

POLLINATORS ON PRODUCE FARMS

Vermont Vegetable and Berry Growers Association Annual Meeting
January 24th, 2023

Laura Johnson
UVM Extension Pollinator Support Specialist



NORTHEAST
EXTENSION
RISK
MANAGEMENT
EDUCATION



THE UNIVERSITY OF VERMONT
EXTENSION

Not all crops pollinated by bees or only bees, but most of our produce crops are at least in part pollinated by bees.



The significance of bees.

Bees contribute 80% of all pollination services, while other groups contribute 20%.

Value of all pollination services in US by bees estimated to be \$18 billion.

7 groups of diverse pollinators, but not all created equal for *crop* pollination (flies, beetles, wasps, moths, butterflies, birds, and bees).

The State of Vermont's Wild Bees 2022

BEES IN AGRICULTURE

174 bee species have been recorded visiting food crops within the state

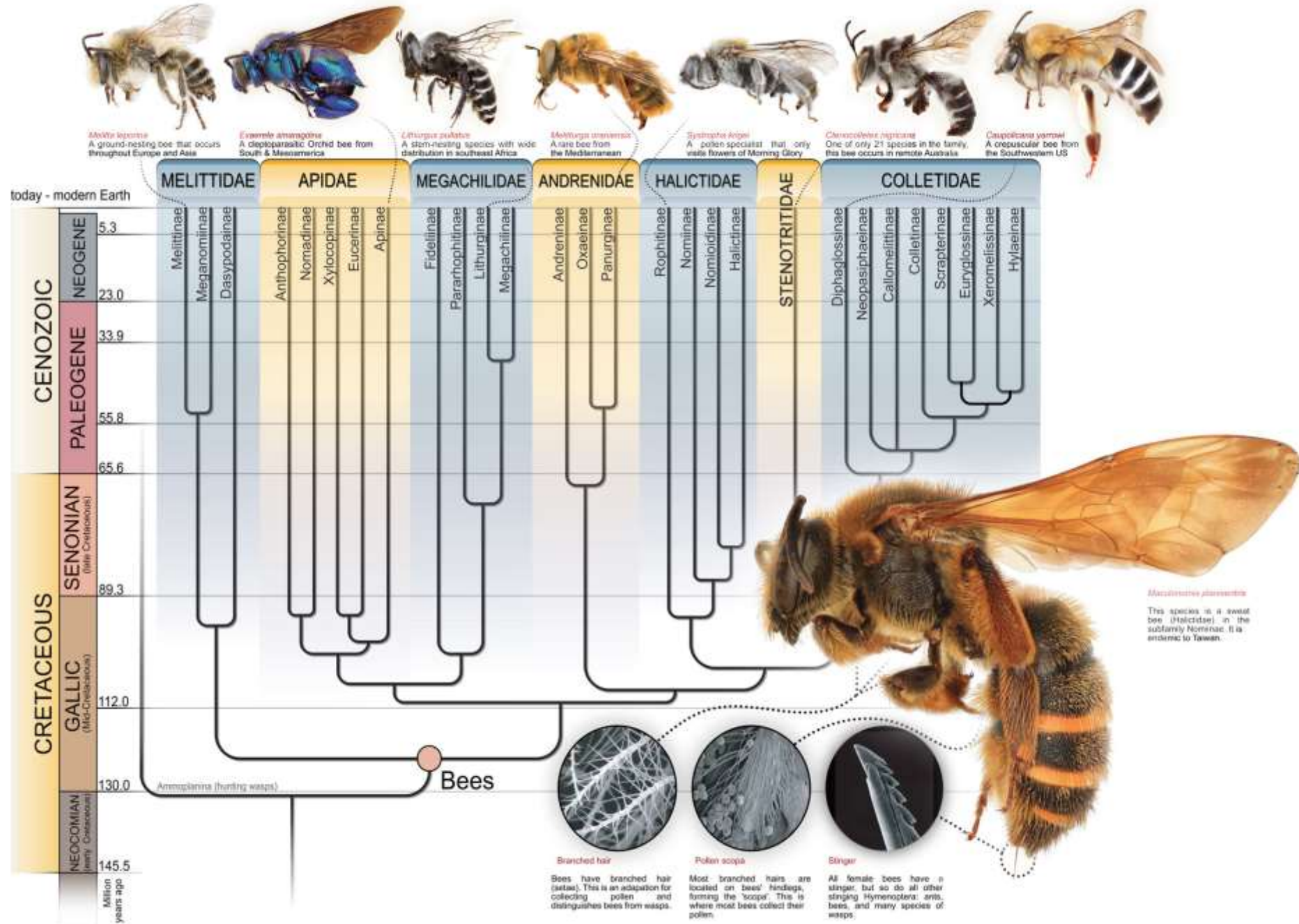


Common Eastern Bumble Bee (*Bombus impatiens*) worker visiting a squash flower. © Kent McFarland

352 bee species in
Vermont.

