Un-BEE lievable Pollinators

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Pollinators Are Stressed

Pollination mediated by animals (insect, avian, mammal) or other factors (wind, water)

US pollination by honey bees approx. $19 billion crop value - by other insect pollinators, $10 billion (in 2010)

Stressors:

- Habitat Loss (conversion, fragmentation, agricultural intensification/monocultures)
- Diseases, Parasites, Viruses, Disorders (colony collapse)
- Pesticides (direct contact, avoidance of treated crops)
- Climate change (geographical shifts)
Non-Bee Insect Pollinators

Unique Benefits

Non-bee pollinators tend to deposit less pollen per flower visit, but visit more frequently.

Provide pollination ‘insurance’ – are more adaptable to land use changes than bees.

- Use resources from a diverse landscape (cover, alternative food sources, etc.)

Flies are second to bees for pollination - Some fly species commercially reared for pollination services.

Some provide pest control services to commercial growers (syrphids, tachinids, etc.)

For many insects, their value as pollinators is yet to be determined.
What Are We Doing?

Habitat plantings provide pollen, nectars, attracted prey, refuge & reproduction sites for beneficial insects.

**Objective:** Evaluate the effectiveness of annual & perennial habitat hedges to attract pollinators & other beneficial insects to growing areas to support biological control of common greenhouse, high tunnel & nursery pests.
Established habitat hedgerows of (mostly native) annual plants (approx. 10 x 3ft ‘30 ft2’)

Some harvestable annual habitat plants (to attract consumer attention)

Transplants & direct seed (to provide floral resources all season)

Primarily observed for syrphids & other pollinators that provide pest management

Also observed perennials in established display gardens during bloom periods

Collected data 1x month

Year 1 of at least 3 more(maybe more!)
Annual Habitat Hedge Choices

- Indian Blanket
- Wild Cosmos
- Zinnia
- Plains Coreopsis
- Sweet Alyssum
- Blue Cornflower
- Sunflower
- Marigold
Examples

Raised Bed Outside

Beds in Ground Outside
Examples

Raised Bed Inside

Outside Cut Flower Garden
What Did We See?

A lot of visitors were observed!

Of particular interest: Syrphids (87%), Orius (11%), several species of lady beetles (2%) & many, many others.
Diptera - Syrphidae Family: Hoverflies, Flower flies, Syrphid flies

Over 6,000 species in 200 genera described

Adults feed on pollen & nectars

- Important pollinators (more so than bees in some systems – high latitudes, elevation)
- Many are effective pollinator due to hairy bodies, others not so much

Mimic bees/wasps to scare off predators

- 1 pair wings (bees have 2 pairs)
- Mostly short bristle-like antennae (bees have long)

Larvae (maggots) that feed on insects, decaying matter, fungi or bacteria
Many overwinter as pupa in litter layers

Adults emerge in spring & seek nectar &/or sugary aphid honeydew (poop)

Suck nectars & absorb pollens along with it (need proteins for egg laying & sugars for flight energy)

Lay eggs near aphid colonies

Several generations per year

Many adults active April-November

Flowering plants encourage early establishment & overwintering
Syrphid Diversity

- **Neoascia sp.**
- **Toxomerus sp.**
- **Allograpta obliqua**
- **Mallota posticata**
- **Eristalis tenax** (Drone fly)
- **Melanostoma mellinum**
- **Chrysotoxum sp.**

- Aphids
- Decaying matter

Rat tail maggot
What Did We See?

Over 260 syrphids observed on annual plantings

Alyssum most attractive followed by cosmos.

Syrphids Within Habitat Hedges

- Alyssum: 61%
- Cosmos: 12%
- Coreopsis
- Indian Blanket
- Cornflower
- Marigold
- Sunflower
- Zinnia
What Did We See?

Over 130 syrphids on observed perennials

- **Liatris** (Gayfeather)
- **Anise hyssop**
- **Astibles**
- **Echinacea purpurea** (purple coneflower)
- **Yarrow**
- **Rudbeckias** (coneflowers/black eyed susans)
- **Coreopsis** (Moonbeam)

*Dendrathema* ‘Rhumba’ Mum

> 11%

5-10%
What Did We See?

Colors Attractive to Syrphids

- Orange: 20%
- Red/Pink: 12%
- White: 30%
- Purple/Blue: 27%
- Yellow: 11%
What Else Did We See?

Pollinator killers -
Jagged Ambush Bugs
(on mountain mint)

Tachinid Flies - Parasites
of caterpillars & beetles

Bee Flies (Bombyliidae) – some larvae feed on moth larvae, others flick eggs into ground bee nests where larvae feed on ground bees/wasps (bad for other pollinators)

Parasitized Japanese Beetles by Tachinid fly
Zinnias (f.yi JB really likes zinnias)

Poecilanthrax tegminipennis
Bombylius major
Project Highlights

Established a link between educators, farm managers & students from a local academy that assisted with planting of habitat hedges & data collection.

Produced consumer awareness signs & brochure (in folder) to educate about importance of habitat for all pollinators.
Bring in beneficial insects to nurseries that attack pests to help avoid the use of chemical insecticides.

Focus on diverse habitat plantings of that bloom all season long & all day.

Protect pollinators from direct pesticide exposure:

- Treat plants that are/when least attractive
- Long before bloom time with systemics
- Early or late in day (when bees not foraging)
- Select least toxic chemistries (consult your supplier!!!)
- Read directions & apply at correct rates
Pollinator Resources


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


NRCS Planting Guides for Native Pollinators: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/plantmaterials/technical/publications/?cid=stelprdb1044847


Pollinator Partnership: http://pollinator.org/

Protecting Bees and Other Pollinators from Pesticides (EPA): https://www.epa.gov/pollinator-protection

Selecting Plants for Pollinators (Northeast): http://pollinator.org/PDFs/Adirondack.rx2.pdf

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

Questions?

Thank You!
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http://www.uvm.edu/~entlab/

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