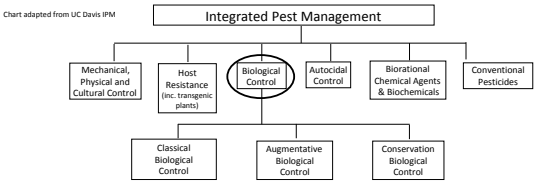
Garden Allies

The Insects, Birds & Other Animals
That Keep Your Garden
Beautiful and Thriving

Conservation biological control

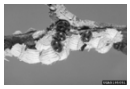
Chart adapted from UC Davis IPM



A decision support system for the selection and use of pest control tactics, based on cost/ benefit analyses that take into account producers, society and the environment.

Classical biological control

Introduction and establishment of the natural enemy of an introduced injurious insect (native to same region)



Jeffrey W. Lotz

C.V. Riley: Chief of the Division of Entomology of the US Department of Agriculture

Augmentative biological control

Artificial supplementation of natural enemies
May be introduced or native natural enemy

Conservation biological control

- Preservation and enhancement of existing natural enemies – both exotic and native
- Positive feedback loop
- Two major strategies: reduce pesticides and provide resources

Ecosystem benefits

-
- Pollination
- Promotes biodiversity
- Decomposition
  - Nutrient cycling
  - Bioremediation
- Microclimate modification
- Soil conservation
- Hydrological processes, erosion control
- Pesticide reduction – suburbs, parks
  - Less runoff

- *Result: Long term sustainability of human-managed landscapes*

Why native plants?

Coevolution

"One approach to what we would like to call coevolution is the examination of patterns of interactions between two major groups of organisms with a close and evident ecological relationship, such as plants and herbivores."

Paul Erlich and Peter Raven, 1964
Butterflies and plants; a study in coevolution

Herbivorous insects

- Plants convert sun's energy to provide nutrients to planetary life
- Herbivorous insects
  -
  -
  -
    energy for use by other animals

- 90% of all herbivorous insect species are specialists
- Role in food web rarely discussed in horticulture

Bird food

-
  arthropods
- 70%+ eat arthropods as adults
- 50%+ diet is Lepidoptera
- Provide pest control
- US bird populations down 60-90% in past 40 years

Photo: Kay Markham

Its all connected

Tug at a thread on the edge of a web, and twang! It reverberates throughout the web.
For healthy gardens, we want to promote biodiversity; a great variety of plants, animals, and other organisms.

But what is biodiversity?

Biodiversity
NATURE IN YOUR NEIGHBOURHOOD
http://www.hart.gov.uk/biodiversity

Biodiversity

- Richness = # of species present
  - Higher # plant species = higher # arthropod species
- Abundance = how many individuals of each species are present
  - More important than richness alone

Functional biodiversity

- Not only richness and abundance, but the species in system
- Insurance species
  - *group*
- Resilience
  - reorganize following a disturbance
  - Higher functional group biodiversity leads to higher resilience

Factors that promote biodiversity

- Age
- Perennial systems
- Lack of disturbance
- Complexity: in space & time
- Ecosystem diversity: niches
- Edges
- Microclimates
- Resources
  - water
  - food (inc. alternate prey)
  - shelter

ALL features of gardens!

How insects feed on plants



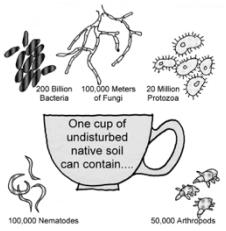
How insects feed on plants


Pest or beneficial?



Beneath Our Feet

Microscopic life

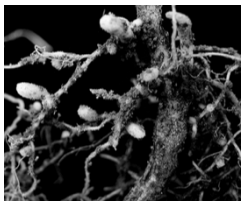


Life in the Soil: A guide for naturalists and gardeners. JM Nardi

Earthworms

- Add photo

Decomposers & nutrient facilitators



On the Wing: Flower Visitors

Bees

Moths & butterflies

Hunting wasps


Flies

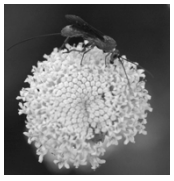

Flies

Philip Van Soelen

Digging Deeper: Predators & Parasites

Flies


Wasps




Scott Bauer

Meet the Beetles

Lady beetles

Soldier beetles

Predaceous ground beetles

Leaf beetles

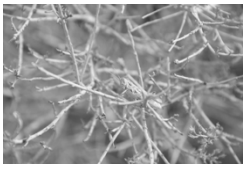
The Garden Commons:
Familiar Garden Insects

True Bugs


True bugs (Homoptera)

Odonata

Orthoptera




Mantises


The Ground Crew & Beyond

Myriapods

- Add photo

Spiders


High & Low: Vertebrates

Amphibians


Reptiles


Birds


Alan Vernon

What Can You Do?

Be observant

Be an example

Be an example

Be an example

Join iNaturalist

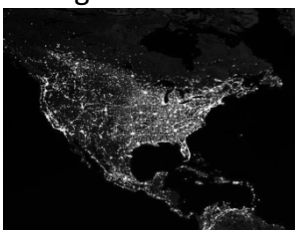
- Northern Plushback (Palpada vinetorum), spotted out of its normal range in San Diego
- "Every day is a new opportunity to find something interesting in the natural order of things right here in my own yard. Discovering the iNaturalist app has literally changed my life!"

  Bonnie Nickel

www.inaturalist.org

Join or volunteer: botanic garden, native plant society, school gardens

Turn off the lights!



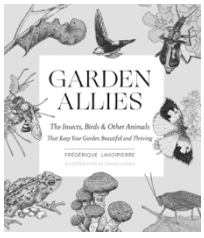
Plant natives!

Visit gardens

Garden Allies

" explains how your garden can be a thriving, balanced community that gives more to your landscape than it takes."

Douglas Tallamy, author of *Nature's Best Hope* and *Bringing Nature Home*



"*When we tug at a single thing in nature, we find it attached to the rest of the world.*" John Muir