Small Beasties!
Working WITH and Encouraging the critters of the farm ecosystem
Microbes, Insects, Worms, Reptiles, Amphibians, Birds and MORE...

INSECTS

Roles in the Garden
- Pollination
- Beneficial Predators
- Pests

The Act of Pollination

Transferred to the stigma of a flower

Critically Important

- As most people now know...
  - Value of crops pollinated by insects is estimated at $29 billion per year from just 58 key crops!
  - Approximately 75% - 80% of ALL flowering plants need pollinators
  - 1 in 3 bites of food...
We often focus on bees because they are a super pollinator:

- Only pollinators that intentionally gather pollen
- For FOOD
- Not passive transfer of pollen

Flower CONSTANCY
- Repeatedly visit same species
- Pollen delivered to RIGHT species for pollination

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Three Broad Groups of Native Bees

- Ground-Nesting Bees (solitary)
- Cavity-Nesting Bees (solitary)
- Bumble Bees (social)

Nesting Habitats

Approx. 4000 species of native bees in North America

- Social Bees
- Solitary Bees

*Solitary Bees
- Tunnel Nesters
- Ground Nesting / Miners

Makes SOIL important
Example:
• Squash Bee
• Specialist on pumpkins and squash
• Only collect pollen from squash blossoms
• May get nectar anywhere
• Often find their burrows around squash!
• Be careful where you till!

13

14

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Squash Bees Cont.
Males active in early morning finding females. Then they nap in blossoms once they close in heat of day.

15

16

Example:
• Common name: Blue orchard bee or orchard mason bee
• Forage at lower temps than honeybee
• Shorter forage range - stay put!
• Need plants close
• Get better access to anther & stigma

17

18
Leafcutter bees are Cavity Nesters TOO!

"Belly pollination"

Leafcutter bees are Cavity Nesters TOO!

"Leafcutter Bee (Megachilesp.) at Work" by Bob Peterson FLICKR

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Drill holes in untreated wood

Or reeds, paper straws, bamboo

Hole diameter ¼ - 3/8 inch, but 5/16 is magic number for orchard bees

4-8 inches deep. CLOSED ENDED

Shelter face southeast

Protect from direct midday sun-overheat

The other "accidental" pollinators are just as important!

Bee Houses

Bee Hotels...
BENEFICIALS PREDATORS
To RECOGNIZE

25

Spiders

26

Praying mantids

27

Ground beetles

28

Lady Beetles

29

More Ladybugs

30
Hornets and Wasps

ALL are beneficial for the farm and garden

Eastern yellow jacket
Aerial yellow jacket
German yellow jacket

WHAT COULD IT BE?

LACEWING LARVAE!
* Larvae sometimes camouflage themselves by placing the dead bodies of their prey on their back or pieces of plants

Lacewings (Family: Chrysopidae & Hemerobiidae)
LACEWINGS eat...
LACEBUGS (a pest)
And also APHIDS and small caterpillars

Lacewings
(Family: Chrysopidae & Hemerobiidae)
Beneficial Predators
Aphids, soft bodied insects
Eggs of green Lacewings!

Ichneumonidae- Parasitic Wasps

Other beneficial wasp predators / parasitoids in the garden...

And of course TONS of biological control out there = NATURAL ENEMIES!

• Caterpillar is “mind controlled” somehow into protecting the pupa in its last days of life!!!!!!
How do we use Biological Control Purposefully?

- Use of NATURAL ENEMIES to maintain BALANCE in populations
- Predators
- Parasitoids
- Pathogens

3 Types of Biological Control

- Classical
- Augmentative
- Conservation

Classical Control That Worked

- Australian Vedalia Lady Beetle on Cottony Cushion Scale in Citrus Industry

Classical that did NOT work...

Introduction of non-native natural enemy to control a pest population.

Story of the Cane Toad

Others you know of...
Release of additional native predators when too few are present

Augmentative

Many studies have failed to find significant increase in pest management this way.
- SCATTER!
- Low food source
- High competition / predation

Augmented

Maintain or enhance existing natural enemy populations by creating a favorable environment for natural enemies

Conservation Bio-Control

NECTAR FLOWERS

FOOD SHELTER

ALSO WORKS TO SUPPORT POLLINATORS... DOUBLE BONUS

Conservation Biological Control- habitat

Intercropping
- Companion Planting
- Native plants
- Healthy Soil
- Diversifying heights, types, habitat
- Flowers- alternative food

Both Pollinators AND BENEFICIAL INSECTS will use nectar and pollen.

