Gardening for Insects .... or not

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Garden plantings can affect incidence of:

- Butterflies
- Hummingbird moths
- Miller moths
- Honey bees
- Bumble bees
- Leafcutter bees
- Lady beetles
- Flower flies
- Tachinid flies
- Lacewings
- Parasitic wasps
- Many, many nuisance pests
In the beginning there was....

Butterfly Gardening
Parsleyworm
Eggs on dill

Young larva
Chrysalid (pupal form) of the parsleyworm
The adult form of the parsleyworm is known as...
Principles of Butterfly Gardening

• Provide for food needs of adults
• Provide for food needs of larvae (caterpillar)
• Provide some shelter if sites are exposed
• Avoid use of harmful insecticides
• Mud puddling habitat?
Foods Used by Butterflies:

Nectar, fruit juices, oozing sap....
Massed plantings are most often visited by butterflies
Some *Annual Plants* Commonly Used by Butterflies

- Zinnia
- Larkspur
- Cosmos
- Verbena
- Sunflowers
- Asters
- Sweet pea
Some *Perennial Plants* Commonly Used by Butterflies

- Butterfly Bush
- Milkweed
- Sedums
- Lilac
- Rabbitbrush
- Potentilla
- Thistles
- Monarda
Foods Used by Butterflies:

Nectar, fruit juices, oozing sap....
Hackberry butterfly on a dead raccoon.
‘Mud puddling’ by tiger swallowtail
Foods Used by Caterpillars:

Leaves of their host plant
Eggs are laid on ash, chokecherry, hoptree.
Mourning Cloak

Larval host plants are willow, aspen, hackberry and elm
Larval host plants are thistles, hollyhock, mallow, occasionally legumes and some other plants.
The common buckeye (left) develops on snapdragons, toadflax, plantain and other plants.

The Arizona sister (above) develops on oak.
The pygmy blue develops on saltbush, pigweed and some other Chenopodiaceae.

The dainty sulfur feeds on sneezeweed, Shepard’s needle and various low growing Asteraceae.
Paper wasps feed their young “bug burger”. Mostly chewed caterpillars.
European Paper Wasp

A new species in the western US (probably post 2000)
Hummingbird Moths
Hummingbird Moths

A type of sphinx/hawk moth that flies during the day
Hornworms

Caterpillars of the family Sphingidae
Tomato hornworm and tobacco hornworm are notorious garden pests.
Young Bill Cranshaw, playing with hornworms
Bill – Still alive, years later
Adult stage of the hornworm is known as a sphinx moth or hawk moth.
Conflict?

You like this....

..but not this.
Moth of the tomato hornworm does not fly during the day.

The whitelined sphinx is a day flying sphinx moth, aka, a “hummingbird moth”
Hummingbird Moths

A type of sphinx/hawk moth that flies during the day
Colorado has about two dozen kinds of hornworms – Utah probably about the same.

Most hornworms are not “pest” insects
Whitelined sphinx

*Hyles lineata*

The most common hummingbird moth of the western US
Plant most visited by hummingbird moths typically have deep sources of nectar that are accessed by their long mouthparts.
Some plants most often visited by hummingbird moths include:

- Four o’clocks
- Evening primrose
- Larkspur
- Honeysuckle......
Landscaping for Biological Control Agents
NATURAL ENEMIES:
Predators
Parasitoids
Pathogens
Principles of Gardening for Beneficial Insects

- Learn to recognize them – and don’t kill them
- Provide for food needs of adults
- Provide for food needs of immature stages
- Provide nest sites, if required
Lady beetles

(“Lady bugs”, “Lady birds”....)
Lady beetle larvae
Full-grown larvae settle and attach, shed their skin, and transform to the pupal stage.
Lady beetle adults maintain themselves on nectar and pollen.
Flower (Syrphid) Flies
Flower fly larvae
Syrphid flies are excellent mimics of bees and wasps.

Honey Bees

Flower (Syrphid) Flies
Adult flower flies sustain themselves on nectar and pollen.
GREEN LACEWING
Green lacewing eggs laid in groups.

Egg hatch has occurred in the lower picture.
Left: Newly hatched green lacewing larva eating aphid

Right: Green lacewing larva eating elm scales
Adult green lacewings maintain themselves on nectar and pollen.
Some parasitic wasps
Aphid parasitoids
Aphid mummies
– aphids killed by a parasitic wasp
Tachinid Flies
Female tachinid flies search for appropriate host insects
Tachinid fly eggs on caterpillar (above) and stink bug (right)
Tachinid fly adults sustain themselves on nectar and pollen.
Adults of many predators use flowers (nectar, pollen) for sustenance.
Small, accessible flowers are most commonly used by natural enemies of garden pest insects.
Some plants useful for providing food for adult stages of insect predators and parasites

- Most Apiaceae - (dill, fennel, mooncarrot, etc.)
- Yarrow
- Many sedums
- Spurges
- Alyssum
- Basket-of-gold
- Thyme, several herbs
Mooncarrot

Seseli gummiferum
Conserving and Enhancing Natural Enemies

- Don’t kill them
  - Limit use of broad spectrum insecticides

- Provide foods that the adults need
  - Often need nectar, pollen

- Provide foods that the immature stages need
  - Allow there to be some hosts, prey available
Provide food for larvae of natural enemies
Landscaping and Pollinators
Gardening for Honey Bees – or Not
Honey Bee *Apis mellifera*
Plants *not favored* by honey bees include:

