Importance of Wild Bees in NY Apple Production and Factors That Maximize Their Pollination Services

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A simple view of the world

Apple + HoneyBee = Fruit
A more realistic view of the world

Apple + Wild bees = Fruit
1. Quantifying bee abundance and species richness

2. Quantifying per-visit-effectiveness

3. Quantifying seed set

4. Factors that drive wild bee presence in apple orchards

5. A new partnership with apple growers.
1. Quantifying abundance and species richness

Total number bee species: 104
1. Quantifying abundance and species richness

Increasing Native Wild Bee Abundance
But are these wild bees **EFFECTIVE** pollinators?
2. Measuring per-visit effectiveness

![Graph showing the number of pollen grains per visit for different types of bees.](image)

**Visit type**
- All visits
- Nectar
- Pollen

**No. pollen grains/flower**

- **Honey Bee**: Orange bars
- **Wild Bee**: Blue bars

* N > P

The graph indicates a higher number of pollen grains for Honey Bees compared to Wild Bees, especially in nectar visits. The asterisk (*) denotes a statistically significant difference (N > P).
Wild Bee Foraging Style
Honeybee Foraging Style
3. Measuring impact of wild bees on seed set

2000 apples later...
3. Measuring impact of wild bees on seed set

- Wild Bee Abundance: Increased seed set
- Wild Bee Species Richness: Increased seed set
- Honey Bee Abundance: No effect on seed set
What factors drive wild bee abundance and diversity?
4. Drivers of bee abundance and diversity in apple orchards

M. Park et al., 2015

Wild abundance

Wild richness

P < 0.05

P < 0.01

% natural habitat

Simple → Complex
4. Drivers of bee abundance and diversity in apple orchards

Pesticides

M. Park et al., 2015

![Graph showing the relationship between pesticide use index and bee abundance and richness.](image)

Low intensity  pesticide use index  High intensity

insecticide

fungicide
4. Drivers of bee abundance and diversity in apple orchards

Pesticides: Fungicides vs. Insecticides

Fungicides, not insecticides, impact bee pollinators

M. Park et al., 2015
Summary

- Wild bees are abundant & diverse in NY apple orchards
- Wild bees are more effective pollinators (on a per-visit basis) than honey bees
- Wild bee abundance and species richness are positively correlated with apple seed set, whereas honey bee abundance shows no such relationship
- Natural habitat and pesticide use are major drivers of wild bee abundance and diversity in NY apple orchards

**Bottom line:** NY apple orchards are remarkably well buffered against the ups and downs of honey bee abundance. Many apple growers are shifting to reliance on wild bees for apple pollination.
THE NORTHEAST POLLINATOR PARTNERSHIP

A partnership between scientists and apple growers to create a deeper understanding of the biodiversity, abundance, and value of wild bees.

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Website: http://www.northeastpollinatorpartnership.org/
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Ranked #2 in US apple production
Other products arising from this research:

On-line pollen reference library:
http://blogs.cornell.edu/pollengrains/

Guide to wild pollinators in eastern apple orchards:
http://entomology.cals.cornell.edu/extension/wild-pollinators

Northeast Pollinator Partnership:
http://www.northeastpollinatorpartnership.org/
Acknowledgements

Growers:
44 orchard owners in NY

Collaborators:
Art Agnello (Cornell)
Ian Merwin (Cornell)
Susan Brown (Cornell)
Mike Bilton (Apple Leaf)
Jim Eve (Eve Farm Services)
Brian Caldwell (Cornell)

Field and lab assistance:
18 undergraduates &
temporary technicians

Graduate Student:
Dr. Mia Park

Post Docs:
Dr. EJ Blitzer
Dr. Laura Russo

Funding agencies: