

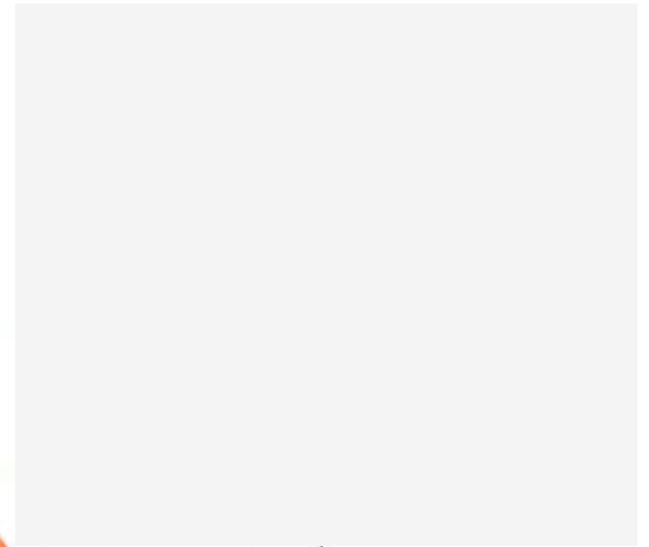
How to manage insect pests in vegetable gardens with minimal use of chemicals



Celeste Welty
Extension Entomologist
March 2018



The goal



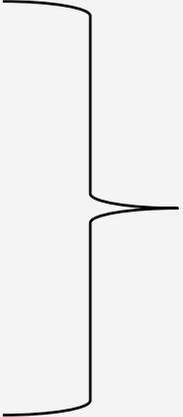
The reality

Topics

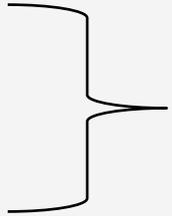
- **Approaches to pest management**
- **Overview of tactics**
- **I.d. & management of common pests**

Topics

- **Approaches to pest management**
- **Overview of tactics**
- **I.d. & management of common pests**



**Handout
1**



**Handout
2**

Types of insect pest damage

- **Direct damage** →
- **Indirect damage** →
- **Disease transmission (vector)**
- **Contamination** →



Strategies of Pest Management

- **Acceptance (do nothing)**
- **Eradication**
 - eliminate pest populations
- **Suppression**
 - reduce pest to tolerable levels

Pest suppression: the search for a weak link in pest's life cycle

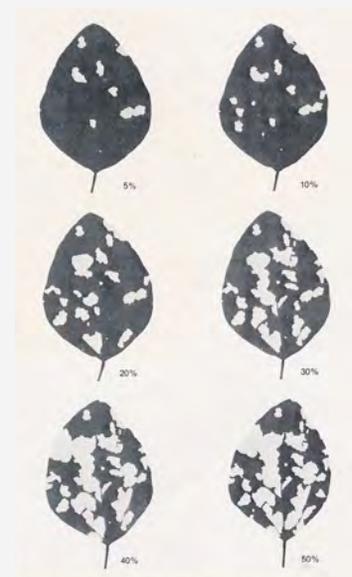


Integrated Pest Management (IPM)

- a **comprehensive** approach to dealing with pests
 - strives to reduce pest status to **tolerable** levels
 - using **multiple** tactics
 - effective
 - economically sound
 - ecologically compatible

Components of IPM

- **Monitoring**
- **Action thresholds**
- **Multiple tactics**



Monitoring

- **Techniques**

- Scouting



- Knockdown



- Sweeping



- Trapping



Action Threshold

- Pest density or amount of damage at which **action** should be taken to **prevent** an increasing pest population from causing economic damage

Action thresholds: beans

<i>Pest</i>	<i>Threshold</i>
Bean leaf beetle 	>1 beetle/seedling or >20% defoliation pre-pod or >10% defoliation after pods
Potato leafhopper 	1 nymph per 10 leaflets

Components of IPM

- **Multiple tactics**
 - Preventive options
 - Remedial options

IPM uses a combination of tactics

- **Mechanical**
- **Cultural**
- **Biological**
- **Microbial**
- **Chemical**

Do chemicals fit in IPM or not?

IPM Continuum



**No
Chemicals**

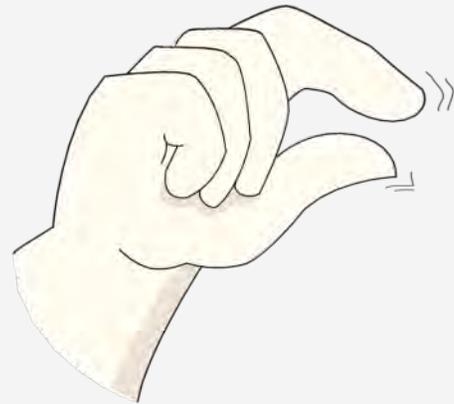
**Intensive
Chemicals**

Approaches to pest management by suppression: **Organic** vs other

- More concern with restoring checks & balances
- Willingness to use tactics:
 - More knowledge intensive
 - More labor intensive
 - More expensive
- Use chemicals or not???

Mechanical Controls

- Exclusion
- Removal



Exclusion by barriers

- Row covers ** →
- Netting, screening
- Plant collars →
- Paper bags →
- Copper barriers
- Trenches (deep furrows)
- Fences



Row covers to exclude pests

- Install on day of planting
- Remove
 - When first flowers appear (cucurbits)
 - At final harvest (broccoli, beans)



Row covers to exclude pests



- **Lightweight**
 - ‘Insect Barrier’, ‘Agri-bon 15’
 - 90% light transmission
(vs 70-85% for heavier covers for frost protection)
 - Sources:
 - Johnny’s Selected Seed: \$24. (10’ x 50’)
 - Gardens Alive: \$10. (8’ x 20’)

Row covers

- Use with or w/o hoops
- Must be anchored tightly
- Be prepared to mend rips



Cages to exclude garden pests

- **Bell cloche**

- \$30/3



- **Pest Control Pop-up**

- \$25 for 4' x 4' x 1'

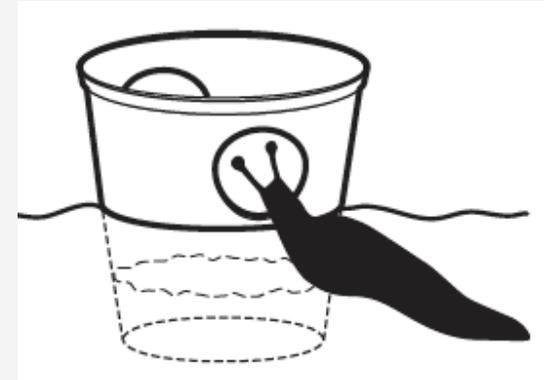
- \$45 for 4' x 4' x 4'

(Gardeners Supply Company)



Mechanical Control by Removal

- **Shelter traps *** →
- **Attraction traps**
- **By tapping, shaking ***
- **By aspirator ***
- **Removal by hand**
- **Removal by vacuum**



Removal by shelter traps

- **Board trap (shingle trap) for squash bug**
- **Tree bands for caterpillars**



Squash bug



Codling moth

Removal by attraction traps



- **Dish of beer for slugs**
 - **Catches many slugs**
 - **Often not significant decrease in population**

Removal by tapping or shaking



- Tap plants by broom or hand
- Tap into bucket or tray
- Daily
- Example: Colorado potato beetle (adults, larvae)



