

Pollinator Declines

Pollinator populations throughout Canada are declining alarmingly. The main causes are habitat disturbance, habitat loss, habitat fragmentation, disease, loss of food sources, and overuse of pesticides. Migratory pollinators are facing a special problem, because if their distance for migration between patches of habitat is too long they can die during the migration. Pesticides are especially harmful as they not only kill and harm organisms, but also destroy their habitats¹. For example, the western honey bee from the US, declined in population by over 40%, from 5.9 million to 3.4 million, from 1947 to 2005¹³.

Local Kingston Issues



1. FARMING

- Pesticides used in local agriculture affect groundwater and native pollinator declines.
- Pollinators provide a large boost to economies worldwide as they increase the yield and production of agricultural crops needed as food and trade resources⁶.
- Agriculture has become highly dependent on insect pollinators to efficiently increase productivity with the growing demand for food resources¹⁶

2. GARDENING

- Flowering plants that don't get pollinated do not produce any fruit or reproductive output for the next season.
- Huge implications for food production as the majority of trees, fruits, grains and vegetables require pollination to be sustainable into the next growing season⁶.

3. ECOSYSTEM SERVICES

- Ecosystem services increase biodiversity while providing a clean, renewable, natural environment with long term benefits. Ex: water purification, air cleaning, pollination⁶



Native vs. Non-Native Plant Species

Invasive plant and animal species have been shown to cause plant-pollination disruptions by outcompeting native plants¹. Some insects have evolved an obligate dependence on native plants (can only use one plant species as a resource)¹. Also, native plants will attract native pollinators³. By using native perennial plants we can minimize recurring costs because these species will persist independently for decades while annuals and biennials need re-seeding⁵. Native plants outperform non-native plants. Insect pollinator-plant interactions have detrimental losses when faced with the increasing stress of habitat loss as insects show higher sensitivity and lower adaptability to environmental stressors⁴.

The **HOW TO** on making a pollinator-friendly garden? ³

1. **Plan your space** – REMEMBER it's not how many but the colour and scent that attracts pollinators!
2. **Pick plants that continuously bloom** (spring-fall)
3. **Pick native plants** to the Kingston area
4. **Pick plants full of nectar and pollen**
5. **Pick bright colours** (blue, yellow, red, violet, and orange) that smell nice!
6. **Plants should range shapes and sizes** (trumpet, cones, cup-shaped, radial)
7. **Provide housing structures**
8. **Provide food:** nuts in the winter for birds
9. **Provide a water source:** bird bath, dripping bottle
10. **Avoid using pesticides and herbicides** – Homemade remedies: garlic spray, plant-derived pesticides & apply after sundown.
11. **Provide sites and materials for overwintering** (tall grasses)
12. If possible, **reduce the amount of lawn grass** as they offer little food or shelter



Pollinator Profiles

Bees: Bee's are the most common pollinators. There are 1000 species of native, however, surprisingly to some, the honeybee is not native. The honeybee was imported from Eurasia for the agriculture of honey. The honeybees in the wild have escaped from domesticated hives. Their populations are declining because of parasitic mites infesting hives, pesticides, and transmission of bacterial diseases between hives¹⁴.



Wasps: Wasps are mainly predatory carnivores eating small insects, and will even feed them to their young. They can also drink flower nectar. They can be beneficial to gardens because they prey on insects that damage plants. The most common wasps in Canada are yellow jackets, baldfaced hornets, and paper wasps.

They can be social insects (colonies) or solitary insects. Wasps can be identified by their thin waists and antennae¹⁴.

Flies: True flies have one pair of wings, a soft body, short antennae, and no stinger. There is a very large number of flies so they contribute to a large portion of pollination. The most important fly pollinators are hover flies and bee flies but there are many others that also feed on nectar.



These most common flies mimic bee's to distinguish them from a bee. Look at their flying pattern because they hover like hummingbirds¹⁴.



Butterflies & Moths: There are few species of butterflies and moths that live in Canada. They are not major pollinators because they generally sit at the edge of flowers and reach their long tongues to the nectar without having to crawl in and touch the pollen.

However, some moths must crawl into deep flowers to reach the nectar, forcing them to come into contact with pollen. Butterflies feed during the day while moths feed at night. Also, butterflies lay eggs and cocoons on host plants, so be careful! Ontario has 148 butterfly species!¹⁴



Beetles: Beetles are the largest insect order with thousands of species just in Canada. Most do not visit flowers, but some do use pollen and nectar as a food source or some will actually eat the flowers or insects on the flowers. They visit larger flowers that are flat or bowl shaped for a place to land. Beetles are generally more clumsy and rough with the flowers so they can sometimes damage the flowers¹⁴.

Pollinator Facts

Ecosystem Economics

- An estimated value of agriculture crop production via the honey bee pollinator was totalled at \$14.6 billion in 2000 (\$3 billion via native species)⁴
- \$253 billion is the assessment of insect pollinator value of world agriculture as of 2005⁶.
- Native pollinators (mainly bees) are primarily responsible for \$3.07 billion of fruits and vegetables produced in the United States⁸



Population Percentages

- 12 species furnish nearly 90% of world's diet energy⁴
- 1/3 of Canadian food is dependent on insect pollination⁴
- ¾ of the world's flowering plants rely on pollination
- 70% of the 250,000 flowering plant species need pollinators as they do moisture, sunlight and soil fertility⁴
- In Europe, syphid flies and bee populations have declined since 1980⁷

Local Facts

- Forty-eight species of hummingbirds (over 14% of the family) are vulnerable, threatened or endangered¹⁰.
- 20% of Ontario's butterfly species are of provincial conservation concern⁹
- Yellow banded bumble bee, eastern green drake mayfly, nine-spotted lady beetle, and atypid purseweb spider are considered high priority candidates for conservation in Ontario¹¹
- Monarch butterflies originally from eastern North America spending winter in Mexico have reach an all time low population due to loss of overwintering habitat, loss of breeding habitat from pesticides, and severe weather¹⁵.



Pollinator Preferences:

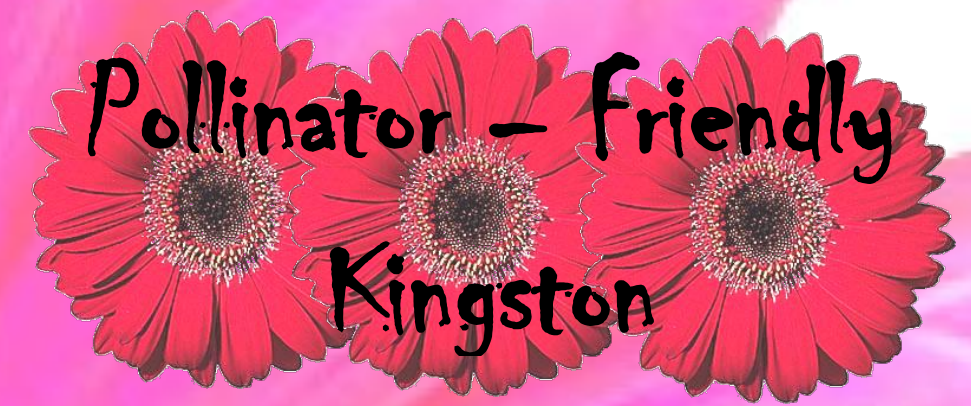
Trait	Bees	Beetles	Butterflies	Flies	Moths
Colour	White Yellow Blue UV	White Green	Bright Red Purple	Pale Dull Brown Purple	Pale red Purple Pink White
Shape	Shallow Tubular	Large Magnolia	Narrow tube Landing	Shallow Funnel Trap-like	Tubular ¹²

Who carries these plants?



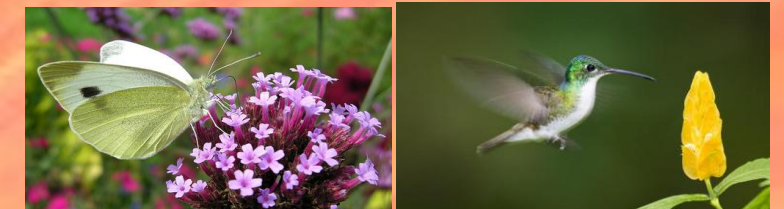
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What is Pollination?

A process where pollen from the stamen (male organ) is transferred to the stigma (female organ) of another flower & fertilizes it¹



Pollinators: animals that pollinate >90% of flowering plants¹

- Pollinators are used as bioindicators for environmental change and predicting species diversity.
- An increasing recognition worldwide of the importance of non-honeybee insect pollinators is needed for increasing protection in encouraging nesting sites for conservation of native pollinators²

What's the Concern?

The global populations of pollinators are declining. The main cause is from human induced changes. Pollinators are important because they sustain ecosystem services, agriculture, and local gardening.



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