

Beneficial Insects



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The Basic Necessities for Beneficial Insects

- Beneficials need **food, water** and **shelter**.
- The menu for beneficials **changes constantly**.
- Many of the predators and most of the parasites will use **pollen and nectar for food**.
- Since many of the beneficials are tiny or have short mouthparts, **offer them tiny flowers with short nectaries**.
- Grow a variety of flowers that bloom at different times.

Food Nectar Plants

- For most beneficials, including parasitic wasps, the most helpful **blossoms are small and relatively open.**
- Plants from the **aster**, **carrot** and **buckwheat** families are especially useful.
- The adult beneficial insects will need pollen and nectar early in the season when prey is scarce.

Annual Insectary

- An **annual insectary strip** established within a field to attract beneficial insects.
- (Includes: dill, cilantro, cosmos, bachelor buttons, marigold, holy basil, nasturtium)
- Joan Olson's farm in Minnesota.
- Photo Credit: Joan Olson.





Food Nectar Plants



- **Aster Family:** blanketflower, coneflower, coreopsis, golden marguerite, cosmos, goldenrod, sunflower, signet marigold, tansy, and yarrow
- **Carrot Family:** caraway, coriander/cilantro, dill, fennel, Bishop's flower, Queen Anne's Lace
- **Buckwheat Family:** buckwheat
- **Others:** sweet allysum, bachelor's button



Blanketflower



Coneflower



Coreopsis



Golden Marguerite



Cosmos



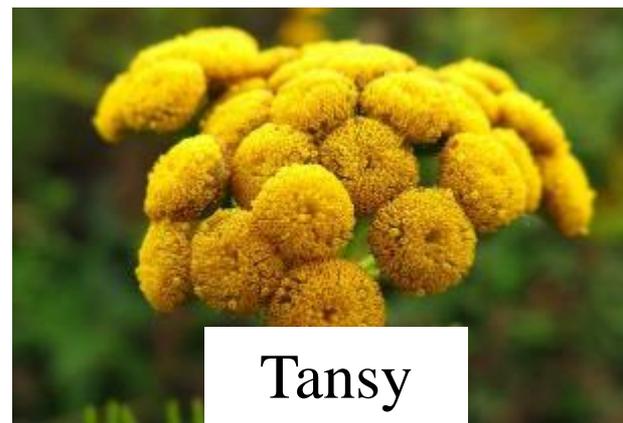
Goldenrod



Sunflower



Marigold



Tansy

Buckwheat

- Is not frost tolerant – Do not plant in early spring.
- Seed germinate in 3 to 4 days in warm, moist soil.
- Flowering begins around 3 weeks after germination.
- Buckwheat is a good nectar source for honeybees.



Buckwheat

- The shallow white flowers attract beneficial insects such as lady beetles, hover flies, tachinid flies, minute pirate bugs, and parasitic wasps that attack or parasitize aphids, mites, and other pests.



Buckwheat's Additional Benefits

- Few cover crops establish as rapidly and as easily as buckwheat.
- Buckwheat is also an excellent weed suppressor.
- The roots of buckwheat produce mild acids that release nutrients from the soil.