Removal by aspirator



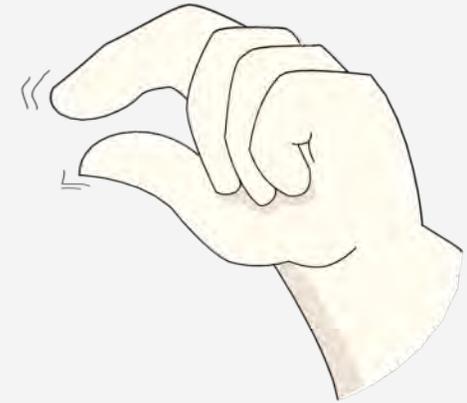
- **Aspirator = Mouth-operated suction device**
- **\$8 – 14 from:**
 - BioQuip
 - Forestry Suppliers
 - Gempler's
- **Good for flea beetles, bean leaf beetle, cucumber beetle**

Removal by aspirator: Eggplant flea beetle



Removal by hand

- **Labor intensive**
- **Target pests:**
 - **Conspicuous pests**
 - **Pests not too active**
 - **In relatively restricted area**
- **Examples**
 - **Spinach leafminer (infested leaves)**
 - **Asparagus beetle (eggs)**
 - **Japanese beetle**
 - **Hornworms**



Sanitation

- **Collect and destroy/compost:**
 - Culled fruit
 - Crop residue (after harvest)
- **Plant clean nursery stock**

Cultural Control

- **How soil is prepared**
 - **Till vs no-till**
- **Which crops are planted**
 - **Trap cropping ***
- **Where crops are planted**
 - **Crop rotation**
- **When crops are planted**
 - **Delayed planting ***
- **How crop is maintained**
 - **Irrigation**
 - **Weeding**

Delayed planting

- **Cucumber beetle**



- **Problem if plant in late May**

- **Less problem if plant in mid-June**

Delayed planting

- **Cucumber beetle**

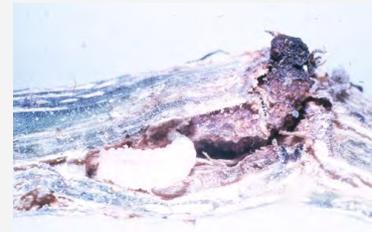


- **Problem if plant in late May**

- **Less problem if plant in mid-June**

- **Squash vine borer**

- **Same**



Delayed planting

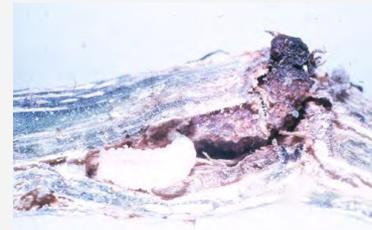
- **Cucumber beetle**



- Problem if plant in late May

- Less problem if plant in mid-June

- **Squash vine borer**



- Same

- **Bean leaf beetle**

- Peak populations in May, July

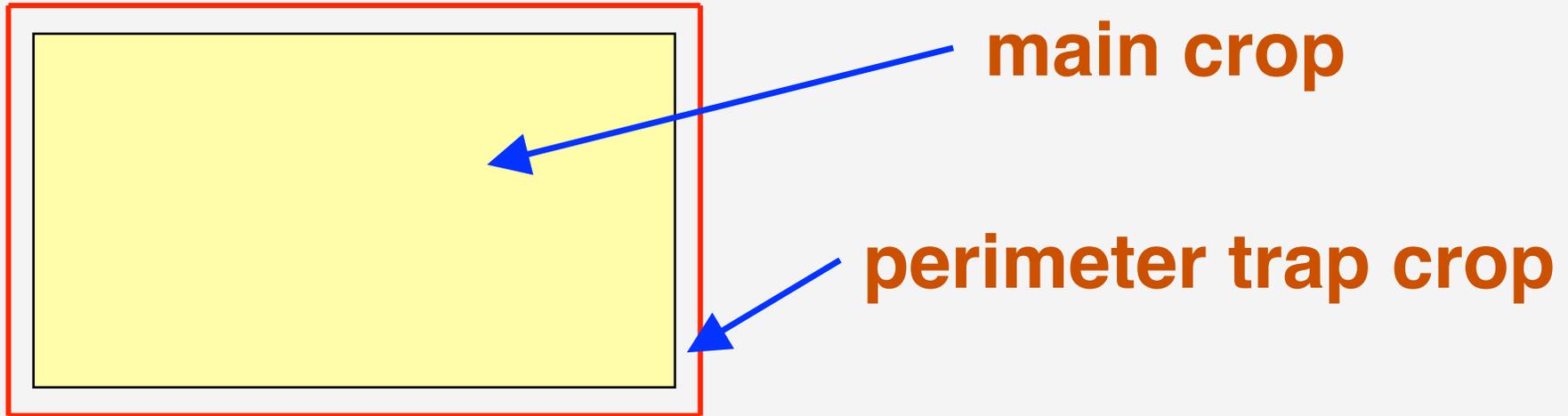
- Fewer in June



Trap cropping

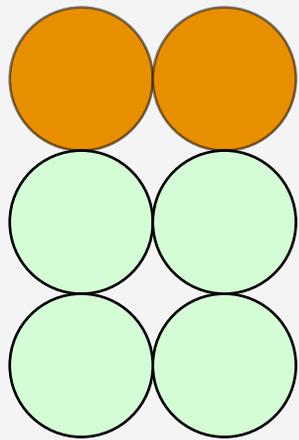
- Lure pest **away from** main crop to a more attractive crop
- Then **kill** the pest in trap crop
 - Mechanical
 - Chemical

Trap cropping



- **Planting time options**
 - Same time
 - 2 weeks early for trap crop

Trap cropping adapted to garden scale



**Squash, trap crop,
planted 2 weeks early**

Cantaloupe, Main crop

Trap cropping examples

<i>Main crop</i>	<i>Trap crop</i>	<i>Target pest</i>
cabbage	collards	diamondback moth
cabbage	kale	harlequin bug
cucumber	hubbard squash	cucumber beetles
peppers	sweet corn (late)	Europ. corn borer

Cultural control: trade-offs

Example: straw mulch

- **Benefits**
 - Moisture retention
 - Weed suppression
 - Reduces soil splash
 - Reduces fungal spore dispersal
- **Makes some pest problems worse**
 - Cucumber beetles, slugs



Biological Control

- Control of pest by other organisms that act as natural enemies
- Common natural enemies
 - Predators
 - Parasitoids



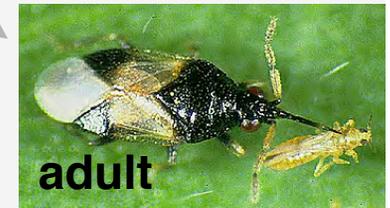
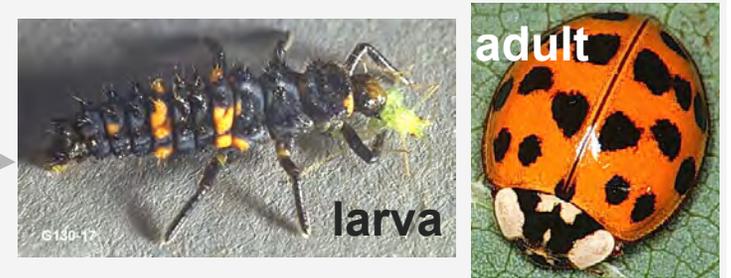
Biological Control: Predators

- Develop at expense of more than one prey item
- Predator often larger than prey
- Prey usually killed & consumed quickly

