

Supporting
Pollinators
Despite the
Threats of
Invasive
Species and
Pesticides

- **What are the Real Threats?**

Gary Fish

State Horticulturist

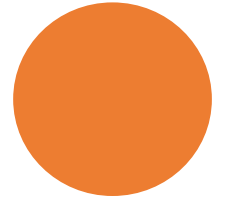
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First, a couple of invasive species updates

- Mile-a-minute vine
- and
- Jumping worms



Mile-a-Minute Vine

- Found at four Maine locations so far
 - Boothbay Harbor
 - Winthrop
 - Islesboro, and
 - Topsham
- Known as a hitchhiker plant
- On the do-not-sell list





Mile-a-Minute Vine

- Leaves are very triangular and not lobed at the base
- Stems have sparse but strong reflexed prickles, and
- Clasping leaf-like structures at the leaf base and flower stem (Ocrea)
- Pale green flowers are inconspicuous, and fruits are red, white, and blue



Look-alikes

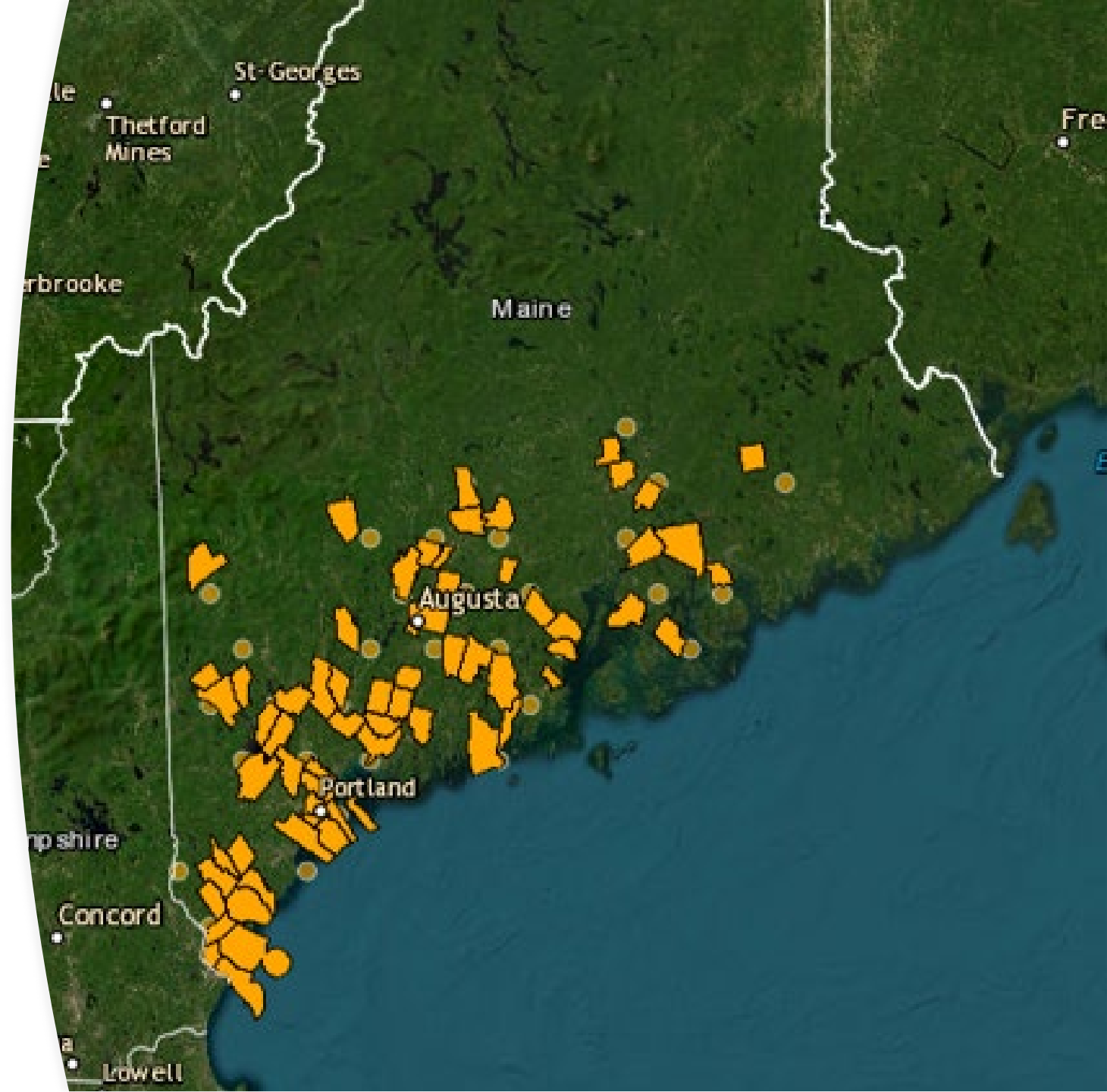
- Species that have been mistaken as Mile-a-Minute vine include:
 - tearthumbs,
 - bindweeds,
 - American hog-peanut,
 - poison ivy,
 - Asiatic bittersweet, and
 - climbing nightshade.



