Pollinators and Neonicotinoids
Who are the pollinators?

There are between 100,000 and 200,000 species of invertebrate pollinators!!

- bees, butterflies, wasps, ants, moths, flies, and beetles

There are over 1000 species of vertebrate pollinators.

- birds, bats, small mammals, and a few reptiles
Why Are Pollinators Important?

Pollinators are a keystone species.

“Without the keystone species, the ecosystem would be dramatically different or cease to function at all.”

National Geographic Society
What makes pollinators a keystone species?

Fruits and seeds derived from insect pollination are a major part of the diet of approximately 25% of all birds, and of mammals ranging from voles to grizzly bears.

Over 85% of the flowering plants on the planet require pollination. This gives pollinators a very large role in maintaining biodiversity.

-- Xerces Society for Invertebrate Conservation
Why is biodiversity important?

Functioning ecosystems provide important services, including:

• moderation of weather extremes and their impacts
• mitigation of drought and floods
• nutrient cycling
• erosion protection
• detoxification
• pest control
• soil health preservation
• climate stability
• purification of water and air
• regulation of disease carrying organisms
• and pollination of crops and natural vegetation.
Pollinators are also critical to a healthy human food system.

"Our nutritional security is intimately linked to pollinators, with many of our vitamins derived from pollinated crops. So there is this kind of link between pollinators, crops and human diets and ultimately health." Simon Potts, February 26, 2016
Worldwide, pollinators contribute $210 billion in agricultural earnings.

In the US, honeybees alone contribute $17 billion in pollination services.
Why are we talking about pollinators today?

Pollinators are declining at alarming rates.

HONEY BEES - beekeepers losing >50% of hives, annually
MONARCH BUTTERFLIES - 2014 lowest winter population on record
NATIVE BEES – showing declines similar to honey bees, a number of bumble bees are heading towards extinction.
Why are pollinators declining?

Habitat loss - *Loss of biodiversity*
Increased pesticide use → neonicotinoids
Introduced diseases and pests
What are neonicotinoids?

Systemic pesticides -
End up in all parts of the plant – leaves, stems, pollen, nectar

Applied as foliar spray, soil drench or seed coating -
Largest use is as a seed coating on agricultural crops
Neonics have caused a change in the way we use pesticides \(\rightarrow\) from reactive to prophylactic \(\rightarrow\) greatly increasing the amount of pesticide used in agricultural fields.

Over 100 million acres of cropland in the US are planted with neonicotinoid-coated seeds.

Pollinator decline correlates very closely with the rise in use.
Winding up in:

• Soil

• Off-target vegetation

• Surface water and streams – 50% of US streams contain neonicotinoids

• Drinking water in Iowa City

• Honey and pollen - more than 70% of samples collected in Massachusetts

• Food supply – US Congressional Cafeteria – 91% of foods contained 1 neonicotinoid; 71% contained 2 or more.
Exposed:
  During planting
  Plant resources – pollen, nectar
  Off-target vegetation
  Water sources

Lethal effects –
  Death or disorientation

Sub-lethal effects -
  Changes in foraging behavior
  Reduced predator avoidance
  Delayed development
  Decreased reproductive success

Neonicotinoids are highly toxic to pollinators.
Why do we use neonicotinoids?

• Intense marketing – creating a sense of need
• Neonics are seen as a cheap form of insurance
• Information about neonicotinoid efficacy isn’t readily available
• We are used to planting coated seeds
• Access to non-coated seeds is limited***
What can we do to reduce the need for pesticides?

Utilize farming practices that:
• Increase diversity
• Build soil health
• Reduce disturbance

“The problem isn’t pests, but a lack of diversity and too much disturbance. If you have a pest problem, it’s because your field is out of whack.” -- Dr. Jonathan Lundgren
What can we do to help pollinators on the farm?

• Retain or restore natural habitat - Marginal lands, edges, ponds, fallow fields, riparian buffers, snags, hedgerows and windbreaks

• Create pollinator habitat – *Foraging habitat and nesting sites*
  CRP → other programs (CSP, CREP, GRP, WRP, EQIP, WHIP, Monarch Watch)

• Utilize farming strategies that support pollinators - Organic practices, agro-ecological principles, conservation biological control, integrated pest management, patch burn grazing, no-till, regenerative agriculture, and others

✓ Increase diversity: habitat, crops, animals
✓ Build soil health
✓ Utilize cover crops
✓ Reduce tillage
✓ Eliminate or reduce pesticide use
✓ Allow crops to bolt
✓ Plant natives!
Resources:

ATTRA – Farmscaping to Enhance Biological Control -
http://extension.oregonstate.edu/sorec/sites/default/files/farmscaping.pdf

XERCES – How to Farm for Pollinators (webpage – many resources) - https://xerces.org/pollinator-conservation/agriculture/


XERCES – Protecting Pollinators from Pesticides (webpage) - http://xerces.org/pollinator-conservation/agriculture/managing-pesticides-to-protect-bees/

Union of Concerned Scientists -

Thank you!

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