Buckwheat planting in Kentucky Farm



Buckwheat in a Vegetable Garden



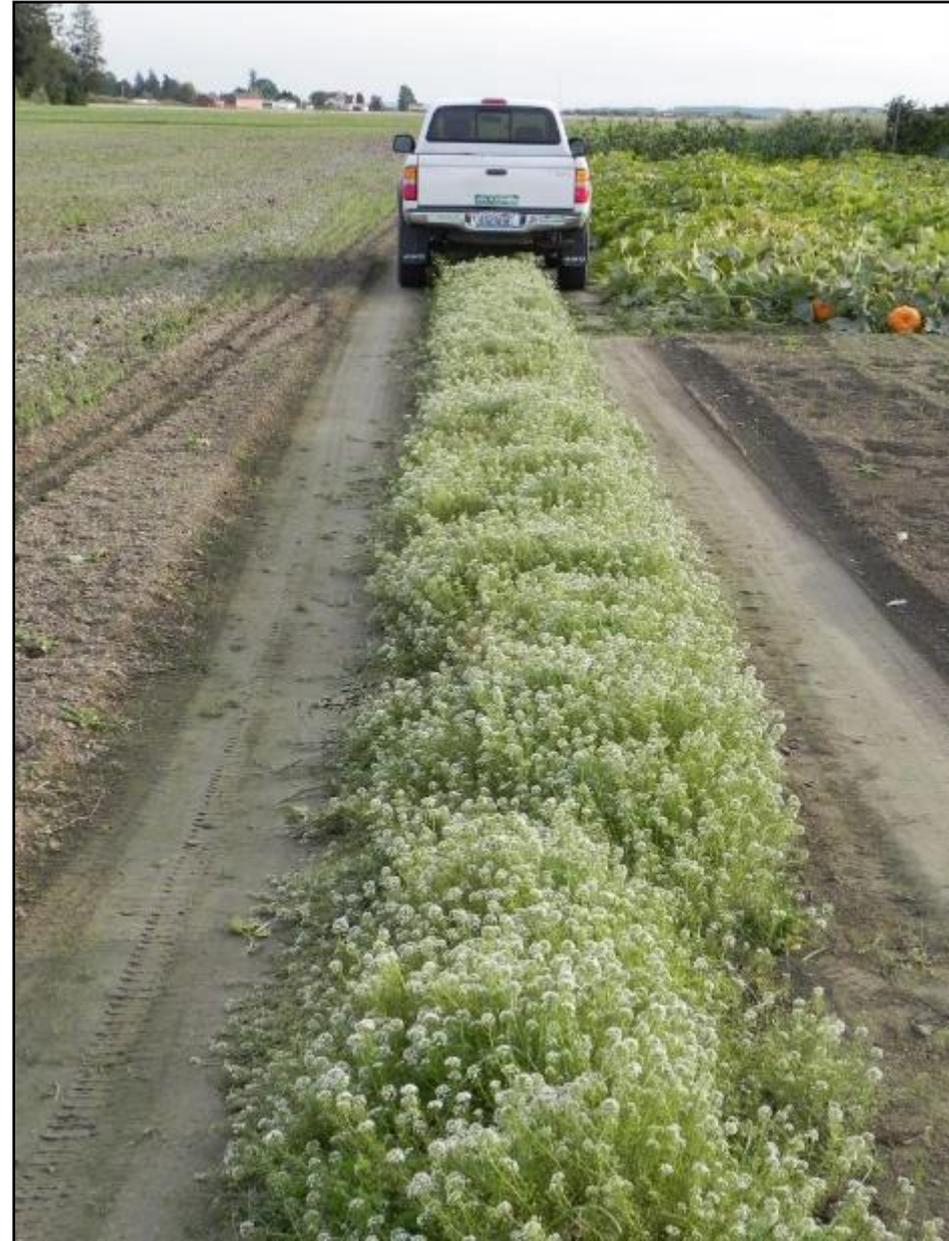
- Sow buckwheat seeds on the edge of your garden, between rows, and/or next to individual plants.

Sweet Alyssum

- A hardy annual best sown in early spring.
- Seeds germinate in 15 to 20 days.
- Optimum soil temperature for germination is 55 to 75° F.
- Sweet alyssum is both drought tolerant and heat resistant.



Sweet Alyssum planted to attract beneficial parasitic wasps





Sweet Alyssum in the Landscape



Bachelor's Button/Cornflower

- This annual wildflower has extrafloral nectaries.
- The plant's leaves release nectar even when not flowering.
- The flowers will attract pollinating insects such as lady beetles, lacewings, hover flies and parasitic wasps.