Who new worms are invasive too?

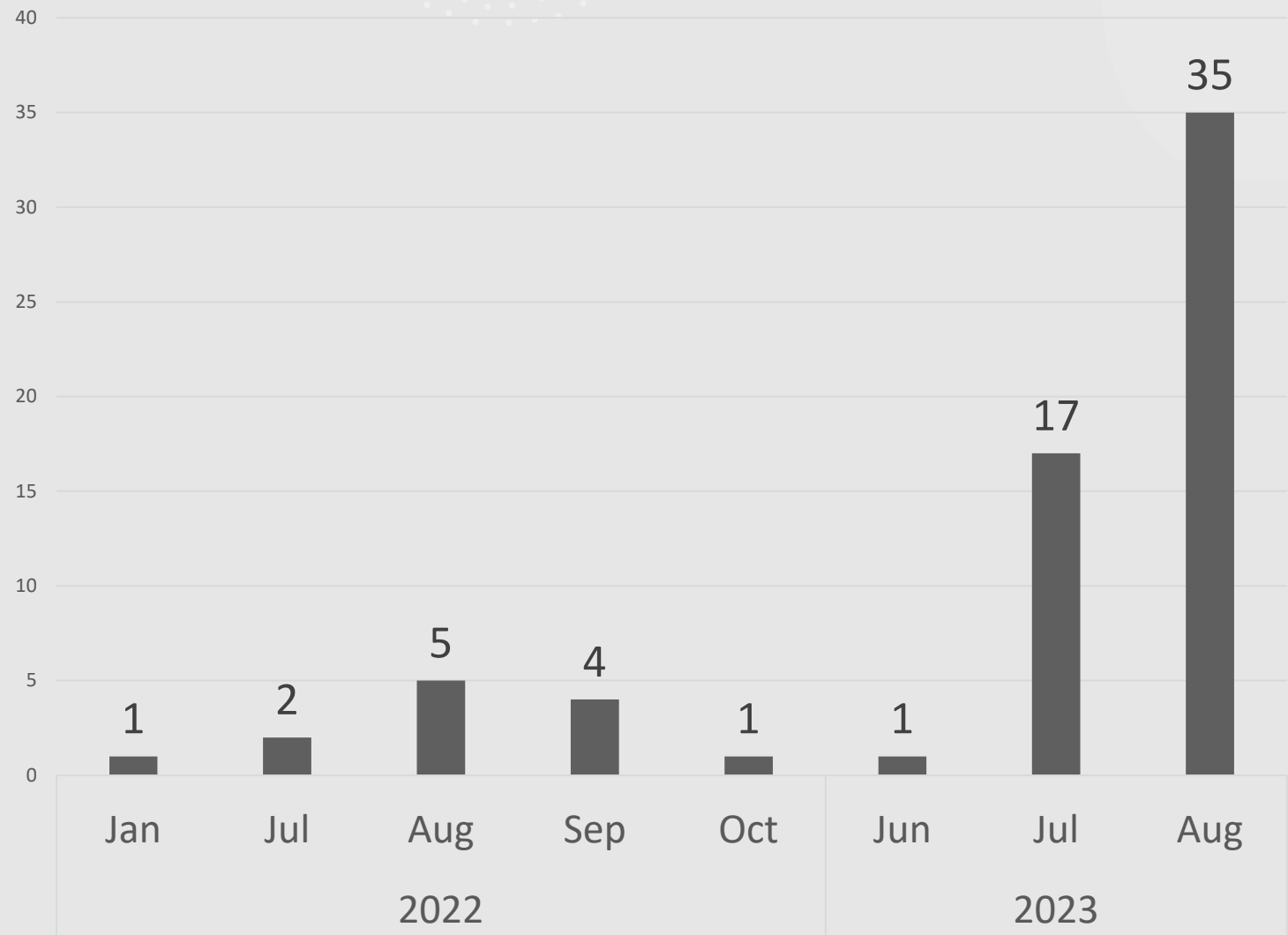
Jumping worms now widespread in Maine

- Reported in 13 of 16 counties
- Over 300 reports in 2023
- Reports increased by 10 x over 2022



Jumping Worm Report Form Stats

Date of Observation of Submitted Jumping Worm Photos (confirmed) 8/31/2023



Amyntas worm spp.

