Bugs Happen

Stanton Gill, Extension Specialist in IPM and Entomology , University of Maryland Extension

and Professor with Montgomery College Landscape Technology Program

Remember the good guys

Amaranths – beautiful cut flower for markets

Purple knight amaranths

Amaranths beetle on cardinal flower- Amaranths sp

Amaranths beetle will feed on pigweed also.

Florida stinkbug attacks amaranths beetle in Maryland

Red garnet is least attractive of amaranths to amaranths beetle

Kidney bean amaranths appears to be fairly resistant

- Chemical control
- Neem – azadirachtin will give 2-3 days of control
- Acephate – Orthene
- Acetamiprid (TriStar)

If deer are a problem consider the alliums as a cut stem

May to June depending on cultivar

Wheat celosia have very few bug problems. Good for pollinators

Wheat celosia – Amazon women – Ralph Cramer introduction

Hybrid cross between crested and wheat celosia

Crested type of celosia

Everyone loves zinnias

Benary Giant

Sequence plant and avoid overhead irrigation to reduce bacterial leafspot

Big problem for 2018

2003 and 2004 Record Wet Summers = record Adult Japanese beetles adults in 2004 and 2005 summers

2006- 2013 - 7 years of droughty summer = no real Japanese beetle adult in summers

2014 and 2017 Wet summers with frequent rains up to mid-July = 2015 thru 2018 **BIG Adult Japanese beetle seasons**

ols

Need to get in early for Japanese beetle control. Once they start feeding the foliage releases volatiles that other beetle pick up and increase feeding at site. Control

- **Active(s) – Cyantraniliprole**
- For foliar and systemic insect control on ornamental
- plants, shrubs and trees in greenhouses and interiorscapes
- APPLICATION PROCEDURES AND SPRAY EQUIPMENT
- Mainspring readily mixes with water and may in many
- different types of application equipment and to either
- the foliage or root system
- **RATES – 1 – 16 oz. in 100 gallons of water**

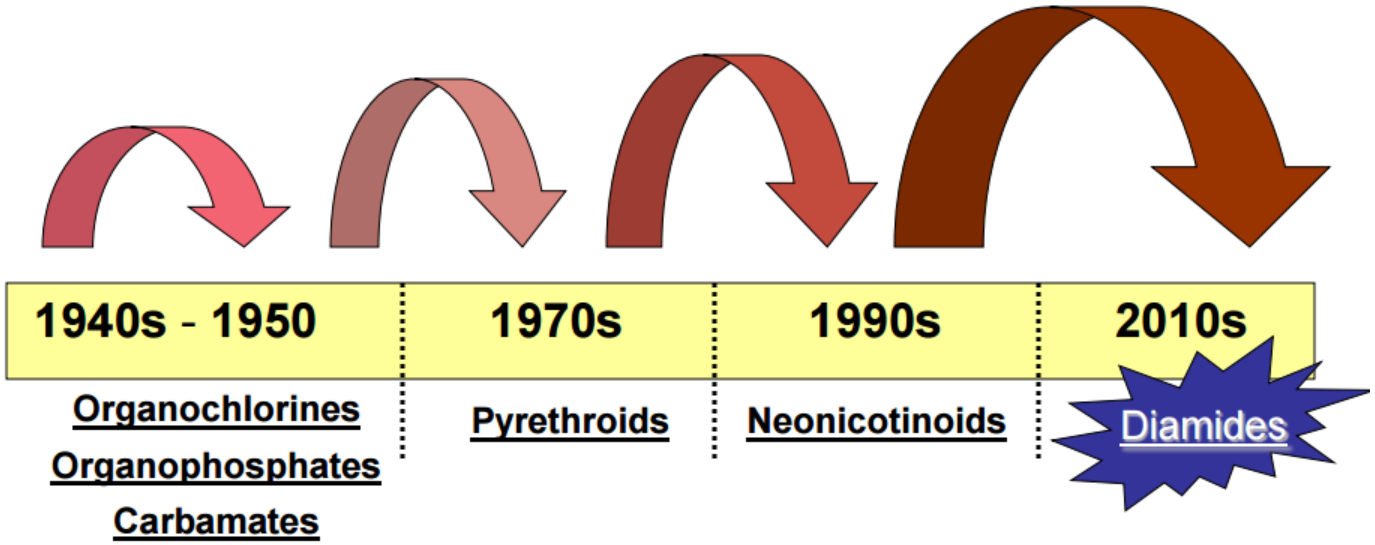
Mainspring insecticide by Syngenta

- Neonics work but could show up in pollen
- What else do we have?
- Possibly Altus from Bayer company – need trials in 2018