Bees vary greatly:

- Size
- Appearance
- Behavior
- Effectiveness as pollinators
- Floral choices
- Nesting locations



Pollinators face threats:

- Loss of habitat and resource diversity
- Pests and pathogens
- Pesticides
- Climate change

Study Reveals Striking Decline of Vermont's Bumble Bees



What do pollinator declines mean for growers? Inconsistencies in the field.

“it was our worst yielding crop ever with a very low (but healthy) fruit count per acre. The only thing I can attribute it to was the wet July potentially resulting in a lack of pollination.....”



Image credit: Julianna Wilson

“Lack of pollinator activity was the primary driver in low cucurbit yields.”

“We noticed a steep decline in visible activity...”

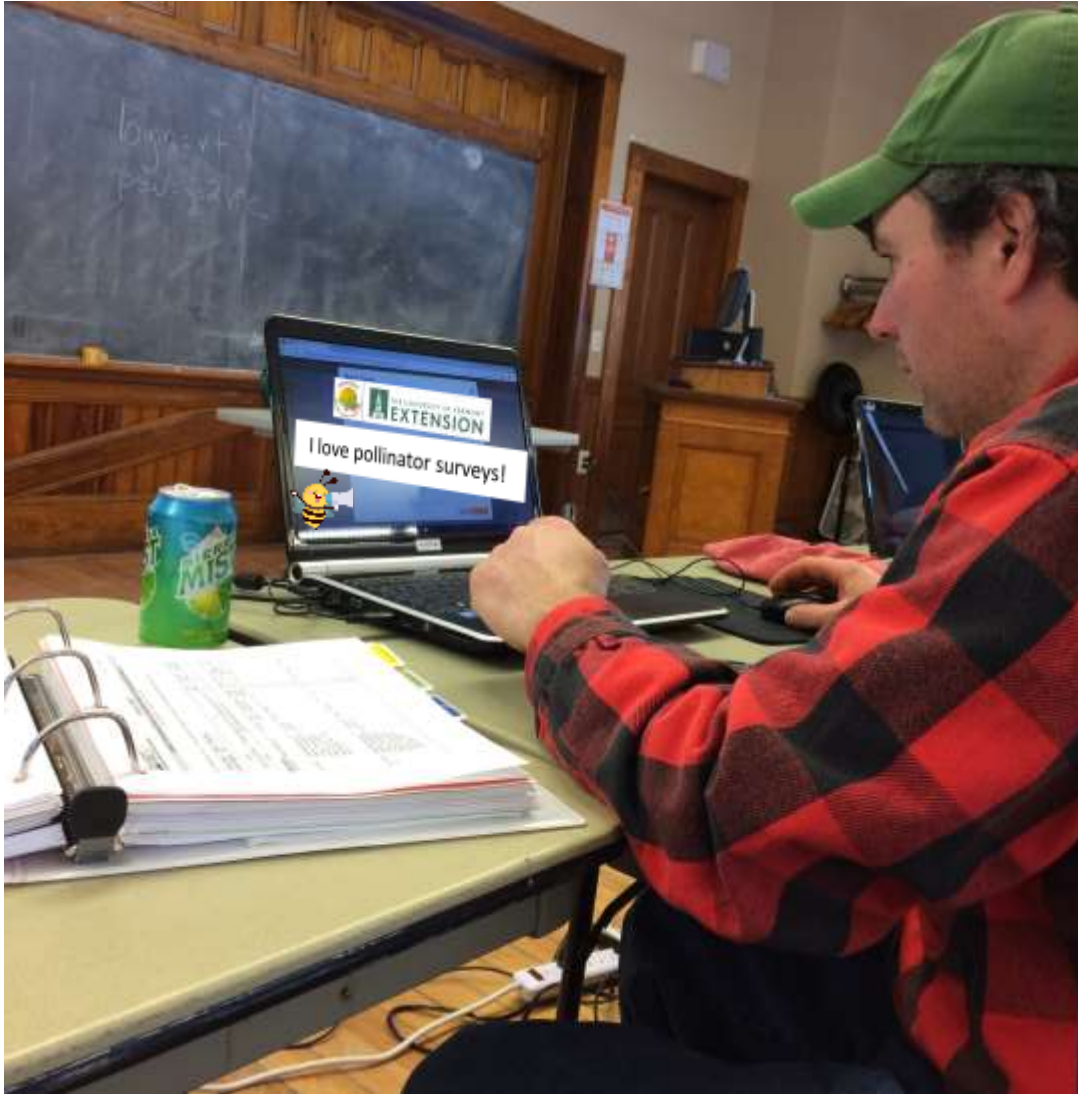
“This was the first year we suffered from poor pollination of early zucchini and melons. Was a real drag!”