Jumping Worm, Crazy Worm, Snake Worm, Alabama Jumper

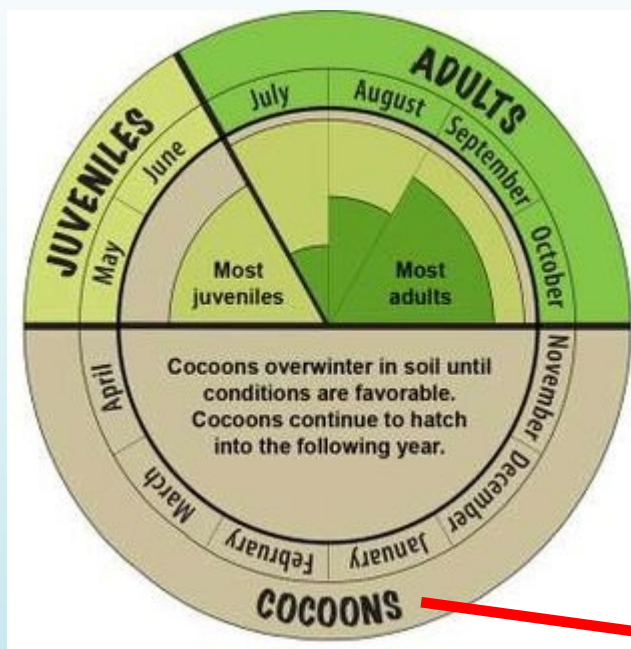
Characteristics

- Darker in color – appearing almost gray
- Glossy smooth skin
- Light milky white clitellum smooth to the body
- Very active, thrashing and jumping
- Moves like a snake
- Sheds its tail when handled
- Parthenogenic – asexual reproduction so it only takes one worm to start a family.



Amynthus tokioensis

Amynthus agrestis



Life Cycle

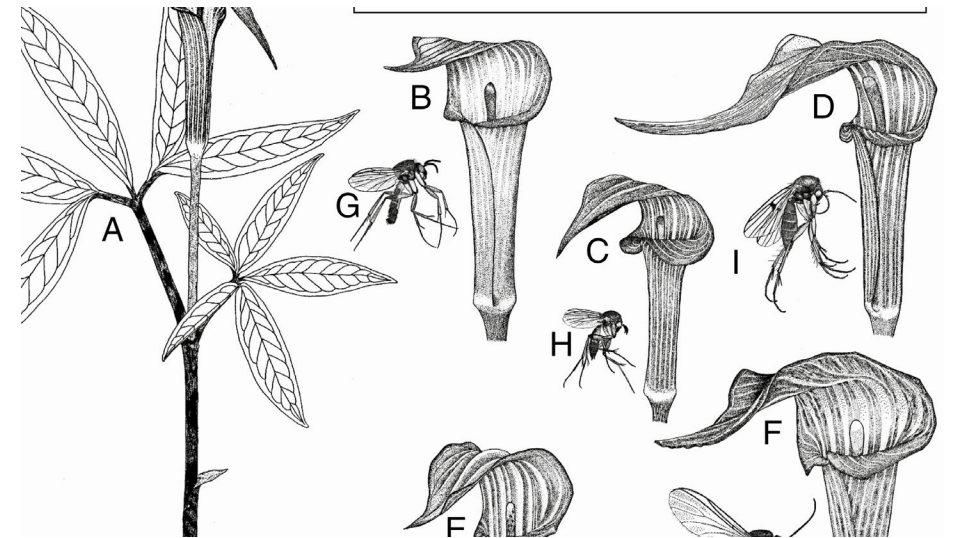


HOW ARE THEY SPREADING?



Are jumping worms a threat to pollinators?

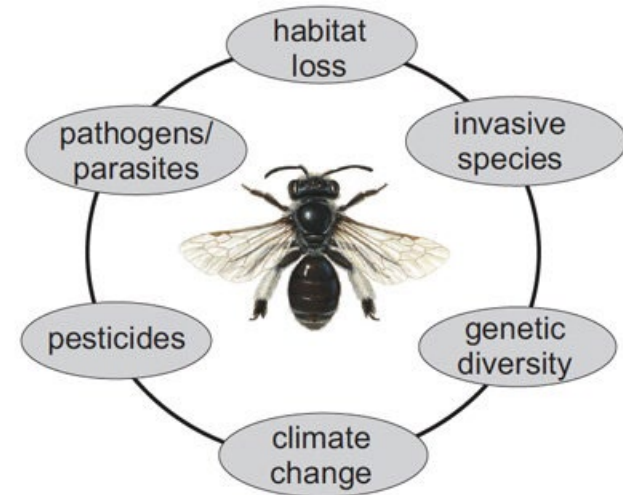
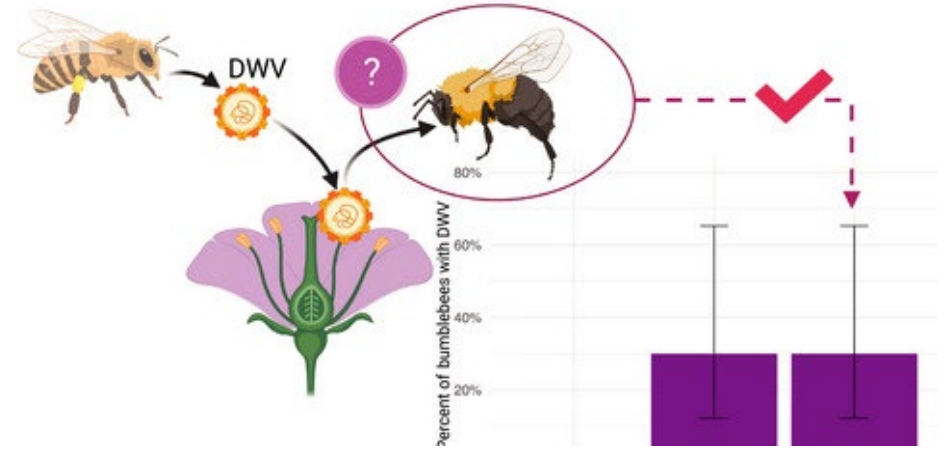
- YES - For some forest pollinators
- In highly affected hardwood forest areas, there are no understory plants
- Starflower provides pollen to halictid and andrenid bees and syrphid flies
- Jack-in-the-pulpit feeds fungus gnats



