POWER OF POLLINATORS

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Why is pollination important?
DO YOU LIKE
CHOCOLATE?
COFFEE?
ALMONDS?
APPLES?
BANANAS?
TEQUILA?
“Pollination is one of the most important mechanisms in the maintenance and promotion of biodiversity and, in general, life on Earth. Pollination benefits society by increasing food security and improving livelihoods. “

-Convention on Biological Diversity,
Sustaining Life on Earth
Q: Insect pollinators help produce products amounting to $\underline{\phantom{0}}$ annually in the U.S.

A. $20$ thousand
B. $20$ million
C. $20$ billion
D. $20$ trillion
Answer: $20 BILLION

Foods
Beverages
Spices & Condiments
Fibers
Medicines
70% of the world’s crop plants depend on pollination (apples, bananas, blueberries, chocolate, coffee, melons, potatoes, pumpkins, almonds, tequila)

Wildlife depends on production of berries and fruits for food
So, how does pollination work?

Pollination 101
Pollen is moved from the stamen to the pistil where the ovules are fertilized.

Stamen: male part of the flower

Pistil: female part of the flower
So then what?

When the pollen reaches the ovule, this results in the production of fertile seeds.

Some plants will self fertilize, others will cross pollinate.

What’s the difference?
Self-pollination vs. Cross-pollination

With cross pollination, you get more genetic diversity in the plan... this leads to a plant that is better able to survive.

Cloning vs. Breeding
So *THEN* what?

After fertilization, some plants produce fruit in order to attract animals...

Animals eat the fruit and disperse the seeds

Other plants, simply produce the seed and rely on wind to disperse the seeds... Others water, still others....

This gets into seed dispersal methods... another day!
MEET THE POLLINATION SUPER POWERS

POLLINATOR SPECIES
Q: Which species provide pollination services __________?

A. Insects
B. Birds
C. Bats
D. Wind
E. Self-pollination
F. All of the above
A: All of the above
(insects, birds, bats, wind, self-pollination)

80% of flowering plants rely on animals for pollination

99% of animal pollinators are insects
INSECT POLLINATORS
Types of Insect Pollinators

- Bees
- Butterflies
- Wasps
- Moths
- Flies
- Beetles
- Ants

Syrphid Fly (honey bee mimic)
Q: Which species of bees is NOT native to North America?

A. Mason Bee

B. Honey Bee

C. Bumble Bee
A: Honey Bee

So, why is it here?
Imported for agriculture.
Bees

- Bees are one of the most common and efficient pollinators
- 20,000 species of bees world-wide
- 4,000 species of bees in North America

- Types of bees
  - honey, bumble, carpenter, mason, leafcutter, sweat, and digger
Bees
Most are solitary not social, therefore not aggressive

Most DO NOT live in a hive... this is only for social bees (i.e.. honey bees)

Branched body hairs help collect pollen

Use pollen & nectar as food
True or False?
Butterflies have taste buds on their antennae?
FALSE!

Their taste buds are on their feet.... antenna are for smelling!

Females “taste” plants with their feet to find the right plant to lay their eggs on.

Butterfly taste buds are 2,000 times more sensitive than human’s.
Butterflies

Long tongue called a proboscis.... its used like a straw to drink nectar.

Wings are covered with delicate scales

Life Cycle – complete metamorphosis

Egg
Larva (caterpillar)
Pupa (chrysalis)
Adult
Q: Which is not a pollinator species in Nebraska?

A. Wasps
B. Beetles
C. Ants
D. Bats
E. Flies
A: Bats

Nebraska’s bats are insectivores.

Nebraska has thousands of wasps, flies, beetles, and ants that help pollinate our plants.
THE ROLE OF FLOWERS
What do these two pictures have to do with each other?
They’re both ADVERTISEMENTS

Flowers attract pollinators just like billboards attract people
Flowers rely on several strategies to attract pollinators:

- Nectar: nutritional value
- Pollen: nutritional value
- Fragrance
  - sweet: bees
  - fruity: beetles
  - rotten: flies & wasps
- Color
- Structure
Nectar
Pollen
Pollen
Color

- Bees and butterflies see in color
- Different eye structure than humans
- UV, violet, blue, yellow (NOT red)... If a flower is red, it is not pollinated by a bee or butterfly.
Structure

- Long and skinny – butterflies, hummingbirds
- Flower “lip” – heavy insects like bumble bees
- shallow flowers – insects with a short tongues like wasps
- wide-open flowers – insects with sponge-like mouth parts for “soaking-up” nectar.
- small inconspicuous flowers – small inconspicuous insects (ants)
DECLINING POLLINATORS... WHY?
The Reason for the Decline

- Habitat Loss (nesting sites, feeding sites)
  - Wetlands
  - Prairies
  - Woodlands

- Loss of floral diversity
- Development-increased urbanization
- Expansion of intensive agriculture (no natural areas adjacent to crops)
More reasons for decline

• Pollution
• Pesticides (dusts and micro-encapsulated insecticides are bad)
• Herbicides (broadcast spraying and pellet use)
• Disease
• Competition with non-native & invasive species
• Climate change
• Disruption in migration routes
Q: Which of the following is NOT native to Nebraska?

A. blue (pitcher) sage
B. coneflower
C. butterfly milkweed
D. purple loosestrife
A: Purple Loosestrife

Non-native and invasive species are also a problem for pollinators due to competition (from other insects) and loss of native plant species.
The Consequences

Specialized pollinator for some plant species... Lose the pollinator, lose the plan (and vise versa).

Loss of genetic diversity

Affect crop and fruit production

Drive up food prices
HELPING POLLINATORS

WHAT CAN YOU DO?
What needs to be done:

- Need better understanding of populations and economic importance of pollinators
- Understand their natural history and biology
- Work to provide native habitat diversity including a succession of diverse flowers
- Citizen science (monitoring)
- Incentive programs to use pollinator friendly programs
- EDUCATION!!
In YOUR backyard...

- Provide local native food sources for larva and adults
- Chose several colors and shapes of flowers, flowers in clumps, successional
- Provide clean water
- Provide nesting sites: soft dirt, hollow branches, holes in wood
- Reduce (or eliminate) insecticide and herbicide use (spot treat). Avoid spraying insecticide when flowers are in bloom.
Questions?