Image: Jim Cane, USDA, ARS



Grower Needs Assessment Survey – 102 responses



- **64%** said lack of sufficient pollination poses a risk to the **quality or yield** of their crops.
- **72%** said their **knowledge about practices** to support pollinators was **low to moderate**.
- **94%** would like to learn more about pollinator habitat plantings.



NORTHEAST
EXTENSION
RISK
MANAGEMENT
EDUCATION



THE UNIVERSITY OF VERMONT
EXTENSION

Cover crop mixes with season long blooms

Cover crop mix trials

1. Bear Roots Farm
2. Cedar Circle Farm and Education Center
3. Chamberlin's Garden and Farm Market
4. Deep Meadow Farm
5. Golden Russet Farm
6. Honey Field Farm
7. Luna Bleu Farm
8. MacLennan Farm
9. Newmont Farm
10. Root 5 Farm
11. Intervale Community Farm
12. Edgewater Farm



mustard



buckwheat



sunflower



sunn hemp



crimson clover



red, white, yellow sweet clovers



hairy vetch



alsike clover

Not pictured: balansa and alfalfa clovers.

DATA SHEET FOR MONITORING CROP POLLINATION

Farm Name: Berry Berry Good Farm Field Name: Strawberries, for Scatter, on blk plastic

Size of field monitored (acres or sq feet): 0.5-1 ac? Crop: Strawberries

OPTIONAL: Date commercial bees placed in field: _____ Date bees removed: _____

Commercial bee type (circle): Bumble bee Honey bee Both Neither
at site, I think our watered

INSTRUCTIONS: Visit your crop field or orchard at start of bloom, during peak bloom, and again near end of bloom. If possible, visit when weather conditions are good and bees are mostly likely to be out (e.g. temp. above 55°F, wind is 10mph or less, sunny). Go about 1/3 of the way into the field, then walk slowly for 10 minutes toward (and maybe past) the center of the field, looking at one row and counting all the bees and other insects you see visiting crop flowers, marking the chart below as you go. Count honey bees, bumble bees, and all other bees or insects you see that are touching open flowers.

Date sampled	Number of bumble bees working flowers e.g. ###	Number of honey bees working flowers	Number of other bees or insects working flowers	Temperature, wind, and sky condition (circle)
Visit 1: Start bloom Date: <u>5/10/2020</u> Person's name sampling: Sample time, 2:15pm	<i>one flying low, nest safety?</i> #####	#####	##### 1 (M)	<55F <u>56-85F</u> >85F *Calm, <u>Light breeze</u> , Gentle breeze Part sun <u>Sunny</u> Cloudy
Visit 2: Peak bloom Date: ____/____/____ Person's name sampling:				<55F 56-85F >85F *Calm, Light breeze, Gentle breeze Part sun Sunny Cloudy
Visit 3: Near end of bloom Date: ____/____/____ Person's name sampling:				<55F 56-85F >85F *Calm, Light breeze, Gentle breeze Part sun Sunny Cloudy

*National Weather Service visual clues for estimating wind speed: Calm, smoke rises vertically with little if any drift. Light breeze (4-7mph), wind felt on face, leaves rustle. Gentle breeze (8-12mph), leaves in constant motion, wind

Pollinator Monitoring

- 10-minutes
- Slowly walk down a row
- Looking at one row only
- Count honey bees, bumble bees, and “other bees and insects”
- Only what landed on open blossoms was foraging