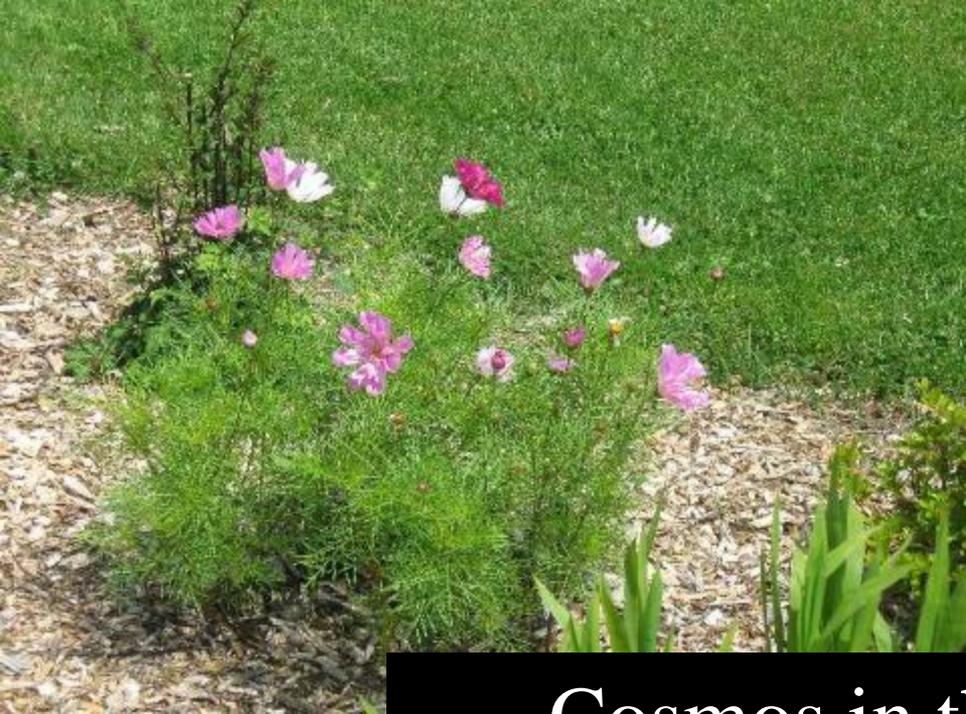
Bachelor's Button in the Landscape



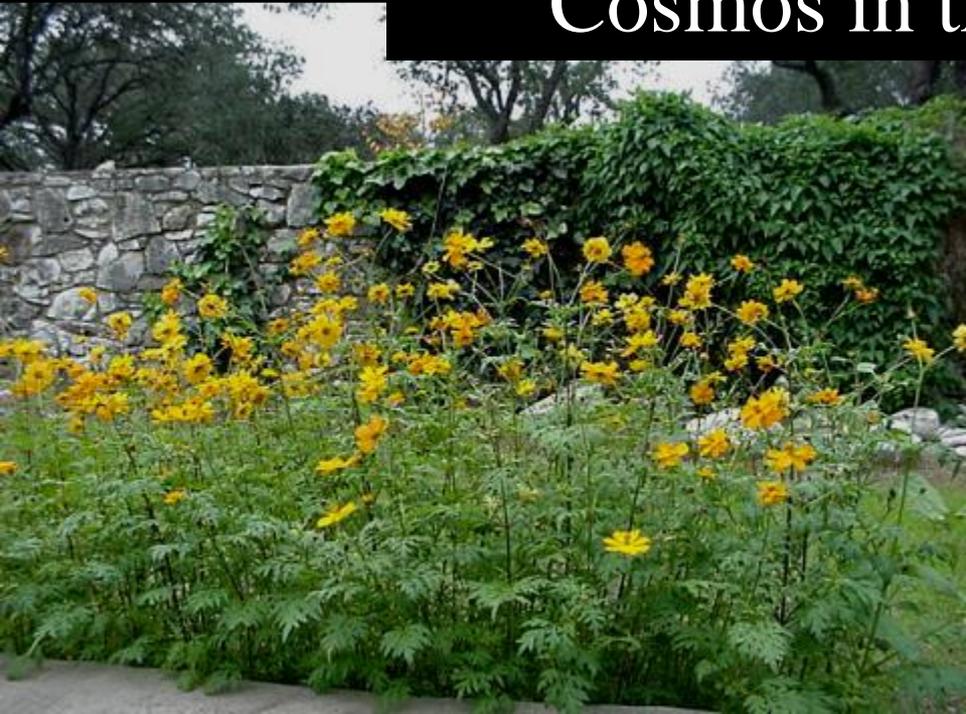
Cosmos

- Flowers are white or various shades yellow, orange, and pink to dark rose, and bloom from June to frost.
- The flowers will attract pollinating insects, as well as hover flies, big-eyed bugs, minute pirate bugs and lacewings.