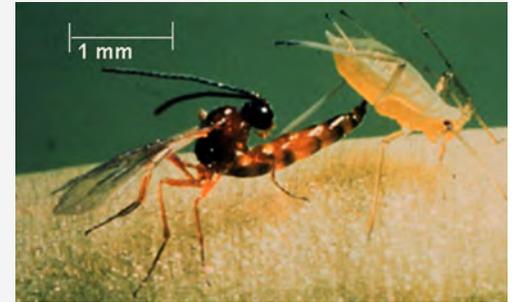


Predators

- Green lacewings
- Lady beetles
- Insideous flower bug
- Damself bugs
- Hover flies



Biological Control: Parasitoids



- Develop at expense of a single host
- Lay egg in or on host insect
- Host is usually killed slowly

Parasitoids

- **Braconid wasps**

- On hornworm: *Cotesia congregata*

- On imported cabbageworm:
Cotesia glomeratus

- On aphids: *Diaeretiella rapae*

- **Ichneumonid wasps**

- On diamondback: *Diadegma insulare*

- **Tachinid flies**

- On squash bug: *Trichopoda pennipes*

- On cucumber beetle: *Celatoria setosa*



& Vertebrate predators eat insects!

- **Bats**
- **Toads**
- **Birds**
- **Geese**
- **Hogs**



Biological control by conservation of local natural enemies



- **Tactics:**

- Avoid broad-spectrum insecticides
- Refuge planting for natural enemies
- Collect-&-transfer generalists

Conservation of local species

- What to do? Provide resources to enhance enemy activity
 - Add pollen source
 - Add nectar source
 - Spray sugar/protein mix
 - Provide winter shelter
 - Release alternate prey (or nursery crop)



Insectary planting as refuge for natural enemies



- Adult parasitoids need nectar
- Adult predators need pollen
- Plant **flowering border** to enhance biocontrol

Biological control by augmentation of local natural enemies

- **Tactics:**
 - Buy from insectary →
 - Collect and transfer



Augmentation: Collect & transfer

- What to do?
 - Hunt for generalist predators
 - Collect them
 - Transfer them to crop
- Who, where, when?
 - Ladybug larvae on **Spirea** in May
 - Lacewings & aphid midges on **apple** leaves in early June
 - Damselfly nymphs on **alfalfa**, April-June



Spirea : bridal wreath



- Often infested by spirea aphid in May
- Good source of ladybugs & lacewings

Our smartphone app!



- **Name: Good Bugs +**
- **Platforms:**
 - For iPhone & Android
- **Now free** (was \$2.99)
- **Topics:**
 - Natural enemies: i.d., biology, mgmt
 - Pollinators
 - Native plants that support them

Chemical control



Chemical control

- **Insecticides** 
- **Repellents**
- **Attractants**

Microbial control



- Kill insects by making them **sick**
- Typically by spraying product containing micro-organisms

Do any insecticides have valid place in organic gardening?

- **Strict organic gardeners: no**
- **Many organic gardeners: yes, if natural origin**

OMRI: The Organic Materials Review Institute

- List of products allowed
- Crops & processing
- Certified organic growers

Example of
label with
OMRI logo





Insecticides, by Origin

- **Natural**
 - Minerals & elementals
 - Oils & soaps
 - Abrasion agents: diatomaceous earth
 - Botanicals (plants)
 - Microbials
 - Compounds derived from microbes
- **Synthetic**
 - Mimics of natural insect hormones
 - Petroleum-based synthetic chemicals



Insecticides, by Origin

- **Natural**

- Minerals & elementals
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- Compounds derived from microbes

OMRI
ok

- **Synthetic**

- Mimics of natural insect hormones
- Petroleum-based synthetic chemicals

OMRI
not
ok

Note on natural insecticides

- Can be toxic to natural enemies
- “Natural” is not always good!

Smothering or suffocation agents

- oils:
 - from petroleum
 - from plants
- insecticidal soaps:
 - potassium salts of fatty acids



Minerals & elementals

- kaolin
- iron phosphate
- sulfur



Dusting Sulfur

Use as a Dust or Spray!

- Controls Black Spot, Powdery Mildew, Leaf Spot, Rust and Brown Cankers on Roses.
- Controls Listed Diseases & Insects on Shrubs, Flowers, Vegetables and Fruits.
- Controls Thrips, Rust Mites, Red Spider Mites and Two Spotted Mites on Citrus.
- Controls Chiggers.



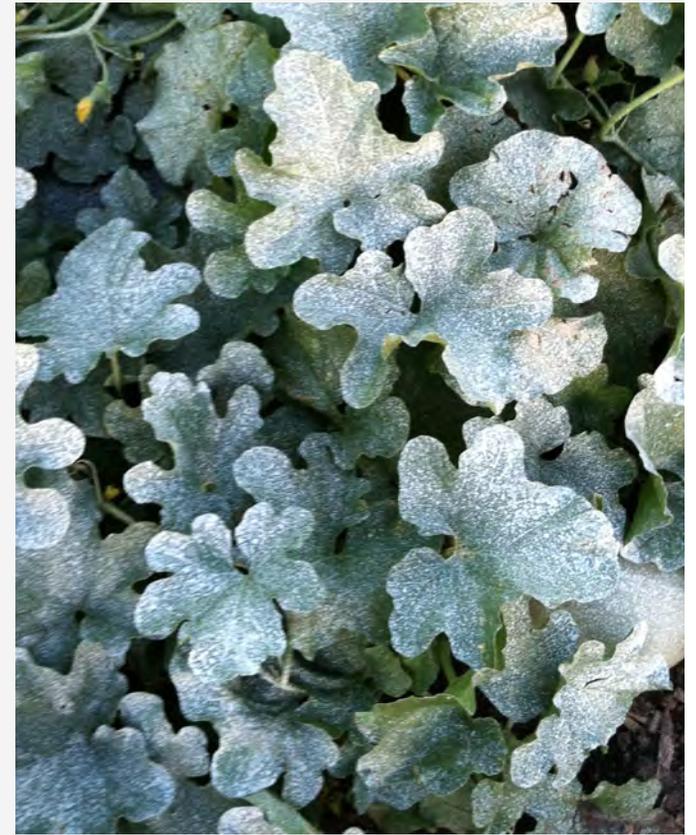
ACTIVE INGREDIENT: Sulfur 80%
INERT INGREDIENTS: 20%
TOTAL: 100%

KEEP OUT OF REACH OF CHILDREN
CAUTION

See Back Panel For Additional Precautionary Statements
NET WEIGHT 2 LBS.

kaolin (clay)

- **‘Surround At Home’**
- **Physical repellent**
- **Photosynthesis not affected**



Abrasion agents: Diatomaceous earth



Natural Guard
GARDENING NATURE'S WAY

CRAWLING
INSECT CONTROL
Containing Diatomaceous Earth

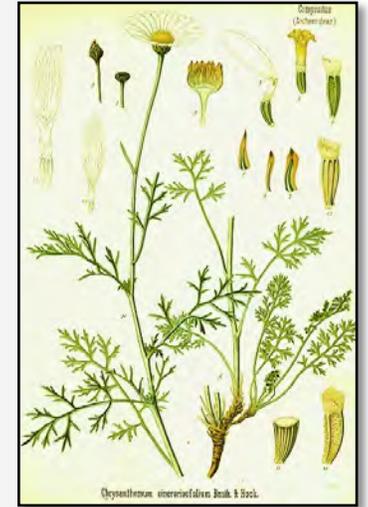
- Effective Long Lasting When Kept Dry.
- Kills Cockroaches, Ants, Earwigs, Millipedes, Centipedes, Crickets, Silverfish, Fleas, Carpet Beetles, Bedbugs, Grasshoppers, Slugs and Other Crawling Insects.
- For Outdoor and Indoor Household Use.

