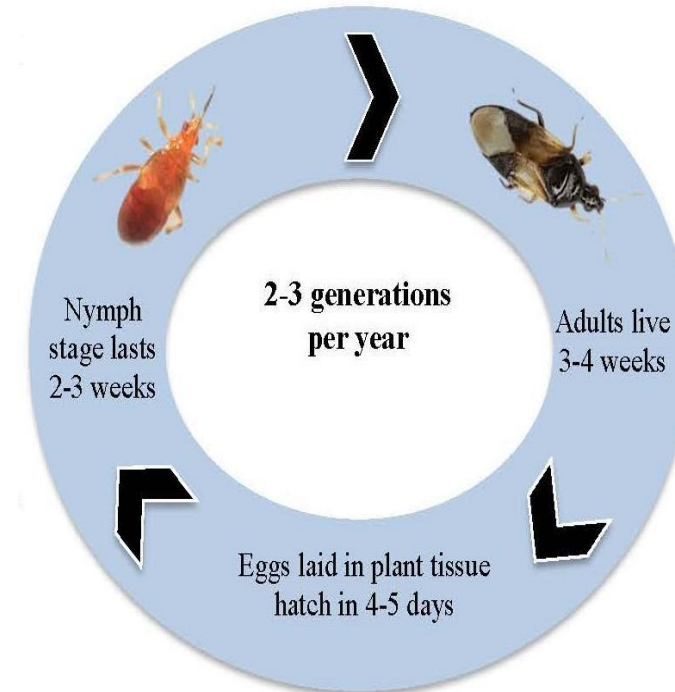
- ❖ General predator (aphids, mites, thrips, small caterpillars).
- ❖ Adults are tiny (1/8 inch).
- ❖ Egg to adult takes approximately 20 days, and there are 2 generations per year in the north.
- ❖ Enter reproductive diapause in response to decreased daylength.
- ❖ Overwinter as adults in leaf litter.



Adult eating an aphid



Nymph (immature)





# Common Lady Beetles

Introduced

Natives



*Coccinella septempunctata*  
sevenspotted 'C-7'



*Propylea quatuordecimpunctata*  
checker spot 'P-14'



*Hippodamia parenthesis*  
parenthesis



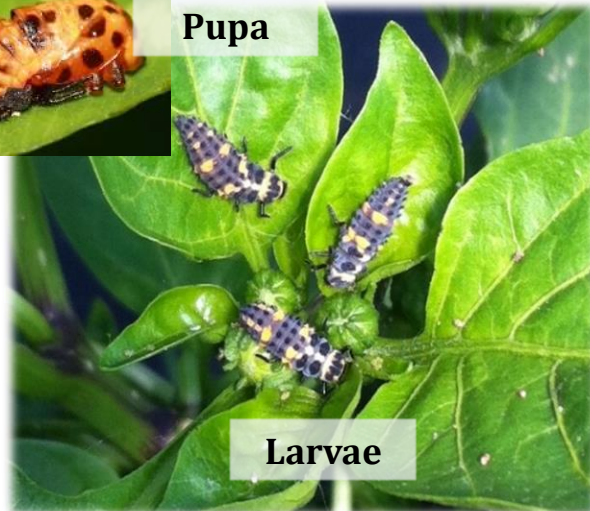
*Hippodamia variegata*  
variegated



*Harmonia axyridis*  
Asian lady beetle



Pupa



Larvae



*Coleomegilla maculate* pink spotted



*Adalia bipunctata* two-spotted  
Rediscovered in VT 2022!