Cosmos in the Landscape



Coreopsis

- Coreopsis are low maintenance, long blooming and drought tolerant.
- Flowers are mainly yellow with pinks and reds also available.
- Attracts a variety of beneficial insects.





Coreopsis in the Landscape



Catmint (*Nepta*)

- The lavender-blue flowers attract butterflies, bees and other beneficial insects.
- Mature plants grow to 3' tall and wide.
- Very drought tolerant when established.





Catmint in the Landscape



Goldenrod

- Over 50 species in North America.
- Blooms from late summer into fall, supplying a late season source of nectar for butterflies, bees and beneficials.
- Wasps, spiders, praying mantids, ambush bugs, assassin bugs, soldier beetles prey on insects attracted to goldenrod.



Sunflower (*Helianthus maximiliani*)

- Perennial that reaches 3 to 8 feet in height.
- Blooms from August thru September, providing a late season nectar food for beneficial insects.

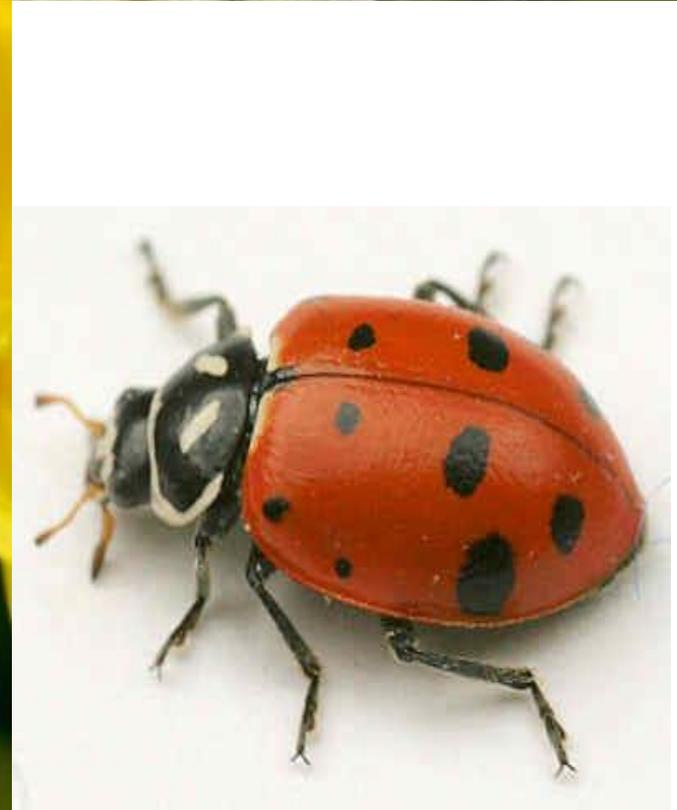


The Beneficials



Lady Beetles

(475 species)



Lady Beetle Larva and Adult

Life Cycle: Generally 1 year; females lay hundreds of eggs.

Color: Red, pink, yellow, orange, black, brown, with spots.

Pests: Aphids, mealybugs, mites, soft scale, and insect eggs.



Lady Beetle Larva & Pupa



Green Lacewings

(87 species in North America)

Life Cycle: 6 weeks; females lay up to 200 eggs.

Color: Green or brown with transparent wings.

Pests: Aphids, thrips, mealybugs, scales, moth eggs, mites, small caterpillars, other soft-bodied insects.



Lacewing Eggs



Hover/Syrphid Flies

(900 species in North America)



Life Cycle: A year or less; females lay up to 100 eggs

Color: Shiny, yellow-and-black, or white-and-black striped.

Pests: Adults feed on pollen; larvae feed on soft bodied insects such as aphids and spider mites.



Hover Fly Egg & Larva



Egg



Larva feeding on aphids.

Tachinid Fly

(1,300 species in North America)

Life Cycle: Varies considerable with species .

Color: Gray, brown, or black with lighter or colorful markings.

