



Beneficial Insects: who are they and what do they do?

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Diversity and abundance

- Most diverse
- 1 million identified insect species
- 5-10 million estimated species
- Highly abundant in terms of number and biomass



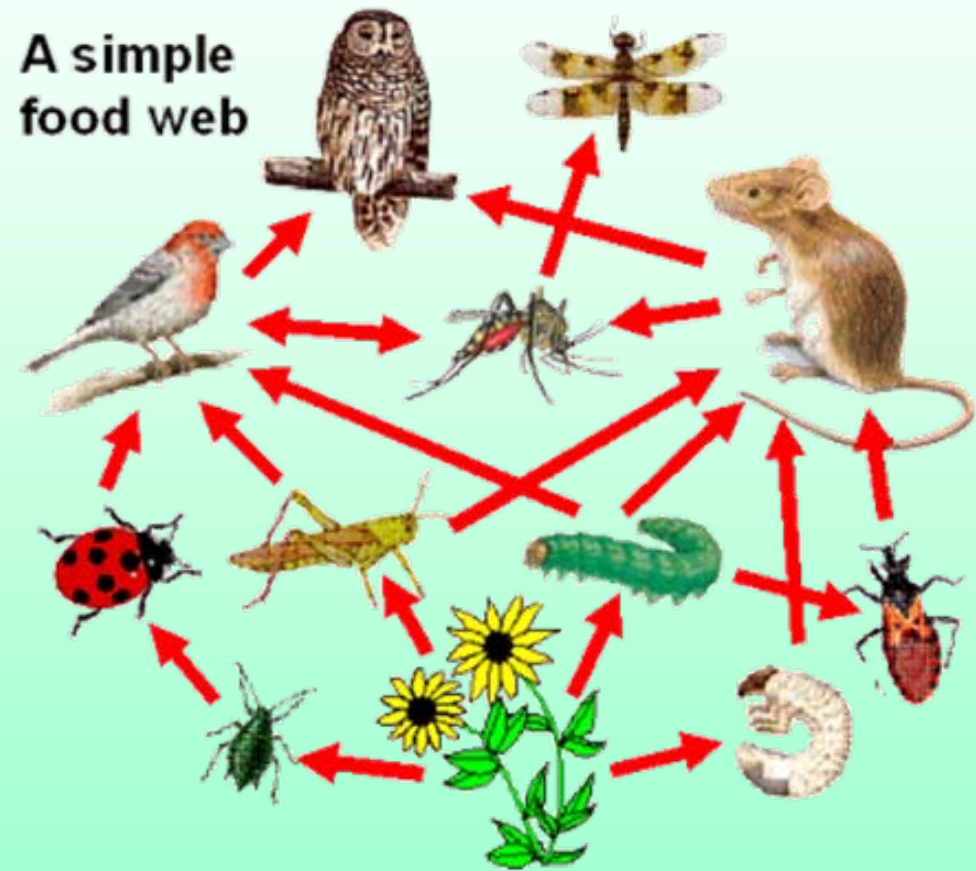
Insect Pests

- About 1000 species of insects are considered serious pests
- Less than 10,000 species of insects are occasional pests
- Some are pests in one life stage and beneficial in another life stage
 - e.g. larva eats the crop plant, adult acts as a pollinator



Beneficial Insects

- Natural enemies
 - Predators
 - Parasitoids
 - Weed seed predation
- Pollination
- Soil health
 - Decomposition
 - Nutrient cycling



Insect predators

- Green and brown lacewings



Insect predators

- Ladybird beetles
- Ground beetles
- Rove beetles
- Bugs



Spiders

- All spiders are predators
- Abundant – 1 million/hectare
- A study in California vineyards found that spiders constituted 98% of all predators
- Documented predators of many pest species including hoppers, aphids, grasshoppers, thrips, caterpillars



Parasitoids

- Wasps and flies
- Lay eggs on or in an insect
- Attack
 - Eggs
 - Larva
 - Pupa
 - Adult
- Eventually kills the host
- Most insects have one or more parasitoids



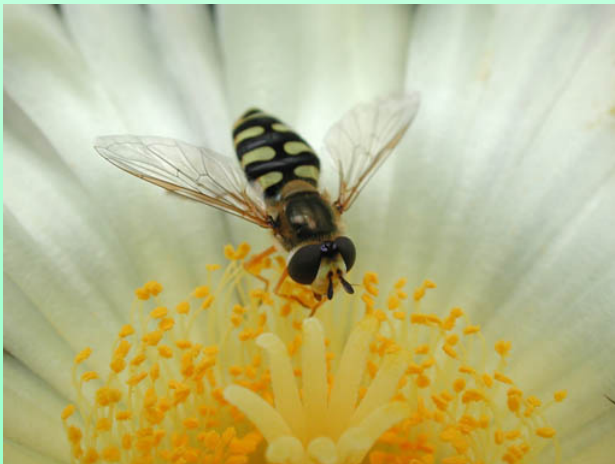
Weed seed predation

- Ants
- Beetles
- 330 species (82% invert.) used non-crop and weed seeds as a food source on an organic farm in England



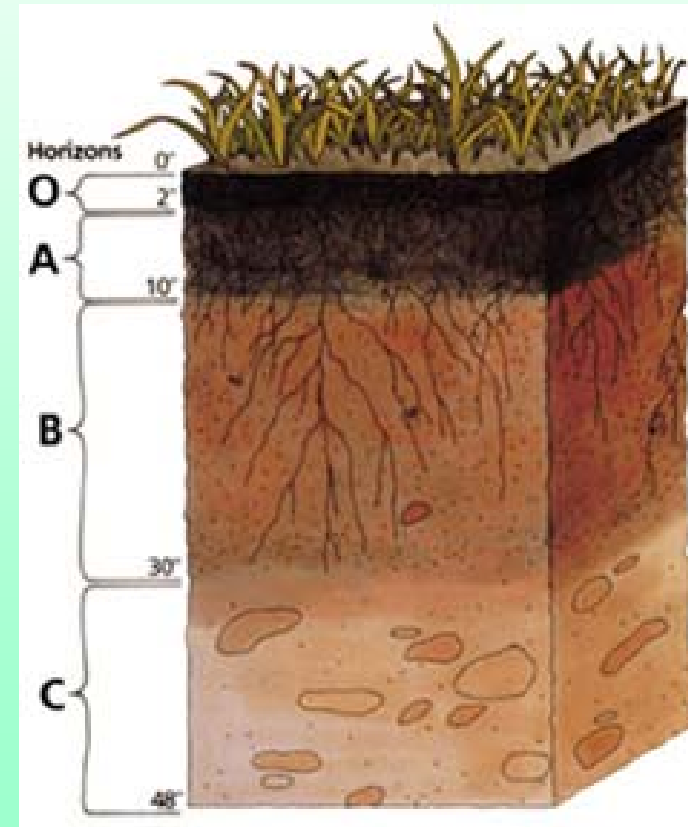
Pollinators

- Honeybee
- Native bees
- Beetles, moths, flies



Soil health

- Insects are well correlated with healthy soil and ecosystem functions
 - Water storage
 - Decomposition
 - Natural enemies



Decomposers

Feed on dead and
dying plant tissue,
animal waste, animal
tissue



Generate substrate for
microbial
decomposers
(bacteria, fungi)



Summary

- Insects are abundant and diverse
 - Natural
 - Agricultural
- Provide essential services (often unrecognized)
 - Natural enemies
 - Pollination services
 - Soil health
- Value of \$8 billion annually
- What can we do to help them do their job or at least not hinder them?





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