Back to the pollinators

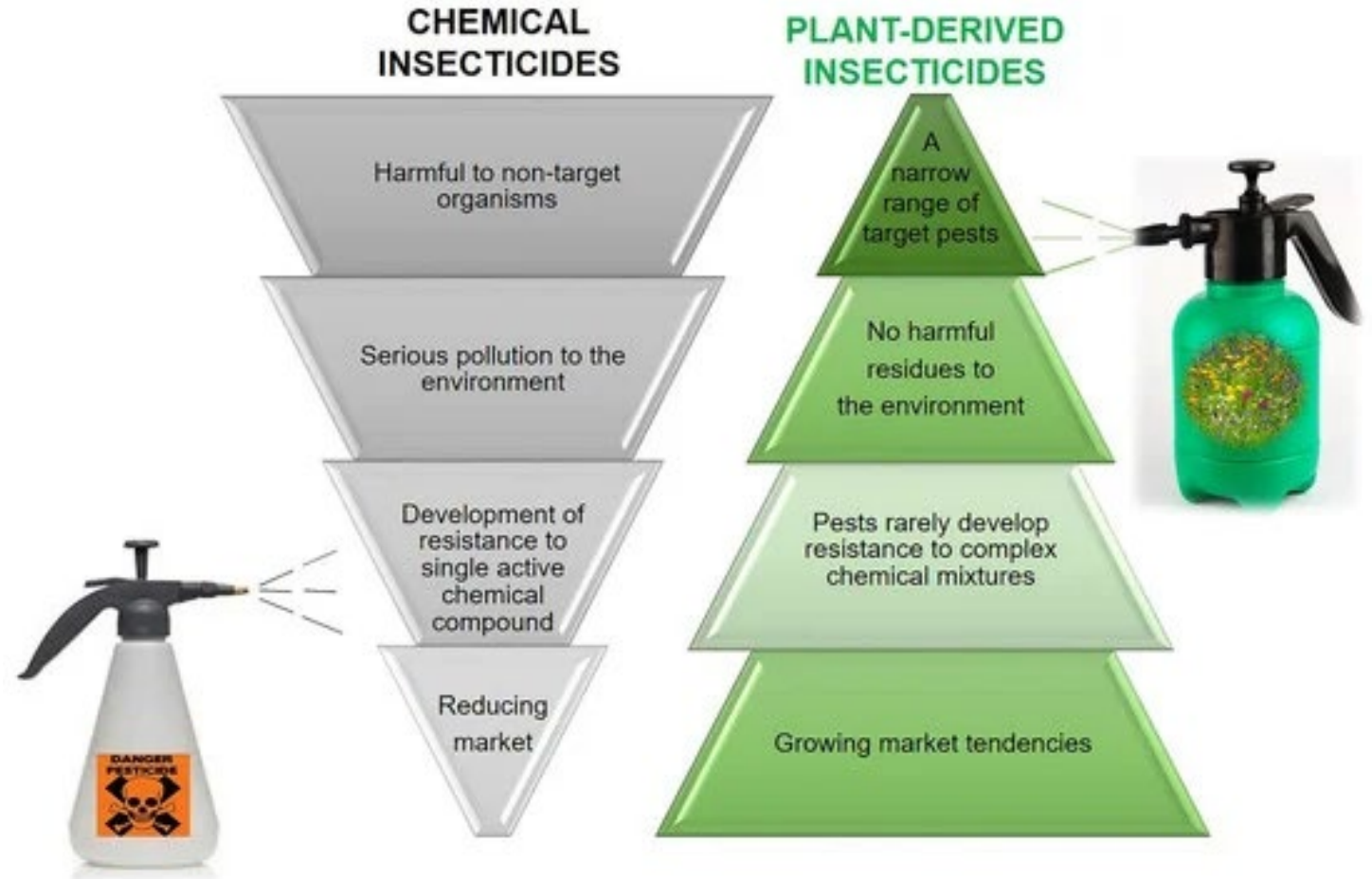
- What about pesticides?
- What about habitat loss?
- What about honey bees?
- What about climate change?

Can honeybees transmit deformed wing virus (DWV) to bumblebees through shared flowers?



Can we blame pesticides?