Most predatory as adults & larvae, some can be crop pests. Others consume fungi

Lost Ladybug Project

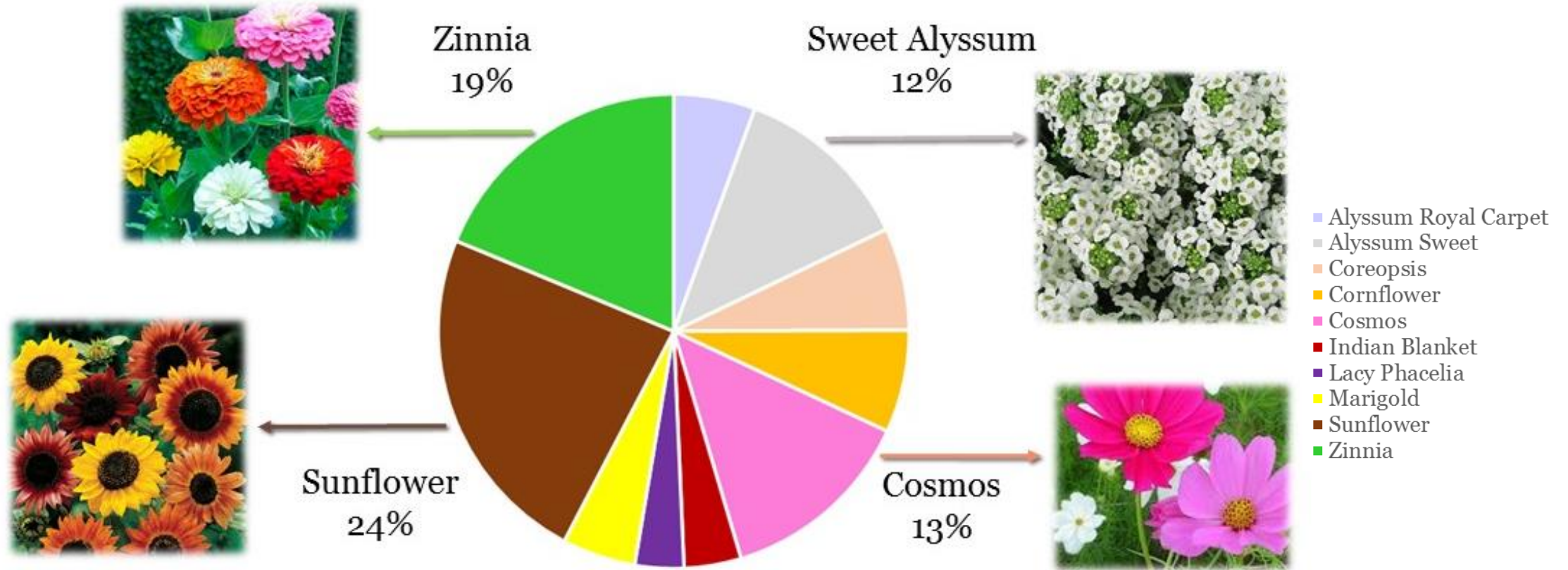
<http://www.lostladybug.org/>

Vermont Lady Beetle Atlas

<https://val.vtecostudies.org/projects/lady-beetle-atlas/>



# A Matter of Preference



*Attractiveness of habitat plants to beneficial insects*







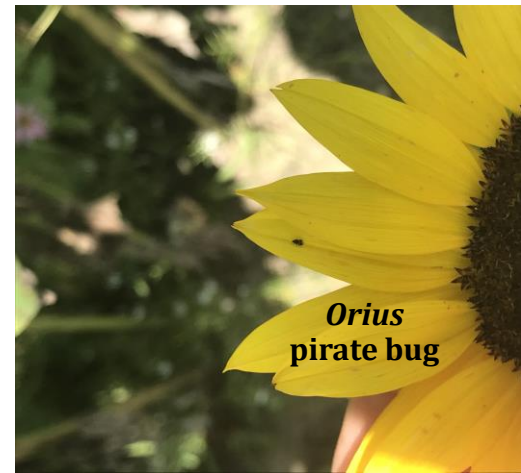
# Sunflower



Pale green assassin bug



Bees



*Orius*  
pirate bug





# Blue Cornflower

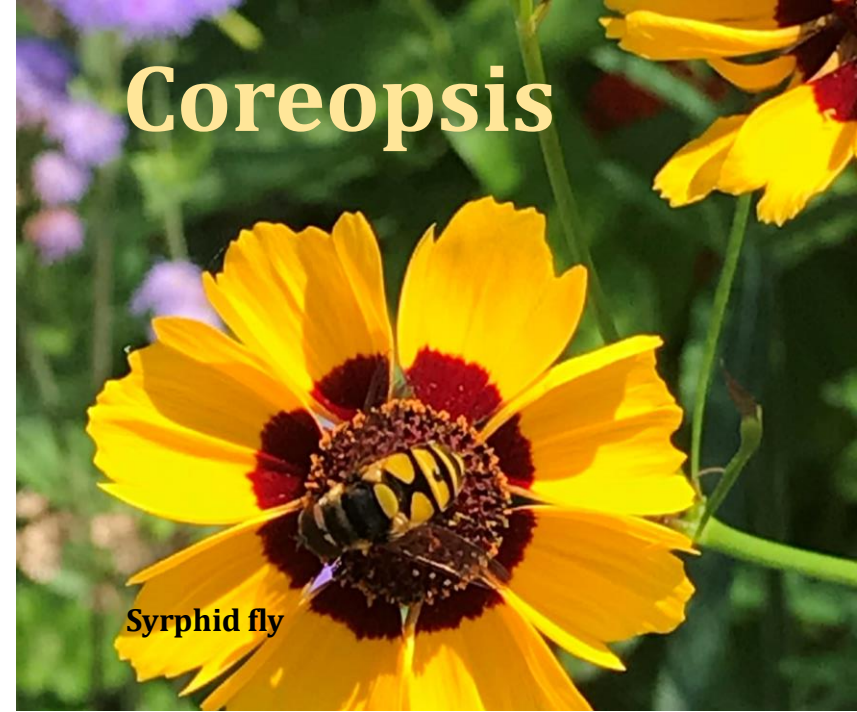
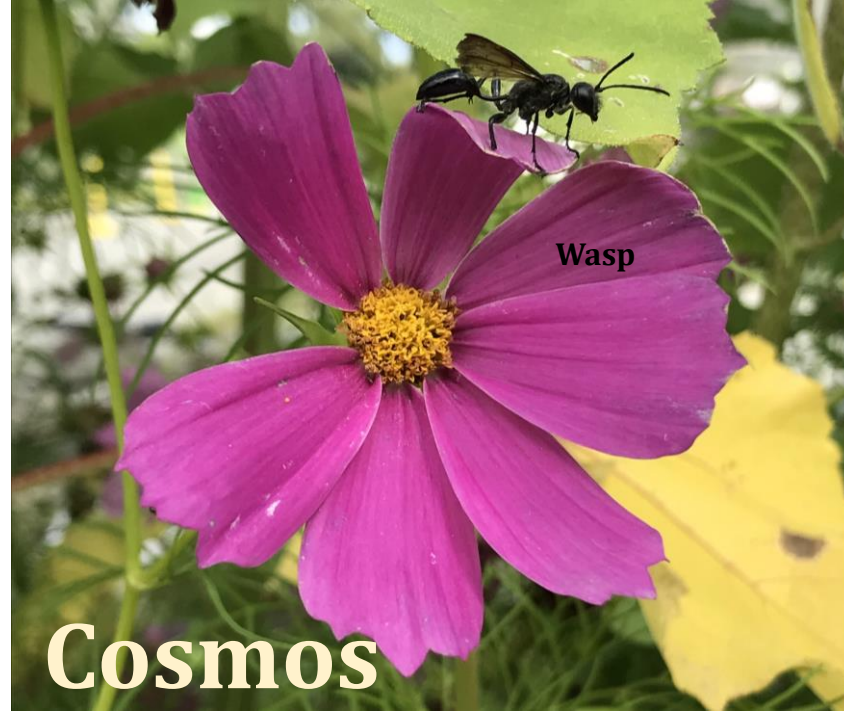
Syrphid fly

Bees

Syrphid fly

# Purple Vervain





**Coreopsis**

**Wasp**

**Syrphid fly**

**Cosmos**

**Bees**

***Orius*  
pirate bug**





Top plant to attract beneficial insects  
to manage aphids and spider mites





Alyssum





## Syrphid fly visiting alyssum





# Delay Debris Removal

- ❖ Stem nesting bees (i.e., leafcutter, mason, small carpenter) like hollow/pithy plants
- ❖ In fall leave dead flower stalks over winter for bees to hibernate.
- ❖ In spring, cut dead flower heads and leave stalks for females to lay eggs within and larvae to develop over summer.
- ❖ Delay mowing to allow early floral resources.

Wild bergamot  
(*Monarda fistulosa*)



Purple coneflower  
(*Echinacea purpurea*)



Goldenrod (*Solidago* sp.)



Hyssop (*Agastache* spp.)