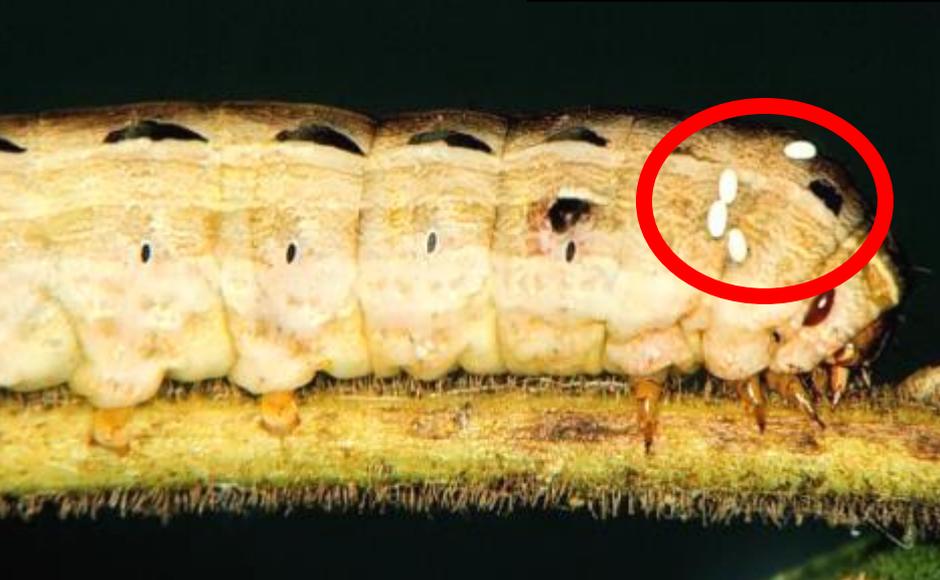
Pests: Caterpillars, sawflies, squash bugs, stink bugs,
and grasshoppers.



Tachinid Fly Eggs on Host Insect



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UF/Castner

Parasitic Wasps (16,000 species)

Numerous tiny wasps parasitize various stages of other insects; many are beneficial parasites (parasitoids) that kill other insect pests.



Pests: Aphids, cabbage worm, tomato hornworm, corn earworm, codling moth, cutworm, armyworm, webworm, cabbage looper, corn borer, and other insects.

Parasitic Wasp Stinging Scale



M. alberti stinging *Coccus hesperidum*, soft brown scale.
Note: wasp is only 1.5-2 mm long.
PHOTO: Mike Rose

Parasitized Aphid



Healthy Aphid



Parasitized Aphid

Parasitized Aphids



Parasitized Hornworm

- The wasp larvae have developed into adult wasps and have chewed openings in the cocoons to fly away.



Paper Wasp



Paper Wasps

- They are primarily predators of caterpillars.
- The caterpillars are stung, paralyzed, chewed up and then placed in the individual cells or chambers of the nest as food for developing wasp larvae.
- Construct nests of a paper-like material containing finely chewed wood fragments and salivary secretions.



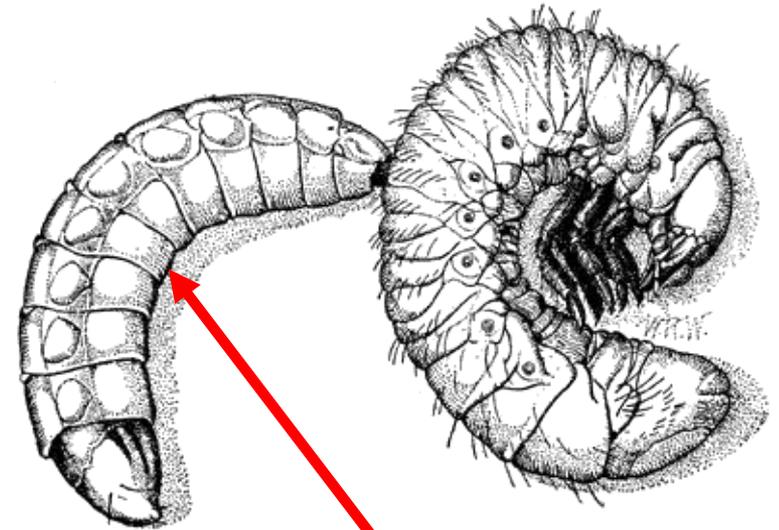
Scolia dubia

- The female digger wasps burrow into the soil and attach an egg to a grub, often Japanese Beetles, or June Bugs, which then will consume the grub as the wasp larvae, grows and matures.