- They are an easy target
- The popular press is very misleading
- Charts like this one simplify and don't reflect reality
- We all are the drivers of pesticide use



What are the benefits of pesticides?



- Aesthetics

- Unblemished plants & produce



What are the benefits of pesticides?



- Bountiful harvest



BROWNTAIL MOTH



DEER TICK

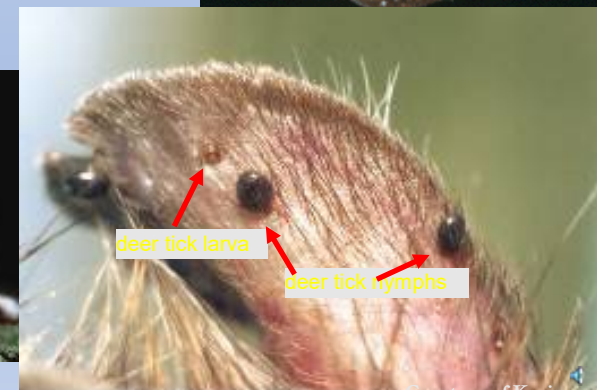
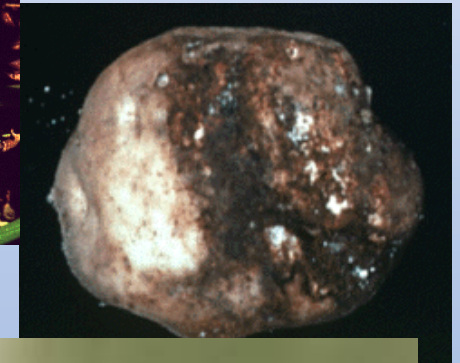
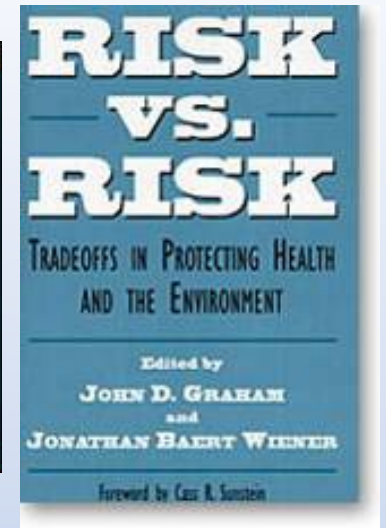
- Nuisance or public health pest control



OH FOR CRYING OUT LOUD ETHEL, STOP SCREAMING, JUST HOW BIG CAN ONE GYPSY MOTH BE?

Risk vs. Risk

- West Nile Virus & EEE
- Potato Late Blight Disease
- Lyme Disease
- Large crop yield reductions
- Food shortages



Courtesy of Kevin Byron

There is no easy button

- Some say, just ban all synthetic pesticides
- The cities that have done that are already re-thinking those decisions
- People's lawns and gardens stir up lots of emotions, especially when white grubs start decimating their lawn



Pesticides approved for organic grower use can be highly toxic to pollinators

Toxicity of Common Organic-Approved Pesticides to Pollinators

PESTICIDE	NON-TOXIC	LOW TOXICITY	HIGHLY TOXIC
Insecticides/Repellants/Pest Barriers			
<i>Bacillus thuringiensis</i> (Bt)	Green		
<i>Beauveria bassiana</i>			Red
<i>Cydia pomonella granulosis</i>	Green		
Diatomaceous Earth			Red
Garlic	Green		
Insecticidal Soap			Red
Kaolin Clay	Green		
Neem		Orange	
Horticultural Oil			Red
Pyrethrins			Red
Rotenone			Red
Sabadilla			Red
Spinosad			Red
Herbicides/Plant Growth Regulators/Adjuvants			
Adjuvants		Orange	
Com Gluten	Green		
Gibberellic Acid	Green		
Horticultural Vinegar		Orange	
Fungicides			
Copper		Orange	
Copper Sulfate			Red
Lime Sulfur	Green		
Sulfur			Red

Soaps and Oils, only when directly sprayed upon the pollinator

INVERTEBRATE CONSERVATION FACT SHEET
Organic-Approved Pesticides
Minimizing Risks to Pollinators

While organic farming offers significant environmental benefits, even some organic-approved pesticides can cause harm to pollinators.

By selecting the least toxic options and applying them when pollinators are not present, harm can be minimized.



Productive cropping systems do not have to rely on chemical inputs for pest control. Photograph by Matthew Shephard

Approximately four thousand species of bees are native to the United States. These wild insects provide crop pollination services, and are often specialized for foraging on particular flowers, such as tomatoes, squash, berries, orchard, or forage crops. This specialization results in efficient pollination, high yields, and larger fruit.

While the non-native European honey bee (*Apis mellifera*) is the most important managed crop pollinator, its numbers are in decline because of disease and other factors. This makes native bees, which contribute an estimated \$1 billion worth of crop pollination annually to the U.S. economy, more important than ever. Native bees are of particular importance to organic farmers because unlike honey bees, their populations can be supported without the use of antibiotics and other chemical inputs.