ACTIVE INGREDIENTS:	KEEP OUT OF REACH OF CHILDREN
Silicon dioxide, from diatomaceous earth..... 85.0%	CAUTION
Other elemental oxides..... 10.0%	See Back Panel for Additional Precautionary Statements.
INERT INGREDIENTS:..... 5.0%	
TOTAL INGREDIENTS:..... 100.00%	

NET WEIGHT 5 LBS. (2.27 kg)



Insecticides from plants (botanicals)



On OMRI list:

- **pyrethrum (chrysanthemum)**
- **azadirachtin (neem tree)**



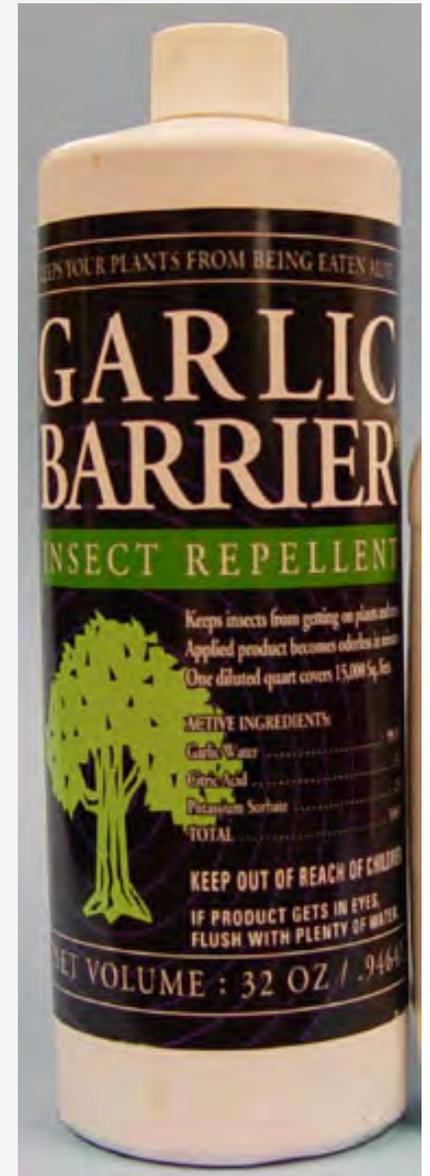
Not on OMRI list:

- **nicotine (tobacco)**



Repellents from plants:

← capsaicin
& garlic →



Microbial insecticides:

cause disease in insects

- Bacteria
- Viruses
- Fungi
- Protozoans
- Nematodes

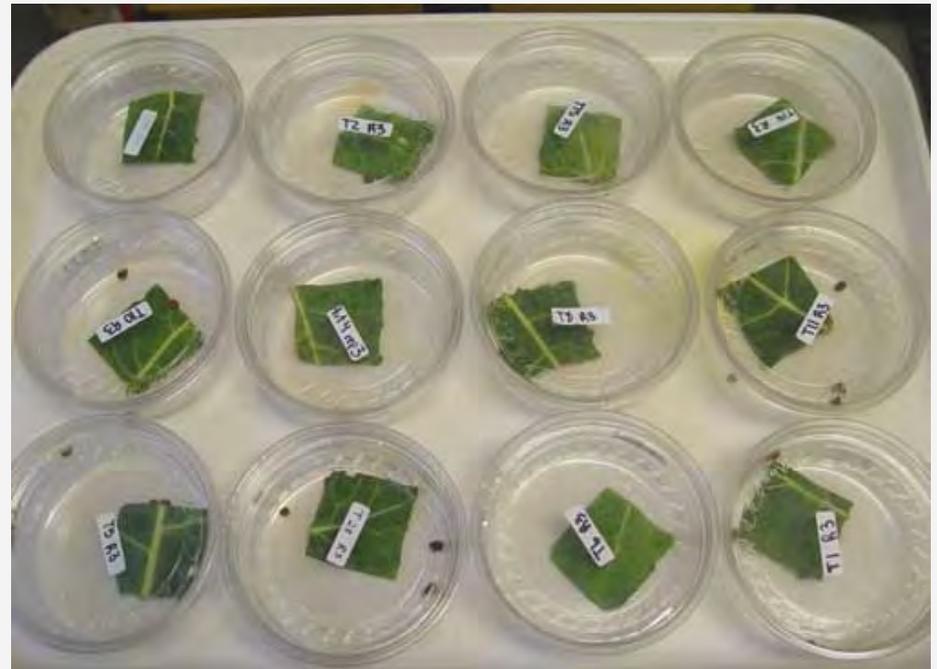


Insecticide derived from microorganisms: spinosad

- **Dow: Entrust**
- **Bonide: Capt. Jack's Deadbug Brew**
- **Fertilome: Borer, Bagworm, Leafminer & Tent Caterpillar spray**
- **GreenLight: Lawn & Garden Spray Spinosad Concentrate**
- **Monterey: Garden Insect Spray**
- **Gardens Alive: Bulls-Eye Bioinsecticide**



Lab bioassays to evaluate insecticide efficacy



- **Defoliation**
- **Mortality**

Trends in insecticide efficacy

<i>spectrum</i>	<i>Exc./Good</i>	<i>Good/Fair</i>	<i>Fair/Poor</i>
broad	pyrethrins + PBO carbaryl esfenvalerate lambda-cyhalothrin cyfluthrin bifenthrin	acetamiprid permethrin malathion pyrethrins + oil pyrethrins + soap	neem seed oil azadirachtin capsaicin garlic
narrow	spinosad soap rotenone dicofol	B.T. oil endosulfan	

in red if on OMRI list

Trends in insecticide efficacy

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narrow	spinosad ★ soap ★ rotenone dicofol	B.T. ★ oil endosulfan	

in red if on OMRI list

So how can pests be managed organically?

- **Maximize non-chemical tactics:**
 - Knowledge & labor intensive
- **Can include chemical control**
 - Only if biorational products chosen
 - Usually as last resort
 - Efficacy mostly fair to poor
 - Do not assume that “natural” = good