- Doubled flower cultivars
- Flowers with long corollas
- Many common bedding plants
  - Vinca
  - Verbena
  - Petunias
  - Pansies
  - Geraniums (most) ……
Honey Bee – Flowering Plant Evaluation

- Evaluate the relative use of flowering plants by honey bees (and other bees) in Colorado
- Identify plants heavily used by honey bees
- Identify plants not visited/used by honey bees
Top Plants Visited by Honey Bees include:

- Blue mist spirea
- *Cleome* (bee plant)
- *Agastache foeniculum*
- *Penstemon eatonii*
- *Ocimum* (basil)
- *Nepeta*
- *Aster novae-angliae*
- *Sedum spectabile*
- Cotoneaster
- *Allium tangitucum*
Bumble Bees

Bombus species
Bumble Bees Are “Buzz Pollinators”

Some Plants are Dependent on Buzz Pollination
Bumble Bee Visited Plants include:

- Echinacea
- Echinops
- Russian sage
- Hypericum frondosum

- Most Penstemons
- Agastache rupestris
Wool Carder Bee and Stachys
Wool Carder Bee

*Anthidium manicatum*
Nests are made in existing cavities. The nest tunnels are lined with plant hairs.
Male wool carder bees patrol and defend territories
Shelter Needs for Insects?

Example: Hunting Wasps
Hunting Wasps

Families Sphecidae, Pompilidae
Ammophila wasp digging nest (left), carrying caterpillar prey (lower left), at nest entrance with prey (below)
Bembix wasp digging while holding horse fly prey
Cicada Killer – Colorado’s largest hunting wasp
Pemphredon hunting wasps
Pemphredon wasps nest in plant stems and hunt small insects.
Condo project for *Pemphredon* sp. hunting wasps
European Paper Wasp

A new species in the western US (probably post 2000)
Paper wasp gnawing on weathered board for wood fibers
European Paper Wasp Nesting in Metal Building Support
European paper wasps in our clothes line
Nest box for European paper wasp
European paper wasp condominium project at Boulder County Fairgrounds
European paper wasp nest established on growing sweet corn!
Mud Dauber:
A hunting wasp of spiders
Black and Yellow Mud Dauber (Scleriphon caementarium)

Nest (top left), crab spider prey cache (top right), larva feeding on spider prey (below left) and cocoons of pupae (below right)
Cat faced spiders used as prey by a black-and-yellow mud dauber
Mud daubers collect mud for nest construction
Landscaping and Pollinators
Leafcutter Bees

Family Megachiladae
Leafcutter Bee Excavating Rotten Porch Board
Leafcutter Bees Nesting in Rotten Log in Garden
Leafcutting Bee cells
nest site in wood cavity

Van Waters & Rogers Inc.
1988 subsidiary of Univar
Leafcutter Bee Damage to Rose, Lilac and Virginia Creeper
Leafcutter Bee Carrying Leaf Fragment
Leafcutter bee returning with leaf fragment
For nest construction:

3-4 rectangular pieces, crimped for the base

Oval pieces along the sides of the cell

Near perfect circles used to cap the cell

All leaf fragments are oriented with the smooth side inwards
Leafcutter bees carry their pollen on the underside of the abdomen.
Leafcutter bee collecting pollen from dandelion
Leafcutter bee working sweet pea flower.

Note how the anthers become exposed as the bee pushes the flower while nectaring.
Leafcutter bees carry their pollen on the underside of the abdomen.
Leafcutter bee cells in hollowed stem of a weed
Leafcutter Bee Boards
Alfalfa leafcutter bees for alfalfa seed pollination
Traveling alfalfa leafcutter bee operation
Street signs on alfalfa leafcutter bee block
Mason Bees

(*Osmia* species)
Predrilled wood for nesting by the orchard mason bee/ Blue orchard bee
Orchard Mason Bee Nest Design

• Drill holes in wooden blocks
  – ¼ to 3/8-inch
  – Holes should be smooth
  – 3 to 6-inches deep

• Place nest blocks where it gets morning sun
  – Nesting may begin in March

• Protect from rain and snow cover
Gardening for Insects .... or not

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Army Cutworm

Euxoa auxiliaris

Photo courtesy Joseph Berger
Cutworms
Army cutworm larva
Army cutworm feeding in a winter wheat field. Primary feeding occurs on broadleaf weeds.
Pupae are present from March through late May
Adult form of the army cutworm – the Colorado ‘Miller Moth’
Miller Moth

Term applied to any species of moth that is locally abundant.

Term refers to the scales on moth wings that dislodge – like flour on the smock of a miller.
Army cutworm moths have variable wing pattern.
The Annual Migration

Move from the Plains to the mountains in May-June

Return to the Plains in September and early October
Next Task….

Follow the flowers and stay cool
Swallows at the intersections?

Its Miller Time!
Plants Commonly Used as Miller Moth Nectar Sources

- Lilac, Chokecherry and other *Prunus*
- Spirea
- Cotoneaster
- Russian olive
Plants Commonly Used as Miller Moth Nectar Sources

- Lilac, Chokecherry and other *Prunus*
- Spirea
- Cotoneaster
- Russian olive
Plants Commonly Used as Miller Daytime Shelter Areas

- Densely growing pines
- Spruce
- Dense evergreen deciduous shrubs (e.g., cotoneaster)