Food Security and Pollinators

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The Importance of Pollinators

- 80 - 96% of angiosperms require pollinators for reproduction
- 1/3 of the food that we eat
- Support and maintain ecosystem services:
  - recreation, climate regulation, erosion control, raw materials production, cultural services
Pollination and Food Production Services
1000 of 1200 common crops are pollinator dependent

1/3 of every bite of food we eat (McGregor 1976, Buchmann and Nabhan 1997)

Support of meat and dairy production – alfalfa production

 Declines in production associated with pollinator declines (Klein et al. 2005)
Value of pollinator services

$217 \text{ billion global crop production from insect pollination} \\
\text{Gallai et al. (2008)}

84\% \text{ of European crops depend on animal pollination} \\
\text{Williams (1994)}

$6.8 \text{ billion from honey bees in US} \\
$3.1 \text{ billion for native bees in US} \\
\text{(from Losey and Vaughan 2003)}

$2 \text{ billion in Canadian Agriculture} \\
\text{AAFC (2016)}
Vulnerability of Agricultural Exports to Loss of Pollinators

- >50% Pollinator Dependent
- 25-50% Pollinator Dependent
- 10-24% Pollinator Dependent
- >10% Pollinator Dependent
- Not an OAS State

Total Agricultural Exports (2005) = $172 Billion
IMPORTANCE OF POLLINATORS TO U.S. AGRICULTURAL CROPS: VALUE OF AGRICULTURAL PRODUCTION (2007)
Foods Requiring Pollination

- Vanilla
- Sugar Cane
- Cinnamon
- Sesame Seeds
- Lettuce
- Onions
- Cheese
- Mustard
- Butter
- Meat
- Canola Oil
- Pickles
- Tomato
- Ketchup
- Potato
Globally: disturbing signs of decline

- Loss of habitat
- Disease
- Parasites
- Invasive species
- Pesticides
Lost pollinators = Lost pollinator functions
Securing Pollination Services Means
Supporting Pollinator Habitat
Everywhere
How do urban areas fit into the pollination equation?
Pollinators in Urban Landscapes

- Present Globally
- Patterns of diversity (urban more diverse)
- Associated with floral species (native and exotic)
- Completing full life cycle in city
- Species of conservation/ag importance

We still need to define
- Pollination systems
- Drivers of service provision
- Drivers of community structure
- Ecosystem services
What do urban pollinators prefer?

• Are urban and natural land bee communities similar?
• What characterizes a more attractive resource patch?
• Is there anything unique about the urban landscape?
• Can we use this information to support pollination and food production in cities?
What factors might impact where you find pollinators in the city?

- Distance to the urban-wild land interface
- Distance to riparian areas (nesting sites)
- Land use (residential vs. commercial)
- Proximity to open space
- Patch (habitat) characteristics (size, density, local richness)
- Disturbance (traffic)

*Pollution and toxins*
Where are we finding bees and why?

California poppy locations within the East Bay

Legend
- Wildland Poppies
- Urban Poppies
- Riparian Areas
- Natural Urban Line
- Urban Green/Open Space
• Urban and Wild Land bee communities are different.
• Urban and Wild Land bee communities respond to different factors.
• Resource size and density is a dominant factor in urban landscapes, landuse is not.
Mean Abundance and Richness

[Graph showing mean abundance and richness for different species in wildland and urban environments.]

- B. californicus
- B. voseki
- Pedrena spp.
- Hal-large
- Hal-medium
- Hal-small
- Honeybee
- Megachile spp.