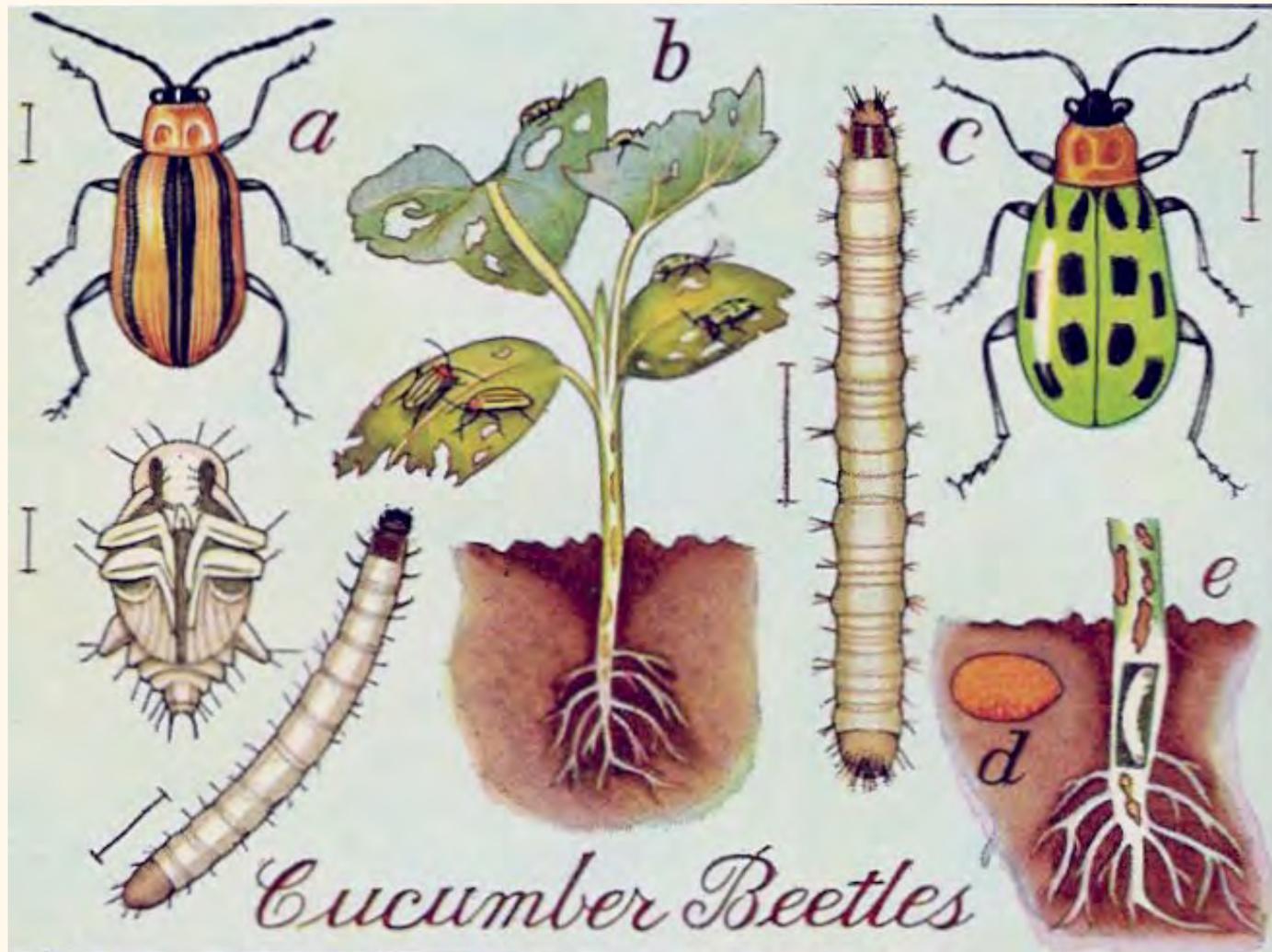
Common vegetable pests: i.d. & management

- **Specialist pests (15)**
 - Cucurbits (4 pests)
 - Cole crops (2+ pests)
 - Tomato etc. (2 pests)
 - Beans (2 pests)
 - Spinach & swiss chard (1 pest)
 - Asparagus (2 pests)
 - Corn (2 pests)
- **Generalist pests (5)**

Cucumber beetles

Striped cucumber beetle

Spotted cucumber beetle





Cucumber beetles

Important damage by adults:

- Chew seedlings
- Transmit bacterial wilt
- Chew on fruit surface

Less critical damage:

- Larvae chew on roots
- Adults chew on flowers



Bacterial wilt of cucurbits

- **Vectored by cucumber beetles**
 - Transmitted in feces
 - Enters via wound in plant (such as feeding wound)



- **Hosts:**
 - Well-known killer of cukes & melons
 - Recently adapted to kill squash & pumpkins (but slower)

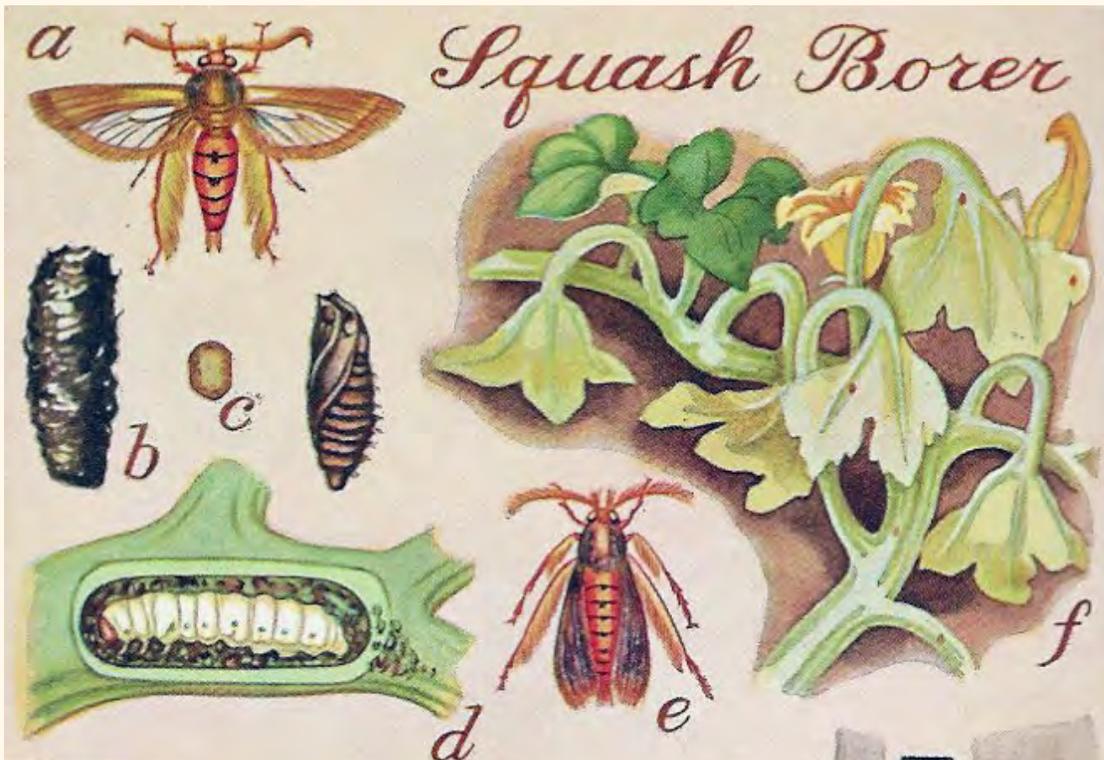
Cucumber beetle management

- **For beginners**
 - **Mechanical control**
 - Screen or row cover (seedlings)
 - **Chemical control**
 - Spray with carbaryl, permethrin, or pyrethrins+PBO,
- **For advanced gardeners**
 - **Cultural control**
 - Early trap crop of squash (Buttercup or Blue Hubbard or Turks Turban)
 - **Biological control**
 - Conserve parasitoids (by no spray)
 - **Behavioral control**
 - Kairomone trap