Protect the pollinators

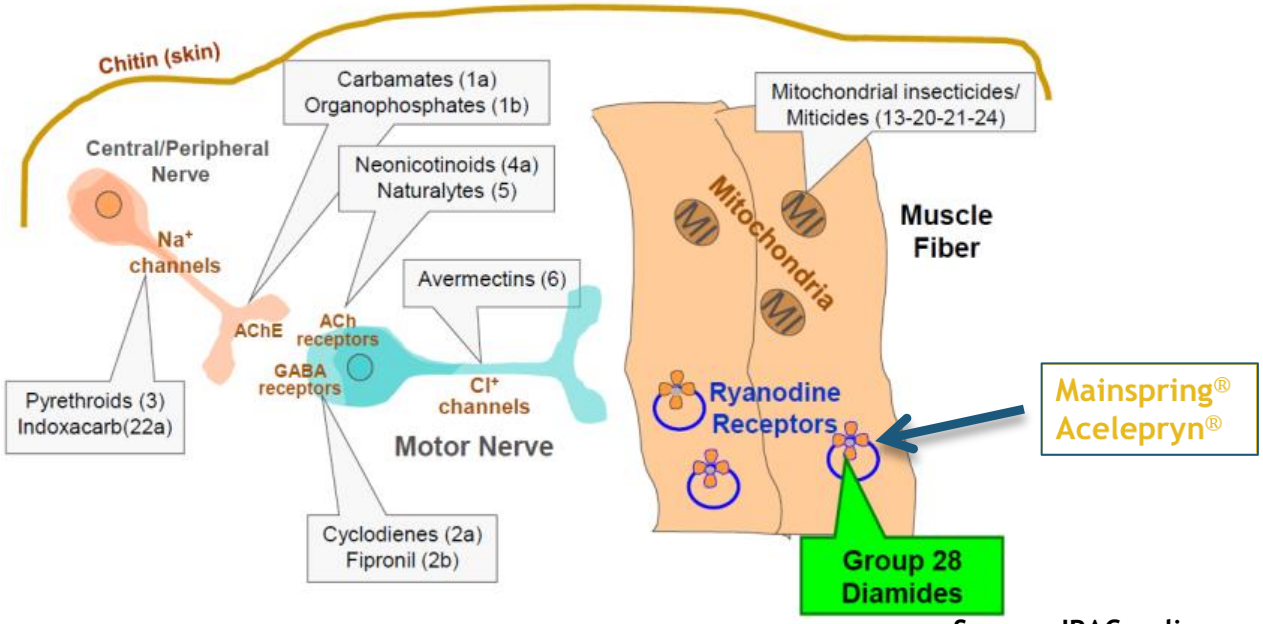
Diamide Story

Insect Control Eras



Resistance Management and Insect Target Sites

Group 28 Products Paralyze Insect Muscle: An Alternate MoA for IRM



Source: IRAC-online.org

- 2 rates of Bacillus thuringiensis ‘galleriae strain’
- Acelepyrn and Mainspring each at mid-rates of 8 oz./100 gallon rate

- Objective: test efficacy and how long they are effective in g trol
- Evaluate activity of predators and parasites in treated areas

- Mainspring and Acelepyrn at 8 oz./100 gallon rate will give your 10 days of control . High rates (16 oz./100 gallons) up to 3 weeks of control
- beetleGone – Needs sticker if rainy but should provide fairly good control at 100 oz/100 gallons of water for 7 days and sometimes 10 days if no rain

Results: to be so predato sites

Black vine weevil

Perennials attacked:
Astilbe
Heuchera
Sedum
Perennial flowering strawberry
Lily of valley
Toad lily
Hosta

Control:
Hb nematodes – soil drench at 1 billion per acre rate
Steinernema feltiae – 1 billion per acre rate

Soil drench of bifenthrin (Talstar)

Coneflowers (Echinacea) are
gardens. These long-blooming
midsummer through fall.

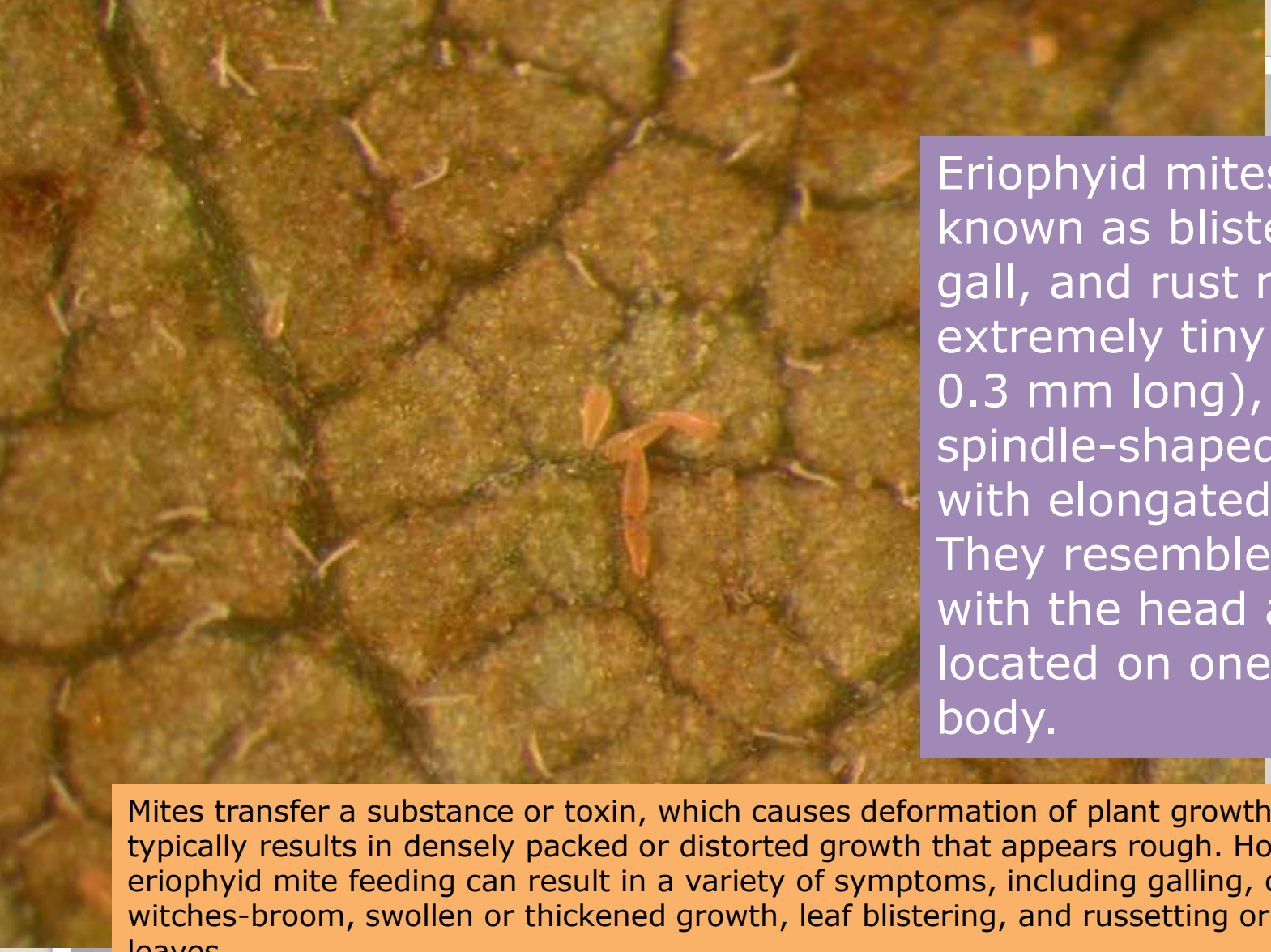
- Aphids – Aphids, (green peach, foxglove and melon aphid) , will suck the nutrients from plants. In large masses, they can quickly overwhelm and kill plants.
- Japanese beetles – Japanese beetles feed in groups and can usually be spotted around June. They will quickly destroy plants by feeding on foliage and flowers, starting at the top and working down.
- Sunflower moth – larvae does damage to flower head
- Eriophyid mites – Eriophyid mites live and feed on the insides of flower buds. Damage can be recognized by stunted growth and distorted flowers.

Major pests of coneflowers

Contact materials:
Insecticidal soap, Horticultural oil

Stylet blockers: Endeavour (Syngenta) , Altus (Bayer) Aria (Gowan Company)

Systemic materials: Acephate, dinotefuran, Altus, Kontos (nursery only)



Eriophyid mites, also known as blister, bud, gall, and rust mites, are extremely tiny (less than 0.3 mm long), worm- or spindle-shaped mites with elongated bodies. They resemble cigars, with the head and legs located on one end of the body.

Mites transfer a substance or toxin, which causes deformation of plant growth. Feeding typically results in densely packed or distorted growth that appears rough. However, eriophyid mite feeding can result in a variety of symptoms, including galling, clustering or witches-broom, swollen or thickened growth, leaf blistering, and russetting or bronzing of leaves.

- Biological:
- Use *Amblyseius cucumeris* or *Amblyseius swirskii predatory mite*

- *Chemical:*
- *Horticultural oil*
- *Forbid (systemic miticide)*
- *Sanmite*
- *Abamectin*

Eriophyid mite control

Sun flower moth larvae-

Life cycle of sunflower moth

***Homoeosoma electellum*, damages the flowers of Echinacea, sunflower, marigolds cosmos, coreopsis and other composites (Asteraceae).**

- Flowers are susceptible in the early stages of bloom, and females lay their eggs at the base of the florets. The newly emerged larvae feed on pollen and florets. The larvae begin tunneling into seeds upon reaching the third instar (larval growth stage).
- Tunneling continues throughout the remainder of larval development. Later instars bore into the head and consume receptacle tissue and seeds. Many overlapping generations occur throughout the summer.
- Although a portion of larvae pupate in the heads, the majority of maturing larvae drop to the ground on silken threads to pupate in crevices or under leaf litter. Diapausing larvae overwinter underground.