Parasitoid Wasp of Green June Beetle Grub

Scolia dubia



Parasitic wasp larva
feeding externally on
white grub.

Praying Mantids



- Mantids are general predators that feed on almost any insects of the right size.
- They have **one generation per year** with winter spent as eggs within a pod.
- There are three species of mantids in Tennessee, the **Carolina Mantid**, **European Mantid**, and **Chinese Mantid**.

Carolina Mantid (female)



Carolina Mantid (male)



European Mantid (female)



European Mantid (male)



Assassin Bugs

- Assassin bugs are generalist predators that feed on a wide variety of insects and many insects that we refer to as pests.
- They vary widely in size and color. Adults can be as long as 1½ inches and range from brown or gray to bright orange with stripes.



Joe Boggs, OSU Extension©



Cathy Keatley Garvey

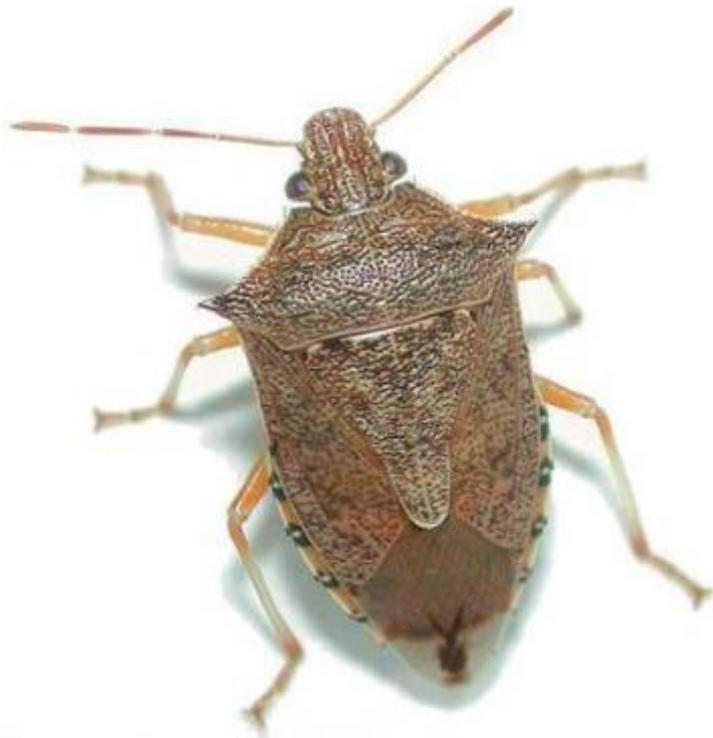


Spined Soldier Bug



Spined Soldier Bug

- These can be identified by spines projecting from their thoraxes, whereas plant feeders have round shoulders.
- The predators feed on many insects, especially caterpillars.



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Big-Eyed Bug



Big-eyed Bugs

- Are about 1/16 inch long, usually brownish or yellowish, somewhat flattened, with a wide head with bulging eyes.
- Are native predators in orchards and field crops.
- Feed on aphids, mites, plant bugs, leafhoppers and caterpillars.



Minute Pirate Bug



Minute Pirate Bug

(1/8 inch long)

- Minute pirate bugs are common insect predators that are found in many agricultural crops, pastureland, and surrounding areas.
- Adults and nymphs feed on spider mites, thrips, small caterpillars, leafhopper nymphs, small insects, and eggs.
- Feed on pollen and plant juices when prey are not available.



Long-legged Flies



Long-legged Flies

- They are small, slender flies, which are usually brilliantly colored with metallic hues of green, blue, copper, gold, and silver.
- Both larvae and adults are predaceous on many insects and small arthropods, including other flies, aphids, mites, thrips, whiteflies, leafhoppers and other insects.



Predatory Mites

- Several mite species are predators of plant-feeding spider mites.
- Typically, these mites are a little larger than spider mites, but are more rounded in shape and faster moving than their prey.
- Low humidity can restrict their activity and are also more susceptible to insecticides than are plant-feeding species.



Conclusion

- Earth is home to a vast number of organisms, and as humans, we must take greater responsibility to ensure that future generations inherit a sustainable place to live.

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