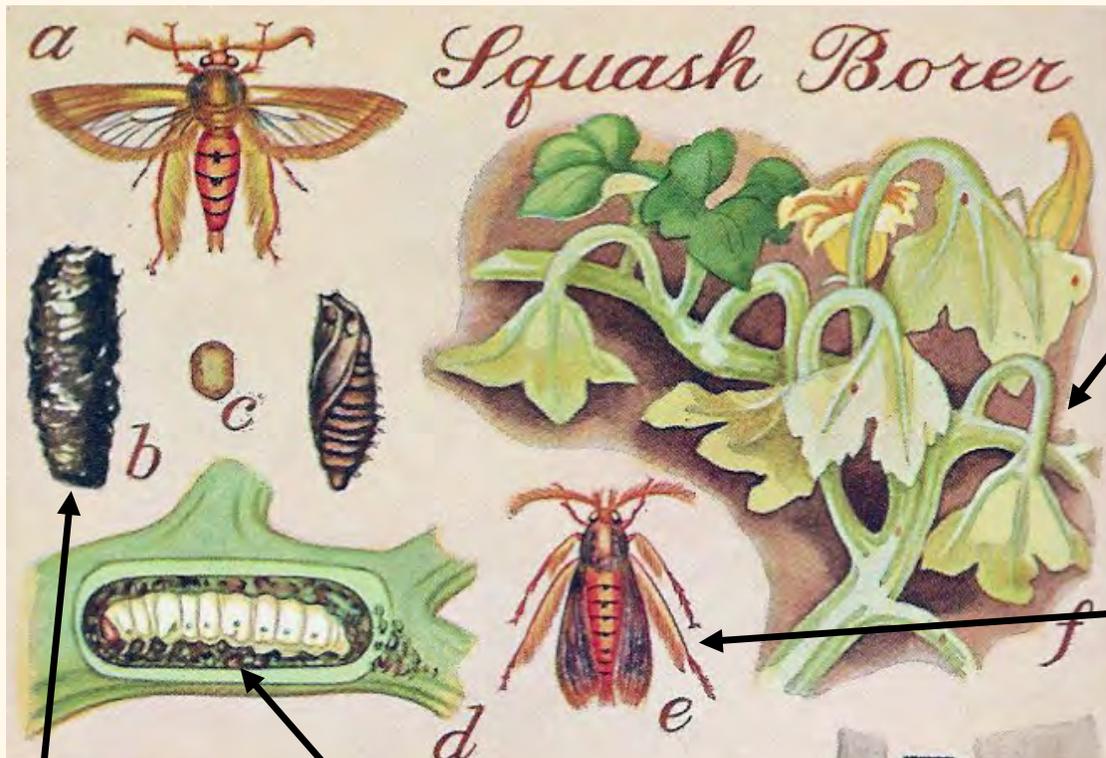
Squash vine borer

- Infests squash, gourd, pumpkins
- Plants often die by July



Squash vine borer

- Infests squash, gourd, pumpkins
- Plants often die by July



wilting leaves
are symptom of
infestation

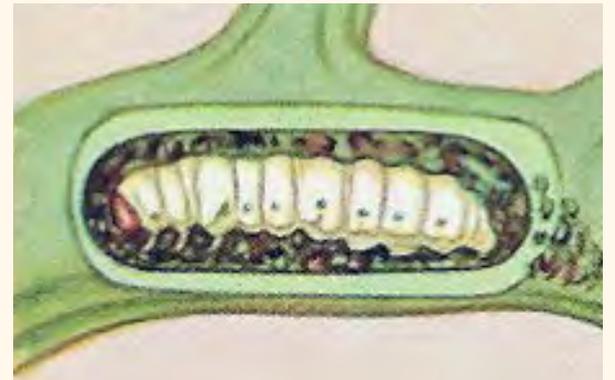
adult is a day-flying
moth, lays eggs in
late June to mid-
July

larva is a caterpillar that bores into stem

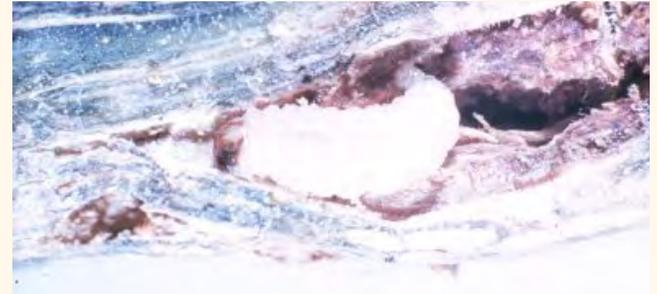
cocoon in soil overwinter

Squash Vine Borer: Management

- **Cultural**
 - Till soil to destroy pupae
 - Plant late for main crop
 - Small planting early as trap crop
- **Mechanical**
 - Row covers (until flowering)
- **Chemical**
 - Insecticide



Squash vine borer



- **Chemical control:**

- During egg hatch period, early July

- Direct at base of stems

- Minimum 2 sprays 1 week apart

- maximum 4 sprays 1 week apart, late June to late July

- permethrin or esfenvalerate or pyrethrins+PBO

Squash Bug: Damage



- **Suck sap: leaves, stems**
 - Patches turn black, die
- **Plants wilt**
 - can die
 - can live but not develop fruit
- **Bugs feed on fruit before harvest**



Zucchini plant killed by squash bug.

Squash bug



eggs



adult



eggs hatching

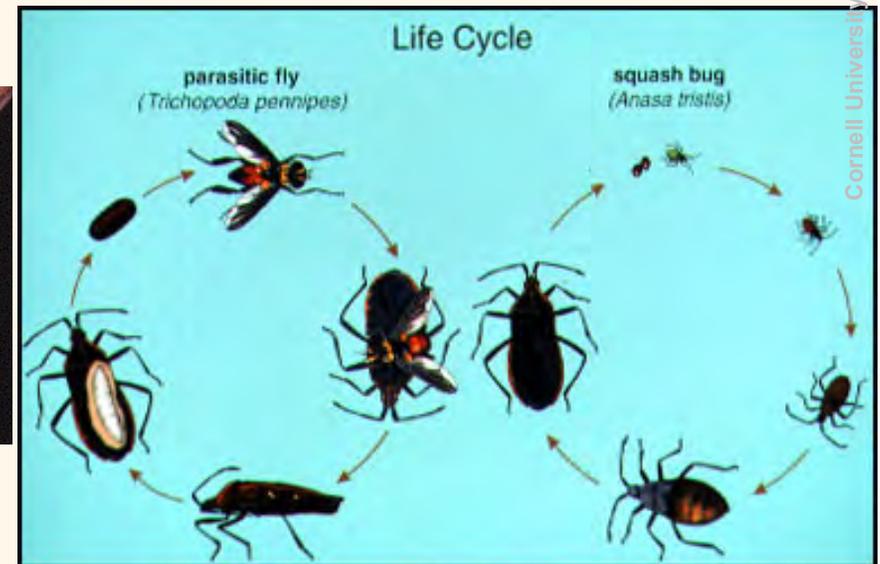


young nymphs



older nymphs

Squash Bug: Biological control



- **Feather-legged fly**
 - *Trichopoda pennipes*
 - lays eggs on adult or large nymph
- **Egg parasitoid wasps**
 - *Gryon pennsylvanicum*
 - *Ooencyrtus anasae*



Squash Bug: Management

- **Mechanical control**
 - **Row covers (until flowering)**
 - **Hand picking, especially eggs**
 - **Shelter traps: board or shingle**
- **Cultural control**
 - **Promote early growth of crop**
 - *** Destroy crop remains**

