



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 \$_____ 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





Food Production

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?**

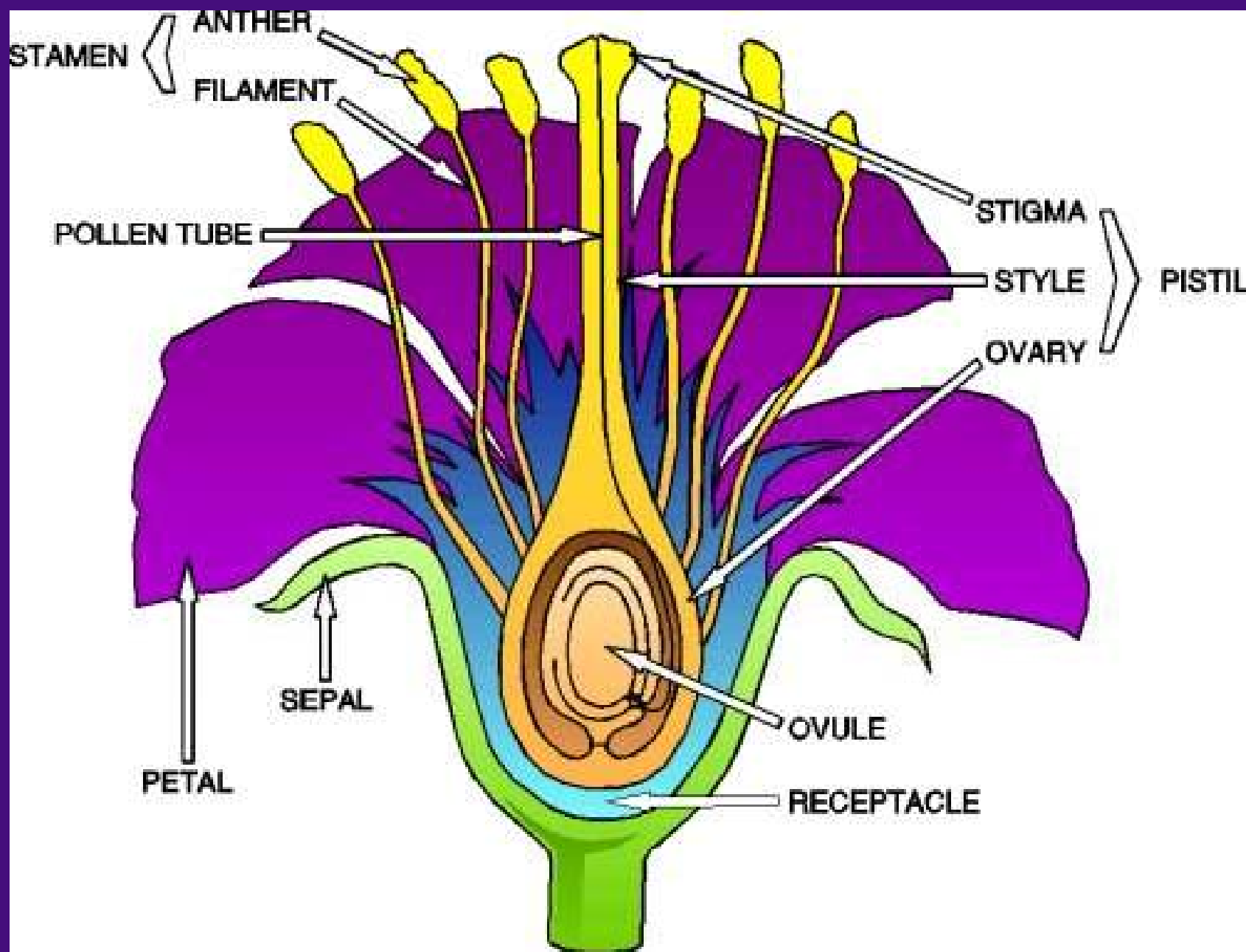
**POLLINATION
101**



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?

A vertical strip on the left side of the slide shows three purple flowers with yellow centers, likely asters, arranged vertically. The background of the slide is a solid dark purple color.

Self-pollination

vs.

Cross-pollination

With cross pollination, you get more genetic diversity in the plant... 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