Provide season-long sources of pollen and nectar.

From EARLY (maples, willows) to LATE SEASON (asters and golden rod)… keep them healthy all year long!
Aim for year-round flowers, including early and late season bloom to provide a food source.

Include a diversity of flower shapes to attract many different pollinators.

Use masses of color to attract pollinators.

DIVERSE HEIGHTS!
Beneficial PREDATORS need diversity of height. Some prefer to ambush from above or below. Different behaviors and predation styles. The more diversity of habitat, the better.

In small areas, plant single species together to increase visibility to pollinators and increase foraging efficiency.

On the farm... even pastures can benefit our bugs...
**PROS:**
- Popular crop – Hay
- Nectar (alfalfa honey)

**CONCERNS:**
- High bloat risk livestock
- More of a cutting forage than for grazing so do bees get to it before cutting?
- Cut for hay early in bloom

**PROS:**
- Great for bees- honey and pollen
- Mixed with Grasses = good pasture or hay

**CONCERNS:**
- Bloat, Slobber in livestock
- Alsike photosensitivity
- Manage grazing height
- Rotate to allow flowering at all

**PROS:**
- "honey lotus"
- Great for bees & butterflies
- Popular: high yield honey production
- Mixed with Grasses- pasture and hay

**CONCERNS:**
- LESS palatable, bitter flavor
- Animals can get used to it but less tasty than other legumes
- Challenging to harvest – cut 10% flower, otherwise low quality hay
- Bloat possible, less likely than from other clovers and alfalfa

**PROS:**
- Non-bloating Legume for Hay, Slage, and Pasture
- Blooms Profusely, June-July
- Requires pollinators for seed

**Con:**
- Manage grazing height
- Becoming “weed” in lawns
- Invasive

**Caution**
- Hairy Vetch, a common cover crop and bee friendly, can cause health issues in livestock in pasture setting.

**Chicory** is a broadleaf forage common in pasture and field-sides. But allowing bolting & flowering of Chicory reduces forage quality & nutrition.
Refuge planting for natural enemies

Phacelia
sweet alyssum
nasturtium
cilantro
dill

Challenges they face

Pollinators and Beneficials
• Loss of Habitat
• Loss of a DIVERSE Diet
• Habitat Fracturing
• Natural disease, predation
• Non-native disease, predation
• Pesticides*
• Environmental Contaminants*

Soil Microbes

• SOIL IS clay, sand, silt, AND air, water, AND all the microbial organisms therein...
• 100,000,000 to 1,000,000,000 bacterial organisms per gram of soil.
• 40 to 500 grams of bacterial material per m²

Helping Microbes?

• EVERYWHERE... Not always need to "ADD"
• Reduce Tillage
• Use "Green Manures" and cover crops
• But beware leaving diseased foliage in plots
• Add Compost = Microbe FOOD
• Some crops have starter rhizobium fungi...
Other Soil Organisms: Nematodes

Fungi, Bacteria, Viruses

GAPS: Food safety
- Human pathogens are a concern
- Compost TEA, Manure TEA

Worms
- Glaciated Northern Ohio does not have any native earth worms.
- They aerate, move nutrients, cycle nutrients
- Can have negative impact on forest floor

Worms
- Use what is there.
- Limit TILLING
- Good Organic Matter
- Leaf mulch OM and moist
- Limit Chemicals

Frogs, Toads...
- Frogs, Toads and other reptiles and amphibians can be excellent predators of insects and rodent pests.
- Indiscriminate predators—eat beneficial too.
- Benefit from undisturbed soils AND cover of plants for beneficial insects...
BATS

Bats are nocturnally active April through September.

Ohio Bats

Solitary Bats

Ohio Bats

Colonial Bats

White Nose Syndrome (WNS)

A deadly disease (90-100% mortality) of cave-hibernating bats caused by a white fungus that appears on the noses of infected bats.

Bat Box

Do not put on a tree

Need 15 – 20 feet UNDER the box to glide out

House bat bugs...

BATCON.ORG

Bat House Instructions

What Questions do YOU have?