Bees seen foraging in cover crops

Bumble bees



NORTHEAST
EXTENSION
RISK
MANAGEMENT
EDUCATION



THE UNIVERSITY OF VERMONT
EXTENSION

Bees seen foraging in cover crops

Green metallic bees



Small dark bees



Bees seen foraging in cover crops

Squash bees

Image credit: Andy Chamberlin



Honey bees



NORTHEAST
EXTENSION
RISK
MANAGEMENT
EDUCATION



THE UNIVERSITY OF VERMONT
EXTENSION

Other pollinators foraging in cover crops

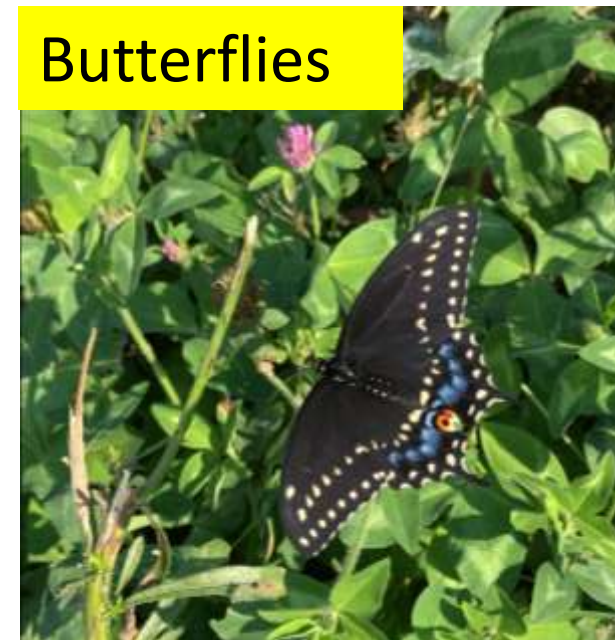
Flies



Moths



Butterflies



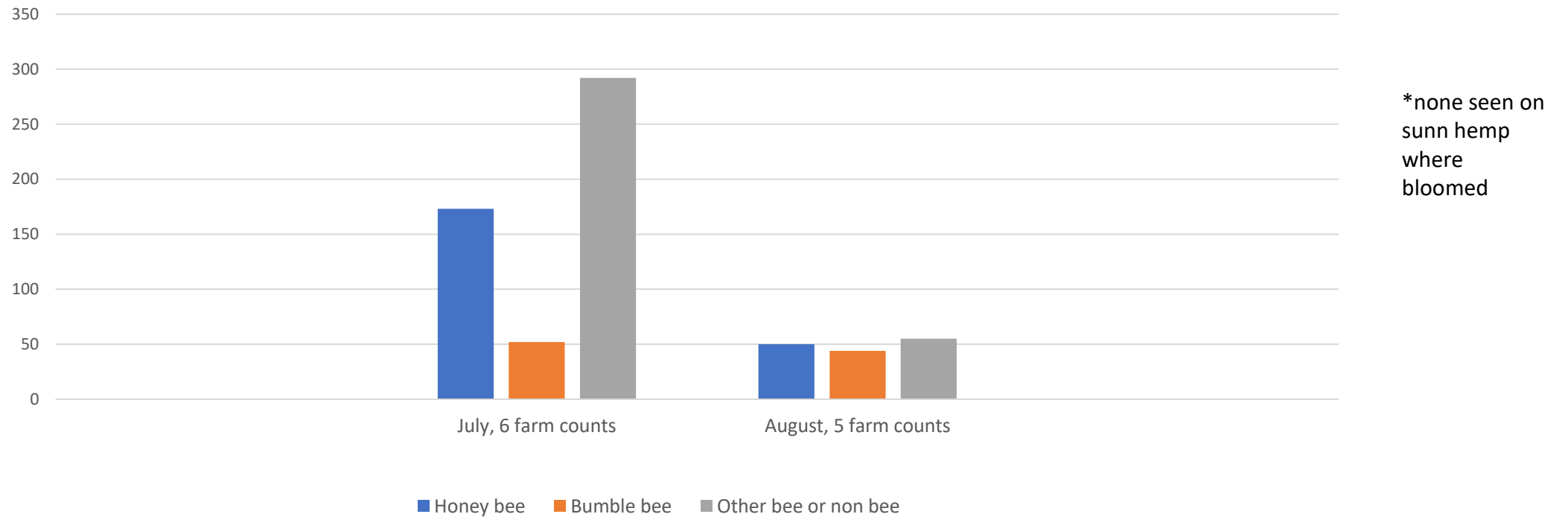
Beetles



Wasps



Total # pollinating insects counted over 10 minutes in cover crops



Shifts in abundance and diversity within the season.