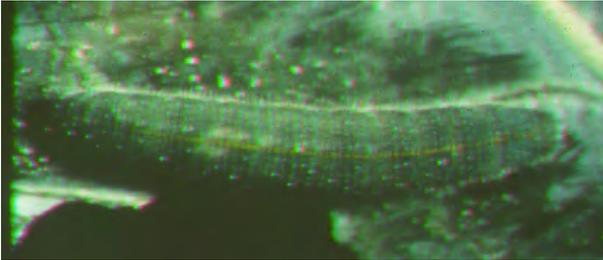


Removal by shelter traps

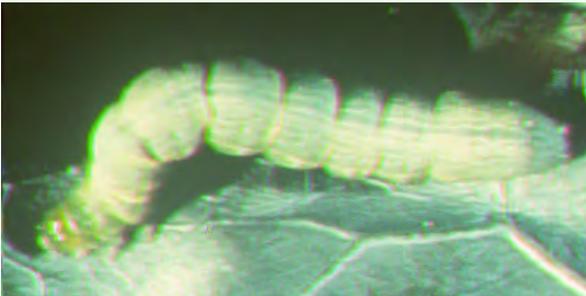


- **Board or shingle trap**
- **Check every morning**

3 Caterpillars on cole crops



Imported cabbageworm

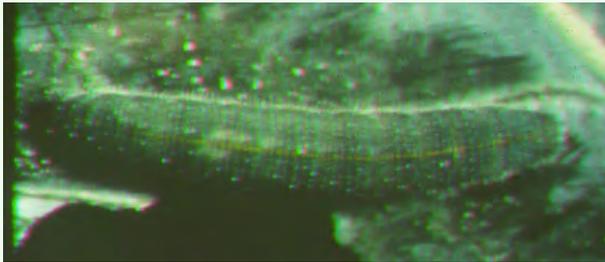


Cabbage looper



Diamondback moth

3 Caterpillars on cole crops & their parasitoids



Imported cabbageworm



***Cotesia* larvae
spinning cocoons**



***Cotesia*
adult wasp**



Cabbage looper



***Copidosoma
floridanum* wasps
emerging from
one cocoon**



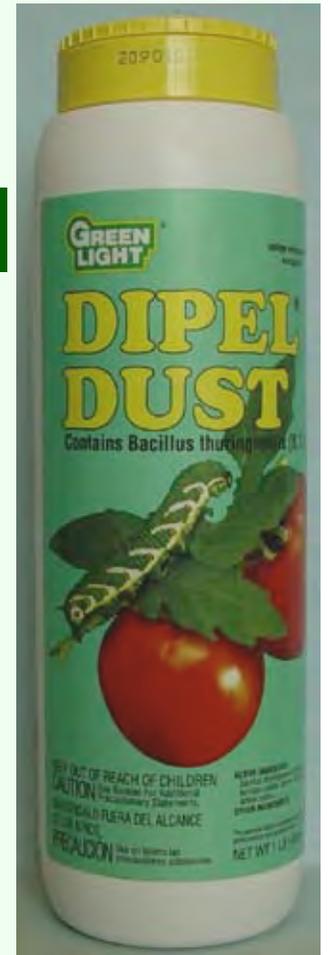
Diamondback moth



***Diadegma insulare*
oviposits on larvae**

Integration of Chemical Control & Biological Control

- Depends on choosing a selective insecticide
 - Kills caterpillars
 - Does not kill parasitoids
 - Use **B.T.** microbial insecticide
 - ‘DiPel’ etc.
 - Spinosad also easy on parasitoids
- Plant border of sweet alyssum to attract parasitoids





Row covers



Cabbage maggot

- Turnip, radish, other cole crops
- Symptoms:
 - Seedlings wilted, stunted
 - Holes or tunnels in roots
- Life cycle:
 - Adult fly lays egg at stem base
 - Larvae feed for 3 weeks
 - 3-4 generations per year
- Control:
 - Choose planting date to avoid egg peak
 - Cardboard collars on stem



Colorado potato beetle

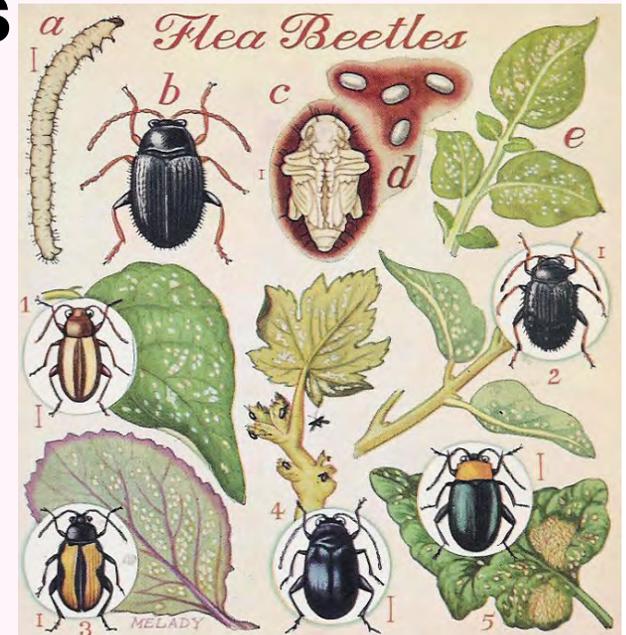


- **Damage:** chewed leaves
 - By adults & larvae
 - Potato, eggplant, tomato
- **2 generations/year**
- **Control:**
 - Hand pick (knock in bucket)
 - Plant potato early or late but not both
 - Spray larvae with spinosad

Eggplant flea beetle



- Chew many small holes in leaves
- Damage critical to seedlings
- Management:
 - Hand-picking (**aspirate**) daily
 - Insecticides or repellents
- Similar species on:
 - Cabbage (2 species)
 - Potato



Removal by aspirator: Eggplant flea beetle



Bean beetles

- **Bean leaf beetle:**
 - Adults chew holes through leaves, pods
- **Mexican bean beetle:**
 - A true lady beetle
 - Larvae skeletonize leaves
- **Cultural control:**
 - Exclusion (row covers)
 - Plow after harvest
- **Chemical control:**
 - carbaryl or pyrethrins+PBO