The reduced use of pesticides, as well as more sustainable management practices, makes organic farms an important asset in protecting our national pollinator resources. Many organic operators already have good numbers of wild bees. In some cases, these native bees can effectively provide all necessary crop pollination services when adequate habitat is available and low-toxicity management practices are implemented.

Unfortunately, however, even pesticide-approved for organic agriculture can cause significant harm to bees. This fact sheet provides a brief overview of how to select and apply pesticides for organic farm operations while minimizing pollinator mortality. Keep in mind that the same practices outlined here that help protect pollinators also may protect beneficial insects such as parasitoid wasps, predators like beetles, ladybugs and assassin bugs, lacewings, and others. The presence of these insects can further reduce pest pressure and the need for chemical treatment.

Written by Eric Mader
 The Xerces Society for Invertebrate Conservation
 www.xerces.org

Even natural products affect bees

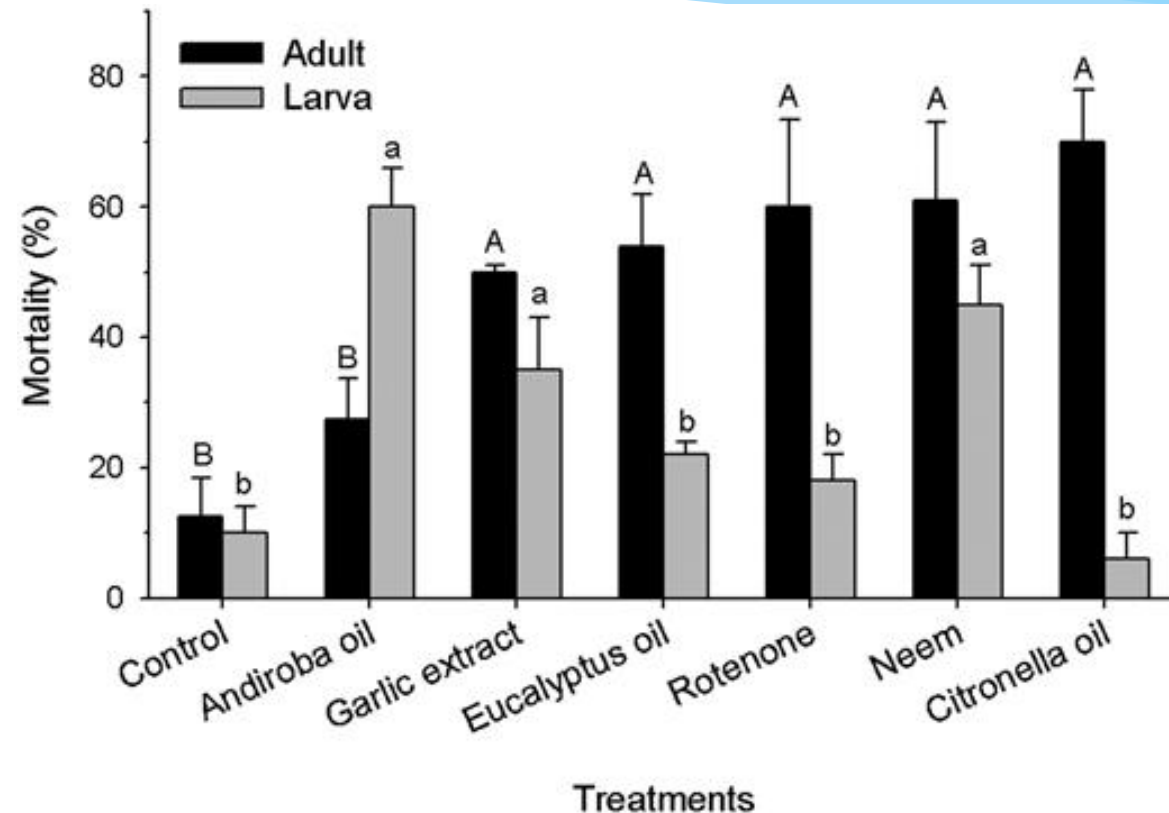
* Acute Toxicity and Sublethal Effects to Honey Bees

* Andiroba oil, Garlic extract, Eucalyptus oil, Rotenone, Neem oil and Citronella oil applied to adults and fed to larvae

* All but Andiroba oil caused significant mortality to adult bees

* Andiroba, Garlic and Neem caused significant larval mortality

* These may work like insect growth regulators preventing moulting

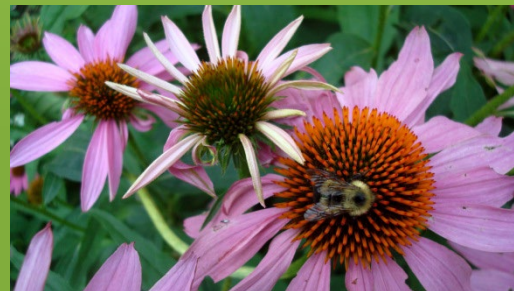


Management practices can make a big difference

- Mowing treatment plots and removing the clover blossoms just before treatment prevented the impact on bumble bees

Table 3. Absence of acute adverse effects on *Bombus impatiens* colonies after 2 weeks' exposure to turf with flowering white clover that had bloomed after the sward was mown to remove flowers present at the time of treatment.