Control

- Bt
- Spinosad (Conserve)
- Acelepyrn
- Mainspring

It is summer and this means Thrips – dahlias – big time

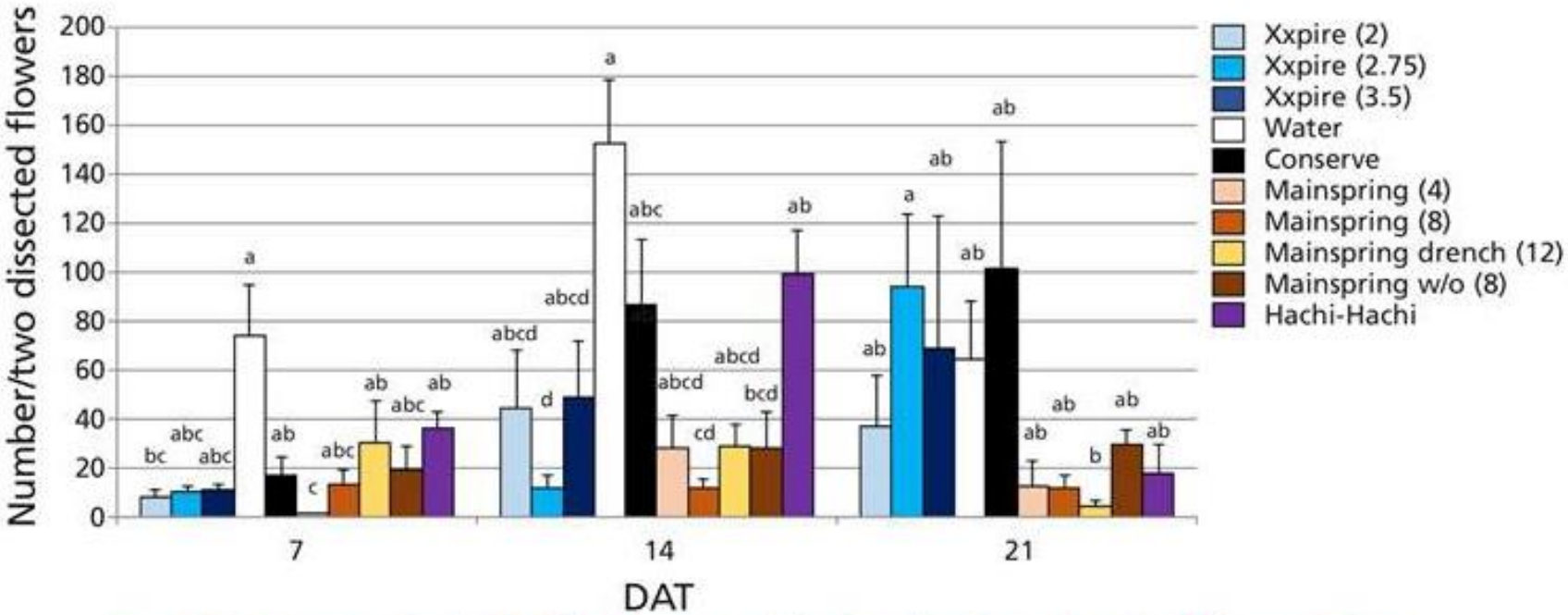


Figure 2. Average number (± S.E.M.) of immature thrips found in dissected marigold flowers before treatments and 7, 14 and 21 days after initial treatment (DAT). Treatments within an evaluation (7, 14, 21 DAT) with different letters are significantly different at α=0.05 (Tukey HSD).

Cucumber beetle love sunflowers, dahlias, marigold, zinnia flower petals

- Striped cucumber beetle
- Spotted Cucumber beetle
- Banded cucumber beetle

Cucumber beetles

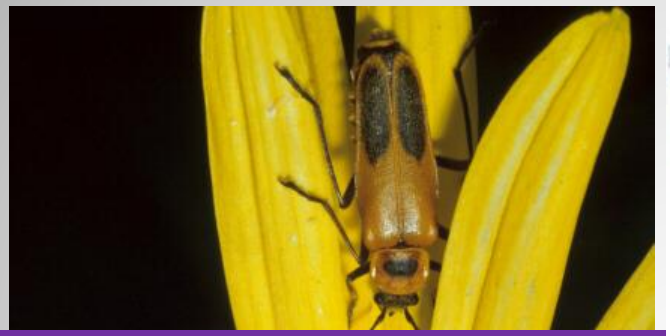
- Beetles become active in mid-spring and quickly start locating host plants for feeding and egg deposition.
- Females oviposit throughout the field and eggs typically hatch within 6-9 days (Webb 2010, Alston and Worwood 2008) and can take up to 30 days with under low temperature conditions (Capinera 2008).
- Eggs are yellow, oval shaped laid in clusters of 25-50 below leaf surface, and measure about 0.7 mm long and 0.5 mm wide (Capinera 2008, Sorensen 1999).
- Adult females deposit eggs in soil crevices at or near the base of cucurbit plants. Freshly laid eggs are completely dependent on soil moisture for their survival (Krysan 1976).
- After eggs hatch, larvae start feeding on plant roots

- Unmated adults overwinter under leaves and debris around woodlands and buildings.
- Adults leave their hiding sites in late March and females oviposit from late April to early June.
- Larvae feed on roots and stems under the soil where they mature for two to four weeks before pupating. Immature stages cause plant damage by boring into plant stem base and roots

Larvae feeding in root

Mature larvae are wormlike and almost 12 mm long.
They have a slender, white body with three pairs of long, brown legs.
Larvae have a brown head capsule


©M.P. Hoffma



- **Biological Control:**
- Some of the important natural enemies that attack cucumber beetles are tachinid flies (*Celatoria diabrotica* (Shimer).
- Biocontrol predator that attack cucumber beetles are soldier beetles, ground beetles, braconid wasps, tachinid flies, and entomopathogenic nematodes.
- Beneficial insects can attack adults, eggs and larvae on plants or on the soil surface.
- Entomopathogenic nematodes have been found to suppress larvae and pupae of beetles in soil . Hb strains and *Steinernema carpocapsae*

- **Trap crops, and baits :**
- The purpose of trapping is to lure beetles away from the "main crop" by means of attractive colors and odors.

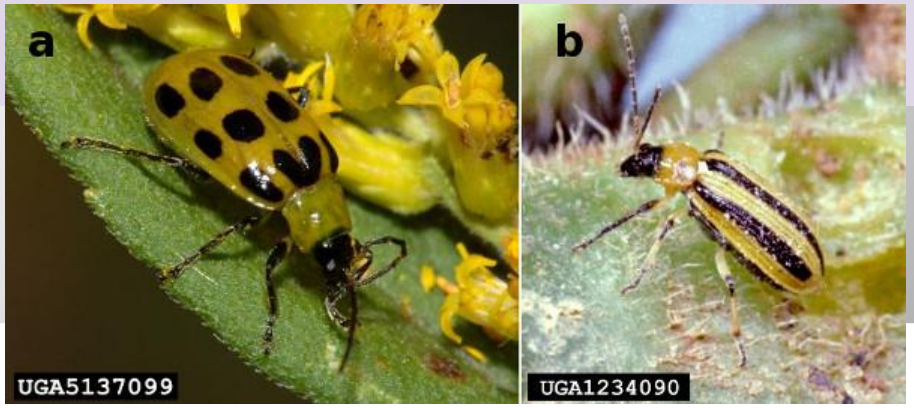
The plants of the Cucurbitaceae family release high concentrations of cucurbitacin and other volatiles in order to defend themselves from herbivores. However, these chemicals are attractive to cucumber beetles so these plants can be used as trap crops.

Trap plants?

- **Trap crops**
- Trap crops should be planted two weeks before main crops along the border or strip adjacent to the main crops. Luna and Xue (2009) reported that field edges are the favorite areas where cucumber beetles aggregate (Luna and Xue 2009).
- Because of the timing, beetles are first attracted to the trap crop rather than main crop. Treat the trap crops with insecticides before the adults start laying eggs.

Alfalfa trap crop, grow a strip of alfalfa or in pots, then vacuum
when you see cucumber beetles (or Lygus) on the plants.

When you vacuum the Cucumber adults, you can hold them in a cage and
feed them veggie culls and collect the Celatoria parasite emerging from
the beetles and release the flies into the greenhouse or garden.
https://www.ncbi.nlm.nih.gov/pubmed/14704104

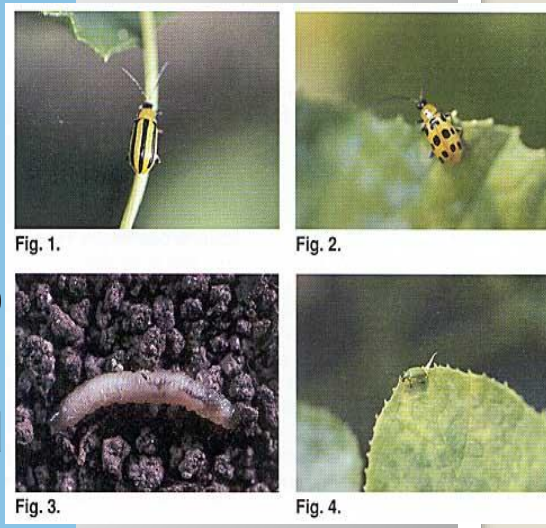


Trece's Cidetrac D (for Diabrotica) is a curcurbitacin product from the powdered root of buffalo gourd. This bitter material attracts Diabrotica and repels many beneficials.

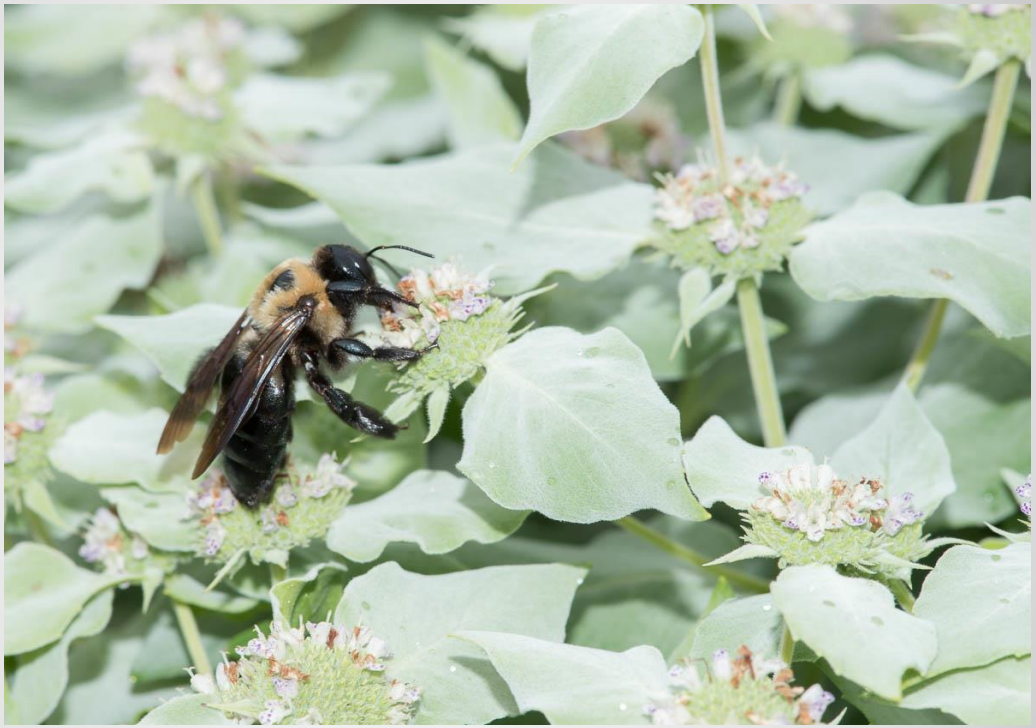
It can be mixed with Spinosad (or Mycotrol) and sprayed as a bait spray to attract and kill Diabrotica (cucumber beetles - 3 spp) with minimum damage to beneficials.

Bait spray is large droplets that are widely scattered Bait spray can be on surrounding vegetation.

http://rinconvitova.com/material.htm#Botanicals



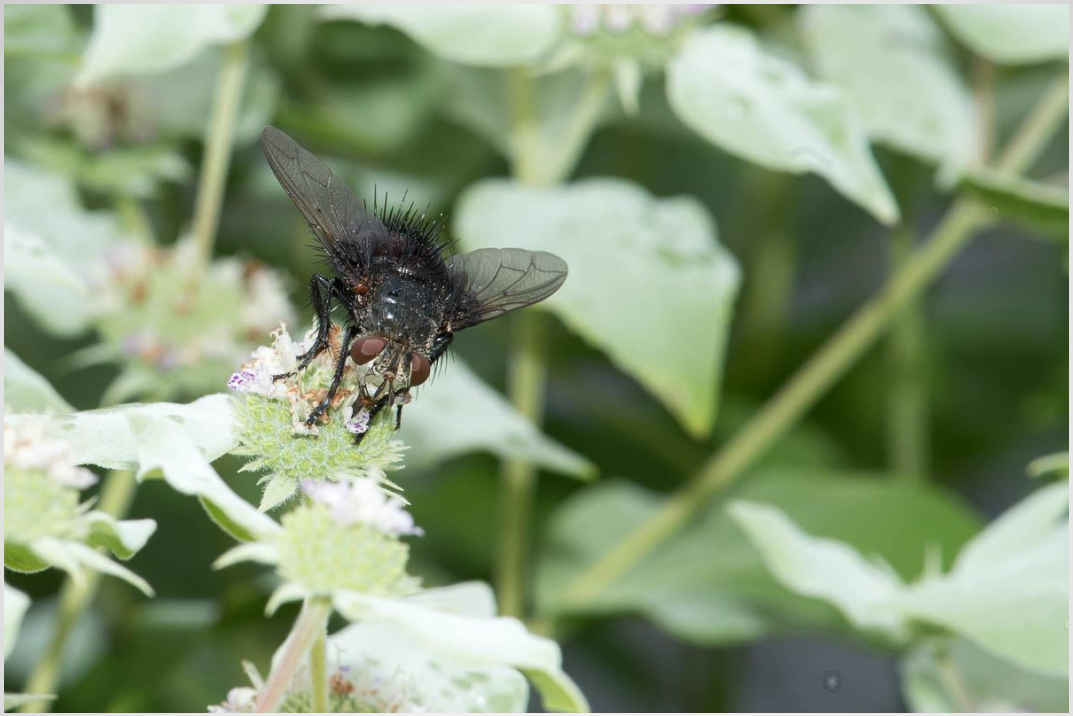
If you plant it
Insect will find you



How about biocontrol in herbaceous plants?

- Owners put out 30 gallon pots with mix of nectar and pollen rich annuals and perennials to attract beneficials.
- In 2015 we have been monitoring the crops every two weeks.
- Plants such as mountain mint, garlic chives, coreopsis, cosmos, buckwheat, Chinese forgot me not, dill, parsley, partridge, sweet alyssum

Cavano's perennials is interested in expanding biocontrol



Tachinid fly on mountain mint

Project at Cavano's Perennial in Baltimore County

Hover fly on coreoposis- larvae feed on aphids

Thread waist wasp predator on caterpillars on mountain mint

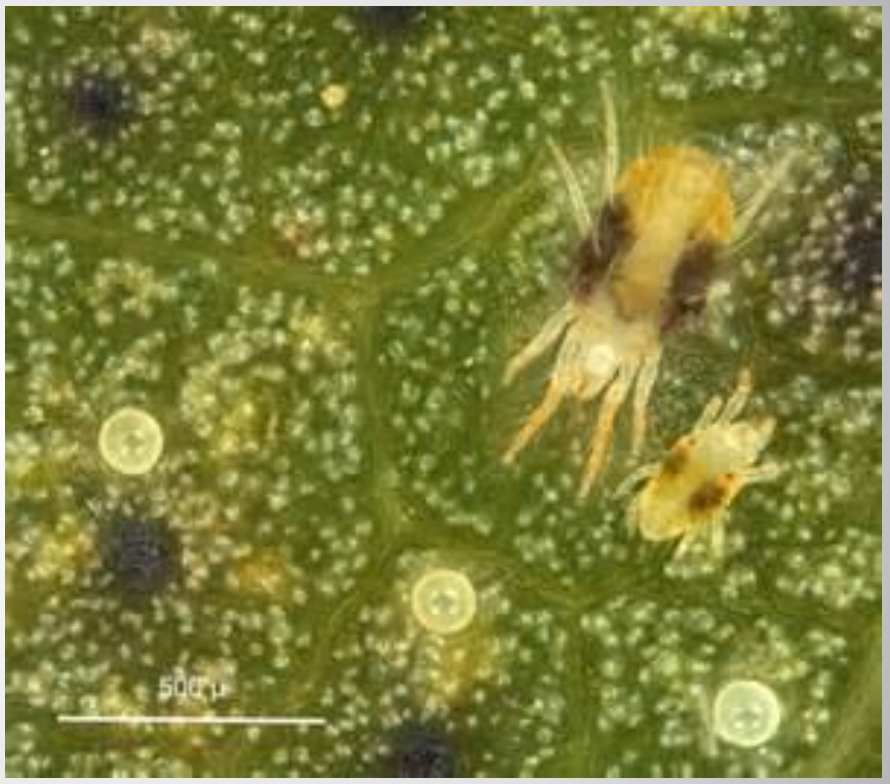
Ladybird beetle on buckwheat flower

Scolia dubia wasp – larvae parasite of white grubs

- Start with making a list of key herbs that you grow.
- Note which ones had problems in other years with certain insects and mites.
- Decide what your “Problem Children” are and monitor them closely

- Spider mite prone herbs:

- Mints
- Sage
- Lemon grass
- Lemon balm
- Hyssop
- Winter Savory

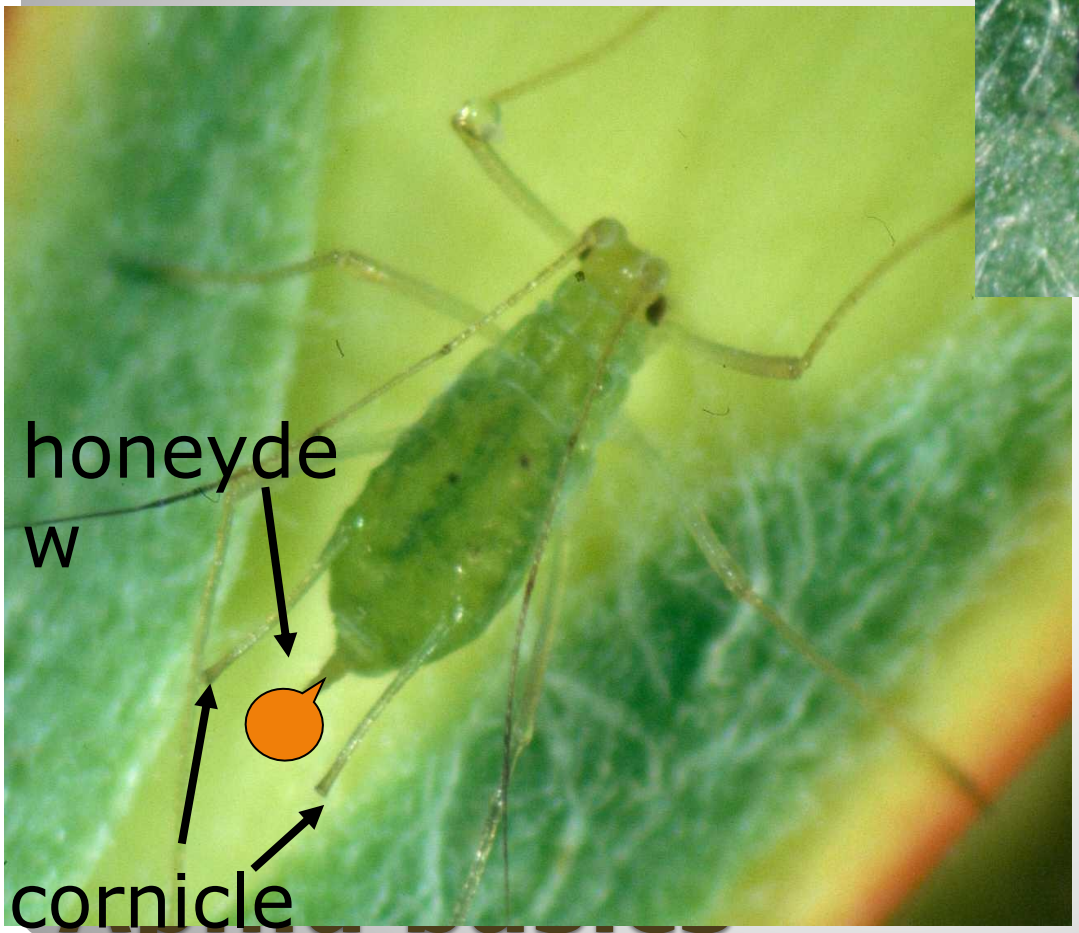


Biological control for mites: Amblyseius californicus released after Phytoseilus persimilis (5 – 6 per sq ft) of area.