Mean number of visitors observed across all counts.
## Models of Foraging

<table>
<thead>
<tr>
<th>Community</th>
<th>Urban</th>
<th>Wild</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abundance</td>
<td>poppy area (+), flw density (+)</td>
<td>flw density (+), floral richness (+)</td>
</tr>
<tr>
<td>Richness</td>
<td>poppy area (+), flw density (+), dist wui (-), dist rip (+)</td>
<td>flw density (+)</td>
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<table>
<thead>
<tr>
<th>Groups</th>
<th>Urban</th>
<th>Wild</th>
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<tbody>
<tr>
<td>Andrena spp.</td>
<td>dist rip (+)</td>
<td>ns model</td>
</tr>
<tr>
<td>Apis mellifera</td>
<td>flw density (+), floral richness (+)</td>
<td>patch area (-), poppy area (+)</td>
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<tr>
<td>B. califronicus</td>
<td>ns model</td>
<td>ns model</td>
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<tr>
<td>B. vosensenskii</td>
<td>poppy area (+), flw density (+), dist rip (+)</td>
<td>flw density (+), floral richness (+)</td>
</tr>
<tr>
<td>Halictids-small</td>
<td>dist rip (+), dist wui (-)</td>
<td>flw density (+)</td>
</tr>
<tr>
<td>Halictids-medium</td>
<td>dist wui (-)</td>
<td>poppy area (+), patch area (-), road class (-)</td>
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<tr>
<td>Halictids-large</td>
<td>ns model</td>
<td>ns model</td>
</tr>
<tr>
<td>Megachile spp.</td>
<td>flw density (+)</td>
<td>ns model</td>
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</table>
CITIES ARE, AND WILL CONTINUE TO BE, HIGHLY MANAGED LANDSCAPES. WHY NOT MANAGE THEM FOR THE PURPOSE OF SUPPORTING AND PROMOTING FUNCTIONAL POLLINATOR ECOSYSTEMS?
Securing Pollination Services Means Supporting Pollinator Habitat Everywhere
If every resident in Berkeley, California...

...planted one good bee plant in a flower pot...

...there would be 102,743 potential individual foraging and nesting sites scattered throughout the city.
If every household in Berkeley, California...

...had bee-appropriate landscaping...

Berkeley Area: 27.1 km² (10.5 sq mi)
Approximate number single family occupied units in Berkeley is 4000 and 26,000 renter occupied units (dividing by half for number of sites, 13,000)
Average landscaped area (2 x 5 m) = 15 m²
(4000 + 13,000) x 15m² = 255,000 m² or 0.255 km² of bee nesting and foraging habitat.

...an additional 1% of Berkeley could be bee habitat.

Currently 7% of landuse is green space.
Our mission is to promote the health of pollinators, critical to food and ecosystems, through conservation, education, and research.
Signature initiatives include:
- NAPPC (North American Pollinator Protection Campaign)
- Pollinator Week
- Original Research
- Pollinator Policy
- EcoRegional Planting Guides
- SHARE Mapping
Science-based
The one-stop shop for pollinator conservation issues in North America
North American Pollinator Protection Campaign (NAPPC)

Some of our partners…
Pollinators need plants that bloom all season. Select local native plants that support local native pollinators.
Use EcoRegional Planting Guides

FREE Ecoregional Guides
And an APP
WILD FOR BEES

Meet The Bees
Every Third Bite
Burt’s For Bees
Go Wild
Wild Eats
Bee Hotels

We’re building BEE HOTELS!
Because bees-in-need deserve rest indeed!

DISCOVER MORE

In partnership with Sustainable T.O, Fairmont Hotels & Resort and Pollinator Partnerships Canada.

MEET THE BEES
Isabella Rossellini gives us an extraordinary look at life inside the hive.

EVERY THIRD BITE
Some of the most nutritious and delicious foods wouldn’t exist without bees.

BURT’S FOR BEES
A world without bees is unimaginable. We won’t let it happen.
2. Reduce or Eliminate Pesticide Use
3. Register a S.H.A.R.E. site
Bee Friendly Farming (BFF) is a program that provides guidelines for farmers and growers interested in promoting pollinator health on their lands.
4. Reach out to others – inform and inspire
Tools that let everyone help:
5. Support local bees and beekeepers.
6. Conserve all of our resources; use less and reduce your impact.
7. Support the work of groups promoting science based, practical efforts for pollinators.
Happy Pollinator Week

Where to get info
www.pollinator.org