Treatment	Adult workers per hive ^a		Immature bees per hive ^b		Honey pots	Total weight (g) of live adults ^c	Hive weight (g)
	Live	Dead	Live	Dead			
Clothianidin	93±9	11±4	12±8	6±1	52±6	13.0±1.3	585±11
Chlorantraniliprole	130±12*	7±2	8±4	6±2	69±6	16.7±1.6	621±16
Untreated	81±8	7±2	0	3±1	56±3	11.3±0.9	588±8



What about glyphosate?

- No national pesticide control agency classifies it as a carcinogen
- Even the WHO does not classify it as a carcinogen
- Lost lawsuits do not prove anything
- Most recent lawsuits have been thrown out or Bayer has prevailed

Litigation | Product Liability | Environment | Health | Litigation

Bayer on winning streak in Roundup litigation after huge initial losses

By **Brendan Pierson**

September 2, 2022 2:38 PM EDT · Updated a year ago



Aa



A photograph of a diverse garden. In the foreground, there are large green leaves of a squash plant, several bright yellow sunflowers, and a dense patch of small white flowers. A wooden beehive is visible in the middle ground. The background is filled with tall, thin trees and dense green foliage. The overall scene is a vibrant and well-maintained garden.

Bee-Friendly Gardens have
Shelter, Plant Diversity, Lots of
Blooms, Water, Some Bare Soil



Social Behavior of Bees

- Social
 - 10% of bee species in the U.S.
 - Several generations in a nest at the same time
 - Cooperation in caring for young
 - Division of labor
 - Bumble and honey bees
- Solitary
 - 90% of bee species in the U.S.
 - Each female constructs and provisions her own nest

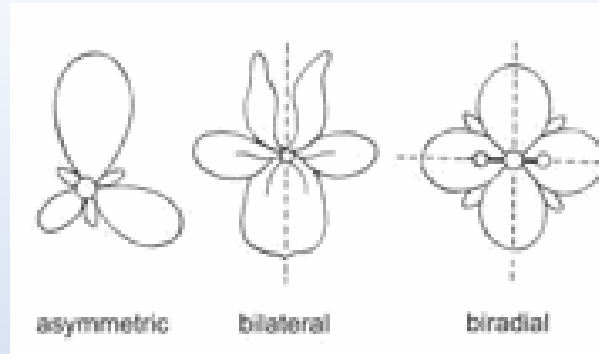


Foraging Selectivity

- Nectar - sugar and amino acids
- Pollen – protein
- Most gather nectar from several different flower species
 - Depends mostly on tongue length and skill
- Pollen collection is usually more selective
 - Some will use any flowering plant, many focus on one species of plant

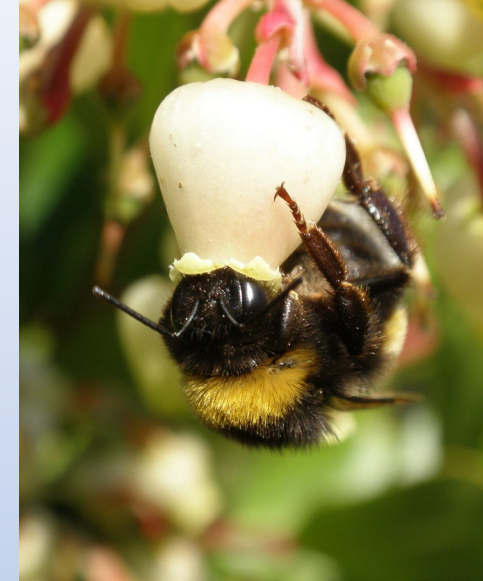


Floral Resources



- Bee flowers

- Bilateral symmetry
- Tube-like or bell-shaped with a nectar reservoir
- Some are complex to receive reward
- Yellow, white, blue or purple with UV markers



Colors attract specific groups

Bees like blue, purple, white and yellow

Butterflies like orange, pink and red

Beetles prefer big fleshy disk shaped smelly white and green flowers

Wasps and flies like yellow, pink and white



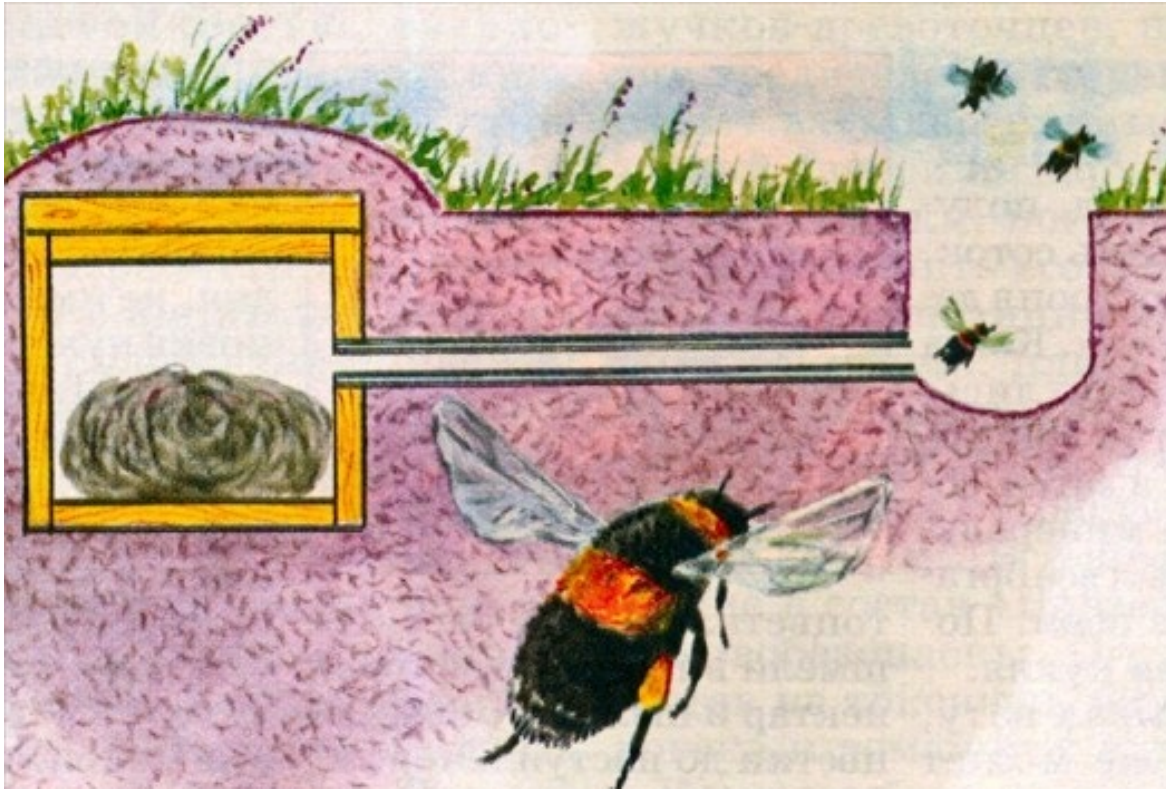
Nesting

- Ground 70%
- Stem 30%
- Cavity
 - Bumble and honey bees

Nesting Resources – Ground Nesters

- Areas of bare or sparsely vegetated soil
 - Loose
 - Well drained
 - Full sun
 - Several yards across
- Flat and/or banked areas





Nesting Resources – Cavity Nesters

- Dead trees, snags, or fallen logs
- Base of bunch grasses
 - Old rodent nests often found under grassy tussocks



Nesting Resources – Stem Nesters

- Pithy, soft centered or hollow stems
 - Sumac
 - Box elder
 - Elderberry
 - Raspberry
 - Allium
 - Asparagus
 - Sedum
 - Sunflower



CAVITY-NESTING NATIVE BEES



Small Carpenter Bees, *Ceratina* spp.

Mason Bees, *Osmia* spp.



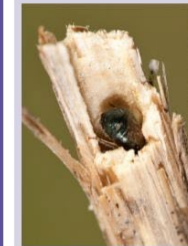
CAVITY NEST

EGG

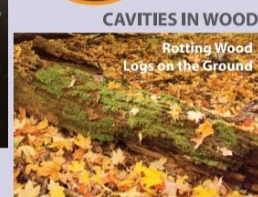
BEE BREAD



CAVITIES IN ROCKS



CAVITIES IN PLANT STEMS



CAVITIES IN WOOD
Rotting Wood Logs on the Ground



Standing Dead Trees



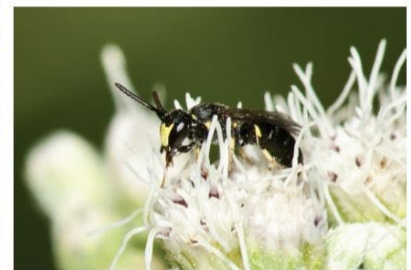
Female



Male

Some species nest in the ground

Leafcutter Bees, *Megachile* spp.



Yellow-Faced Bees, *Hylaeus* spp.

How to Create Habitat for Stem-nesting Bees



WINTER

Leave dead flower stalks in-tact 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-occurring open stems, start a nest, then lay an egg on the pollen balls. Larvae eat the pollen.

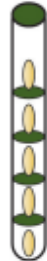


SUMMER

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.



Graphics and content: Colleen Satyshur, Elaine Evans, Heather Holm, Sarah Foltz-Jordan

Nests for Native Bees

www.xerces.org



Pollinator-Friendly Gardens

- Plant diversity of flowering plants
- With overlapping bloom periods throughout the season
- Provide water (small puddles, plants that catch water and dew)
- Provide some shelter
- Replace invasive plants



Questions

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