- Low risk chemicals that control spider mites:
- Azadirachtin (Azatin, Econem, Neemix, Orzazin, Neemazod)
- Horticultural oils (PureSpray, SuffOil-X)
- Insecticidal soaps (M-Pede, Concern, DES-X)

Aphid prone herb plants

- Lemon Verbena
- Oregano
- Basil
- Sage



Wide host range

Sucking insect

Asexual reproduction

Winged aphids

Aphid damage

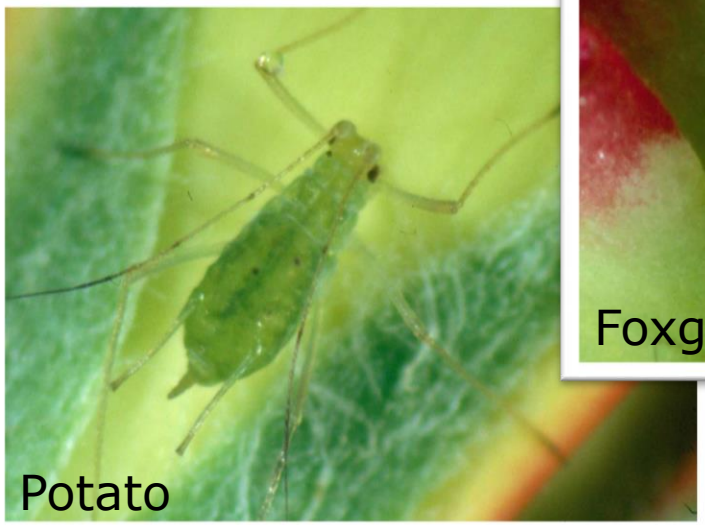
Cast skins

Stunted growth

Honeydew and sooty mold

Virus vector

h



http://aphid.spatialtemporalearth.com/index.php

- **Aphids.**
- The green peach aphid is found on tip growth and populations can explode in spring (March through – early June).
- Look for the long cornicles on the rear end with black tips and notch head area between the antennae


Green peach aphid
common on herbs

Melon aphid- dark green form

- Melon aphid dome shaped head capsule. Cornicle dark for full length.

Melon aphid mottled green form

Aphid control

Good searchers

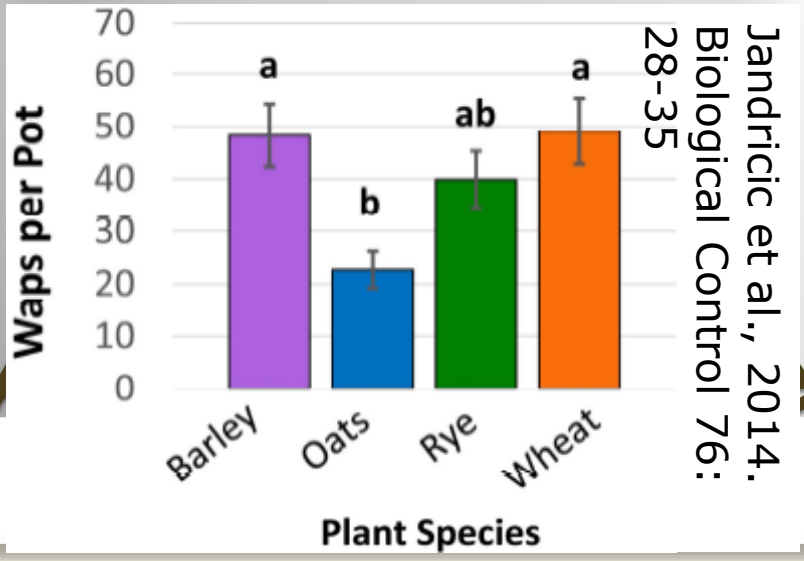
Aphidius colemani wasp that Parasitizes aphid causing aphid mummies (golden-brown and leather-like)

Aphidius colemani- good on green peach and melon aphids

Aphidius ervi

Aphidius ervi- good for potato aphid and other species

- If you are thinking of trying biological control of aphids, plan to start your **either barley, rye or oats** plants in January or February to get the bird cherry oat aphid population established early. It is important to get the parasitic wasp established early in the season before aphids can become established in the greenhouse. - See more at: http://extension.umd.edu/IPM learn/using-banker-plants-aphid-control-greenhouses



Jandricic et al., 2014. Biological Control 76: 28-35

er plants

The aphid parasitoid, *Aphidius colemani*, is released at the rate of 50 Aphidius wasps per 6inch pot of barley plants.

Bird cherry oat aphid

To control ants – Denise put vaseline put on lip of pot

Bird cherry – oat aphid – *Rhopalosiphum padi- obtain these from Biological Supply house*

Hope you got something useful from the lecture

Sgill@umd.edu