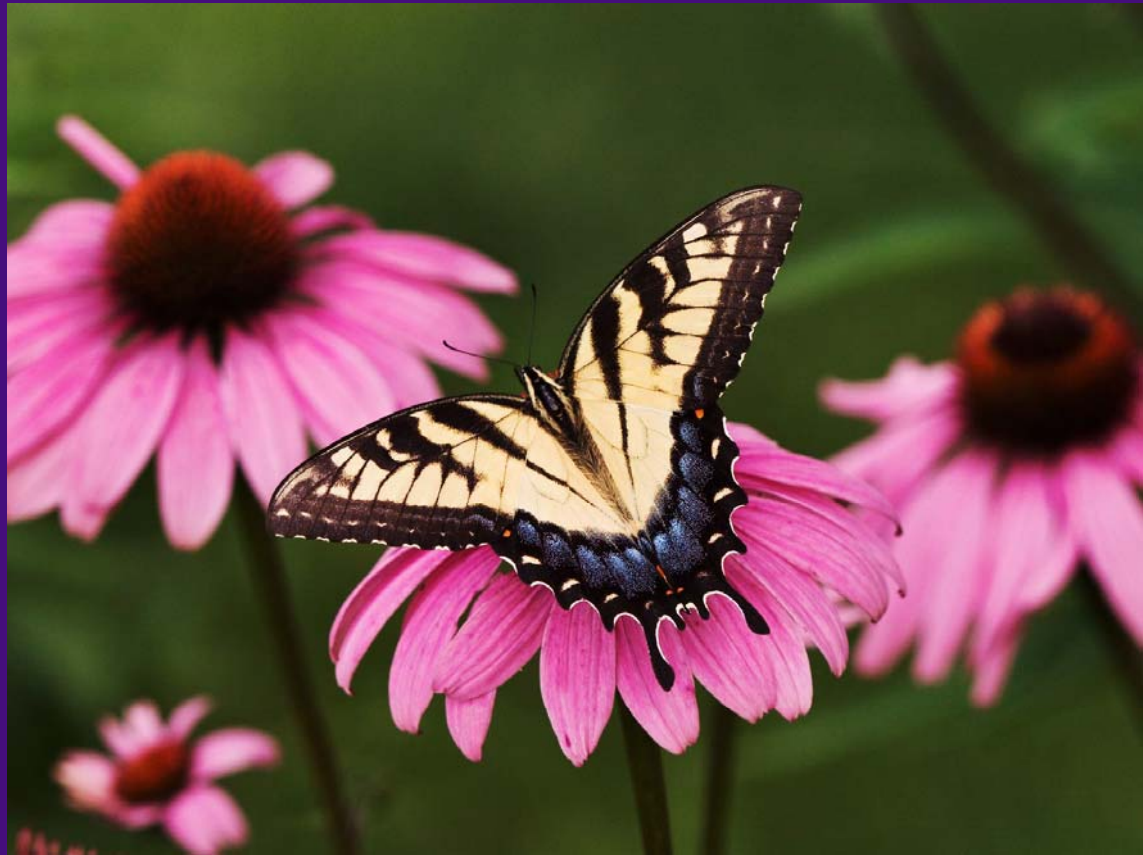
Most are solitary not social,
therefore not aggressive

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

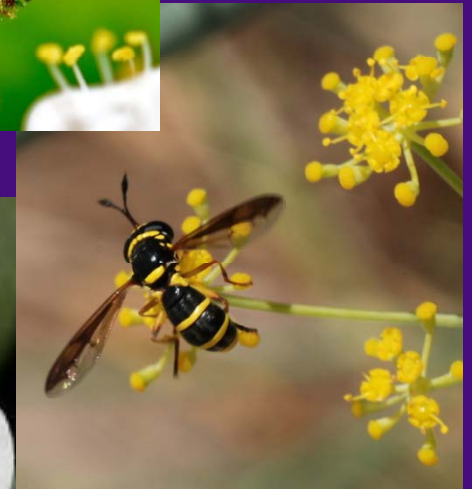
Larva (caterpillar)

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

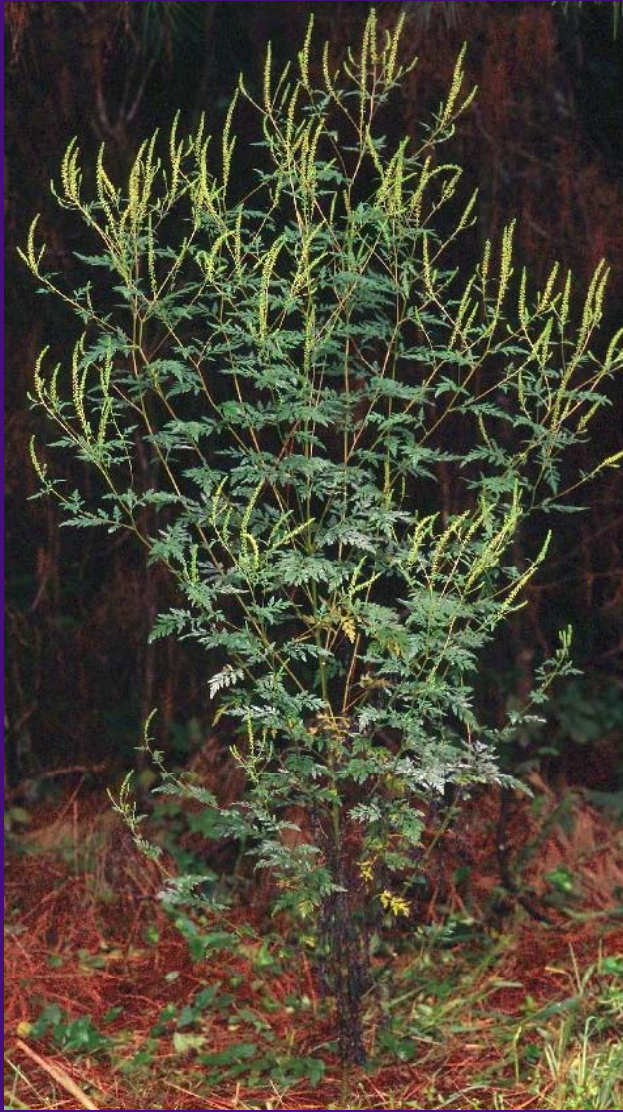


Pollen



(c) Kathy Keatley Garvey

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 plant (and vice versa).

Loss of genetic diversity

Affect crop and fruit production

Drive up food prices



HELPING POLLINATORS

WHAT CAN
SHOULD 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?