Mountain mint  
(*Pycnanthemum* sp.)





# Take Home Messages

- ❖ You can make a difference in the survival of pollinators.
- ❖ Build your pollinator community both within your garden and beyond.
- ❖ Give it time to establish (sometimes a few years with perennials).
- ❖ Monitor hedges for beneficials & pests (you may rediscover one!)
- ❖ Find a combination that works for YOU!





In case you missed it!

Check out the [recording](#) and/or [slides](#) of the Un-Bee-lievable webinar for EMG volunteers in May—found on the web landing page of the Volunteer Portal <https://www.uvm.edu/node/249627> that provides a more in depth overview of the types of pollinators here in Vermont.





# Additional Beneficial Resources

Attracting Beneficial Insects with Native Flowering Plants: <http://www.canr.msu.edu/nativeplants/uploads/files/E2973.pdf>

Beneficial Insects: National Pesticide Information Center: <http://npic.orst.edu/envir/beneficial/index.html>

Beneficial Insects in NH Farms & Gardens (UNH): [https://extension.unh.edu/resources/files/Resource000499\\_Rep521.pdf](https://extension.unh.edu/resources/files/Resource000499_Rep521.pdf)

Creating Gardens for Pollinators:: <https://protectingbees.njaes.rutgers.edu/>

Field Guide to the Syrphidae of Northeastern North America: <http://www.canacoll.org/Diptera/Staff/Skevington/Syrphidae/Syrphidae.htm#General>

Flower Flies (Syrphidae) and Other Biological Control Agents for Aphids in Vegetable Crops: <http://anrcatalog.ucanr.edu/pdf/8285.pdf>

Habitat Planning for Beneficial Insects (Xerces Society) [https://xerces.org/sites/default/files/2018-05/16-020\\_01\\_XercesSoc\\_Habitat-Planning-for-Beneficial-Insects\\_web.pdf](https://xerces.org/sites/default/files/2018-05/16-020_01_XercesSoc_Habitat-Planning-for-Beneficial-Insects_web.pdf)

Native Bee Inventory & Monitoring Lab (USGS): [https://www.usgs.gov/centers/pwrc/science/native-bee-inventory-and-monitoring-lab?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pwrc/science/native-bee-inventory-and-monitoring-lab?qt-science_center_objects=0#qt-science_center_objects)

New England Conservation Cover for Pollinators - Installation Guide. (Xerces Society): <https://www.xerces.org/publications/habitat-installation-guides/new-england-conservation-cover-327-for-pollinators>

Pollinator Habitat Conservation. VT NRCS. <https://anr.vermont.gov/sites/anr/files/specialtopics/Alexander%20Presentation%20Pollinators%203-17-2016.pdf>

Pollinator Network (Cornell): <https://pollinator.cals.cornell.edu/>

Status & Trends of Wild Insect Pollinators in VT & Beyond:

[https://anr.vermont.gov/sites/anr/files/specialtopics/mark\\_kent\\_leif\\_ANR\\_presentation\\_compressed.pdf](https://anr.vermont.gov/sites/anr/files/specialtopics/mark_kent_leif_ANR_presentation_compressed.pdf)

VT Beekeepers Association: <https://www.vermontbeekeepers.org/72-apiology/712-list-of-honey-bee-forage-species-within-region-13-for-the-state-of-vt>

VT Bumble Bee Atlas: <http://val.vtecostudies.org/projects/bumble-bee-atlas/>

Wildlife Habitat Management: A Landowner's Guide CH31. Bees & other Pollinators (VT Fish & Wildlife): <https://vtfishandwildlife.com/node/1136>

Xerces Society Northeast Region: <http://xerces.org/pollinators-northeast-region/>



# Acknowledgments

Several images used in this presentation were obtained from many websites, too many to mention here. We appreciate all those who contributed to promoting the wellbeing of pollinators through their images.

This information is based on work supported by Green Works VT (The Vermont Nursery & Landscape Association, the Crop Protection and Pest Management Program [grant no. 2021-70006-35509/project accession no. 1027204] from the USDA National Institute of Food and Agriculture and the UVM Extension System and the College of Agriculture and Life Sciences.

Any opinions, findings, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the view of the US Dept. of Agriculture or other funding organizations.

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