species	Number of Records
Bombus impatiens	377
Bombus bimaculatus	373
Andrena carlini	326
Andrena vicina	301
Bombus ternarius	168
Bombus vagans	159
Andrena carolina	132
Bombus griseocollis	91
Bombus perplexus	74
Andrena rufosignata	55
Augochlorella aurata	46
Lasioglossum versatum	44
Lasioglossum quebecense	34
Apis mellifera	25
Lasioglossum lineatulum	22
Lasioglossum cressonii	20
Andrena nivalis	19
Lasioglossum imitatum	18
Augochlora pura	18
Andrena bradleyi	18
Andrena imitatrix	17
Xylocopa virginica	15
Andrena crataegi	15
Andrena rugosa	14

Highbush Blueberry



species	Number of Records
Halictus confusus	8
Ceratina calcarata	6
Augochlorella aurata	5
Ceratina mikmaqi	4
Osmia pumila	3
Nomada cressonii	3
Bombus impatiens	3
Andrena melanothroa	3
Nomada articulata	2
Lasioglossum leucomum	2
Lasioglossum imitatum	2
Halictus rubicundus	2
Andrena cressonii	2
Osmia atriventris	1
Nomada pygmaea	1
Nomada denticulata	1
Lasioglossum versatum	1
Lasioglossum planatum	1
Lasioglossum pectorale	1
Lasioglossum lineatulum	1
Lasioglossum hitchensi	1
Lasioglossum foxii	1
Lasioglossum fattigi	1

Strawberries




species	Number of Records
Peponapis pruinosa	33
Bombus impatiens	9
Augochlorella aurata	2
Melissodes bimaculatus	1
Chelostoma rapunculi	1
Bombus bimaculatus	1
Augochlora pura	1
Grand Total	48

Squash



Shifts in abundance and diversity of bees within crop type.



In the Northeast US, squash and pumpkin flowers are visited by at least 38 species of bees, but just a few species account for most flower visits.

Brochu KK, Fleischer SJ, López-Urbe MM (2021). Biology and pollination services of the squash bee, *Eucera (Peponapis) pruinosa*. Penn State Extension (Booklet) <https://lopezuribelab.com/squash-bee-biology>.

BUT REALLY, JUST “KNOW YOUR 5”

Bees seen in squash.

1. Bumble bees
2. Squash bees
3. Small sweat bees
4. Green metallic bees
5. Longhorned bees
(Honey bees)



Small sweat bees



Green metallic bees



Two spotted long horned bees



Bumble bees (multiple spp) (and honey bees)



Squash bees

Image credit: Andy Chamberlin

To support these key crop pollinators, Pollinator Friendly Farms also have.....

1. Flowering hedgerows
2. Wildflowers in non-production spaces
3. Nesting sites and clean water
4. $\geq 5''$ high mowing for re-growth and low growing flowers
5. An integrated pest and pollinator management (IPPM) approach



Mowed cover crop at The Intervale Community Farm

Mowed cover crop at Golden Russet Farm



Planning for pollinator friendly farming

Welcome to the Vermont Vegetable and Berry Growers Association!

VVBGA MEMBER PROGRAMS

Produce Safety & CAPS

Soil Health



Insert here, the VVBGA Pollinator Support Plan, planning and documentation tool

Annual Meeting

Commercial
Membership

Additional Resources

Member Login

Create an Account



Pollinator Support Plan Sections: address threats pollinators are facing and how to support them.

- Farm description
- Cover crop selection and management
- Dedicated pollinator habitat
- Mowing practices
- Pesticide use
- Pollinator monitoring
- Tillage practices
- Water Sources
- Use of managed pollinators



NORTHEAST
EXTENSION
RISK
MANAGEMENT
EDUCATION



THE UNIVERSITY OF VERMONT
EXTENSION

A uniquely VVBGA project.



*VVBGA accreditation for pollinator friendly farms?

Vote.....



UVM Extension Pollinator Support Program



Support the adoption of farm practices that promote the well-being of pollinators, through education and applied research, in collaboration with other agencies, organizations, and people doing similar work.

Thank You



Laura.O.Johnson@uvm.edu

UVM Extension

Pollinator Support Specialist

1-802-476-2003 ext. 222