Bean leaf beetle



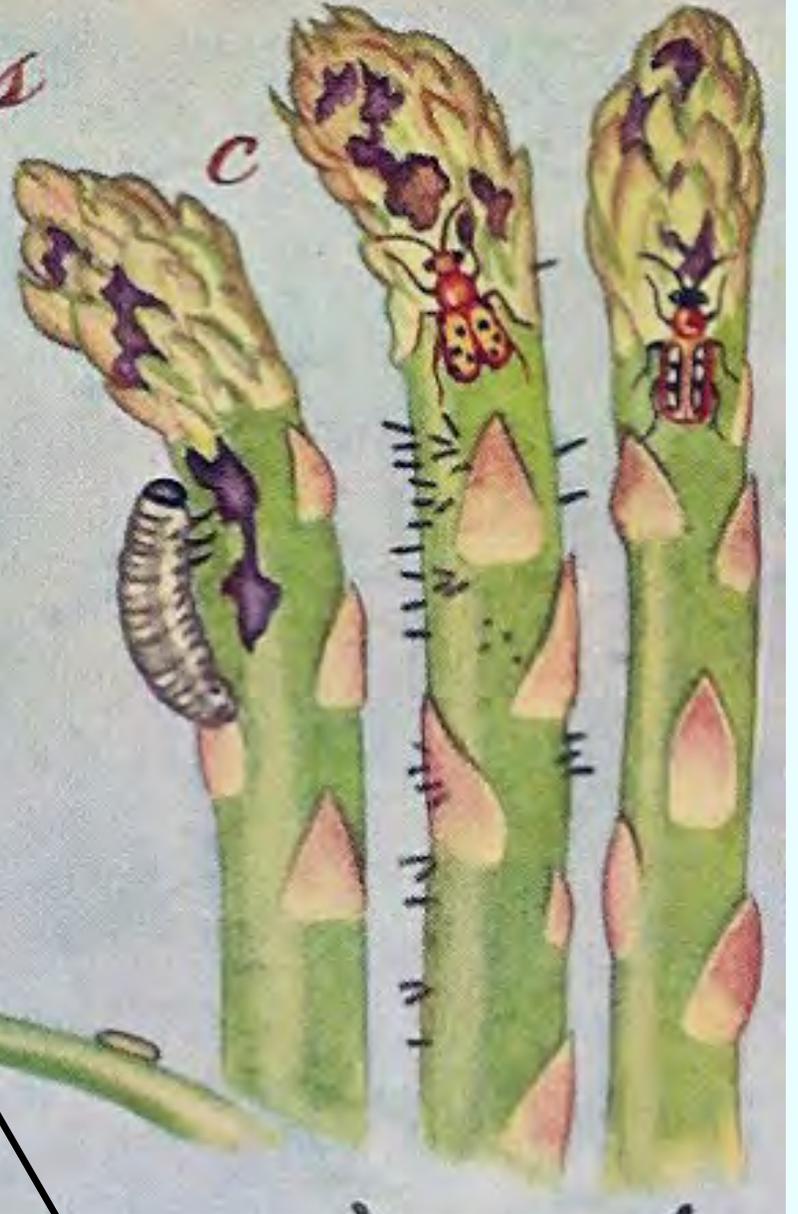
Spinach leafminer & beet leafminer



- **Adult fly lays eggs**
 - On leaf underside
 - in early spring
- **Maggots feed inside leaf, 1-2 weeks**
 - Narrow mine when young
 - Large blister-like mines when older
- **Pupate in soil**
- **Several generations per year**
- **Hand pick** infested leaves, early



Asparagus Beetles



Common asparagus beetle

Spotted asparagus beetle

Asparagus beetles

- **Common asparagus beetle**
 - Adults feed on spears
 - Adults lay eggs on spears
 - Larvae feed on leaves
- **Spotted asparagus beetle**
 - Adults feed on spears
 - Larvae feed in berries



Asparagus beetles

- **Management**
 - **Hand picking**
 - **Insecticides or repellents**

Corn worms



1. European corn borer

- Damage at tip or shank or side
- Two generations per year
- Damage in June & August
- Worm appearance:
 - dark brown head
 - body with rows of flat spots
 - body without microspines

Corn worms



2. Corn earworm

- Damage at ear tip only
- Damage usually mid-August & later
- Worm appearance:
 - light brown head
 - body with long stripes
 - body covered with short microspines

Corn Worm Management

- **Planting date:**
 - Early & late plantings difficult
 - Middle plantings easiest
- **Biocontrol:**
 - Encourage generalist predators
 - *Trichogramma* egg parasitoid
- **Chemical control:**
 - B.t. for 1st generation borer
 - Oil + B.t. in ear tip for earworm
 - Spinosad for both pests

Generalist pests

- Spider mites
- Whiteflies
- Aphids
- Japanese beetle
- Brown marmorated stink bug

Two-spotted spider mite

- Often overlooked
- Often mistaken for disease
- Build up in hot dry weather



Two-spotted spider mite: identification



- **Tiny (1/60 inch)**
- **White with 2 black spots**
- **8 legs**

Two-spotted spider mite: hosts

- **Tomato**
 - Yellow blotches
- **Bean**
 - White stippling



Two-spotted spider mite: hosts

- **Watermelon**
 - Yellow blotches
 - Brown lesions



Two-spotted spider mite: diagnosis

- Fine webbing on leaf underside
- Scout by tapping leaf over paper, look for moving specks
- Early diagnosis for good control



webbing





Spider mite management

- Tolerable at low density
- Conserve natural predators
- Overhead irrigation can help
- Soft control:
 - Insecticidal soap
 - Horticultural oil



Whiteflies: hosts

tomato



squash



beans



lettuce



Whiteflies: size

- Need magnifier to see immatures on underside of leaves



Whiteflies: injury symptoms



leaf scorch



sooty mold

Whiteflies

- Suck sap
- Life stages:
 - Adult
 - Egg
 - Crawler (1st instar)
 - Sessile nymphs
 - Pupa
- Damage done by nymphs from leaf undersides
- Control by soap sprays



Whiteflies: insecticides

- **Best controlled by neonicotinoids**
 - acetamiprid
 - Imidacloprid
 - be sure to know pre-harvest interval

Aphids

- **Appearance:**
 - Small, soft, 2 ‘tailpipes’
 - Every species with winged & wingless forms
- **Damage:**
 - Suck sap
 - Cause leaf puckers
 - Deposit honeydew
 - Transmit viruses



Winged female adult



Aphids

- **Common species:**

- Potato aphid (tomato)

- Green peach aphid (lettuce, pepper)

- Melon aphid (cucurbits)

- Rosy apple aphid (apple)

- Green apple aphid (apple)

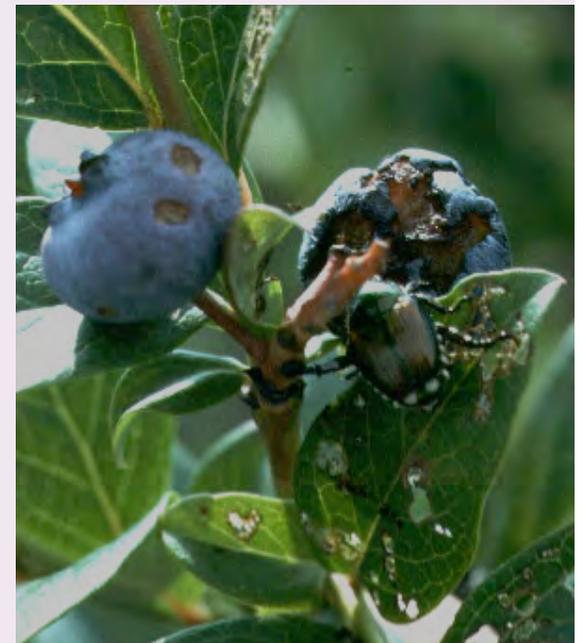


Aphid control

- **Encourage natural enemies by avoiding use of broad-spectrum insecticides**
- **Suffocate with spray of insecticidal soap**
- **Reflective mulch to prevent colonization by winged aphids**

Japanese beetle

- **Attacks many crops:**
 - Beans
 - Sweet corn
 - Grape
 - Raspberry
 - Blueberry
 - Plum
 - Peach
- **Expect start in early July**



Japanese beetle

- Insecticides
 - Sevin (carbaryl)
 - pyrethrins + PBO
- Traps
 - can bring in **MORE** beetles
 - Do not place close to crop



Brown marmorated stink bug



- **Invading Ohio since 2007**
- **Attacks fruits & seed pods**
- **Also nuisance pest:
invades homes in autumn**

Hosts of Brown Marmorated Stink Bug

- **Fruit crop hosts:**
 - Peach, apple, pear, cherry, Asian pear
 - Raspberries, blackberries, grapes
- **Vegetable crops**
 - Sweet corn
 - Peppers
 - Tomatoes
- **Agronomic crops**
 - Soybean
 - Corn



Brown marmorated stink bug: **injury**



corn



G. Brust

pepper



G Brust

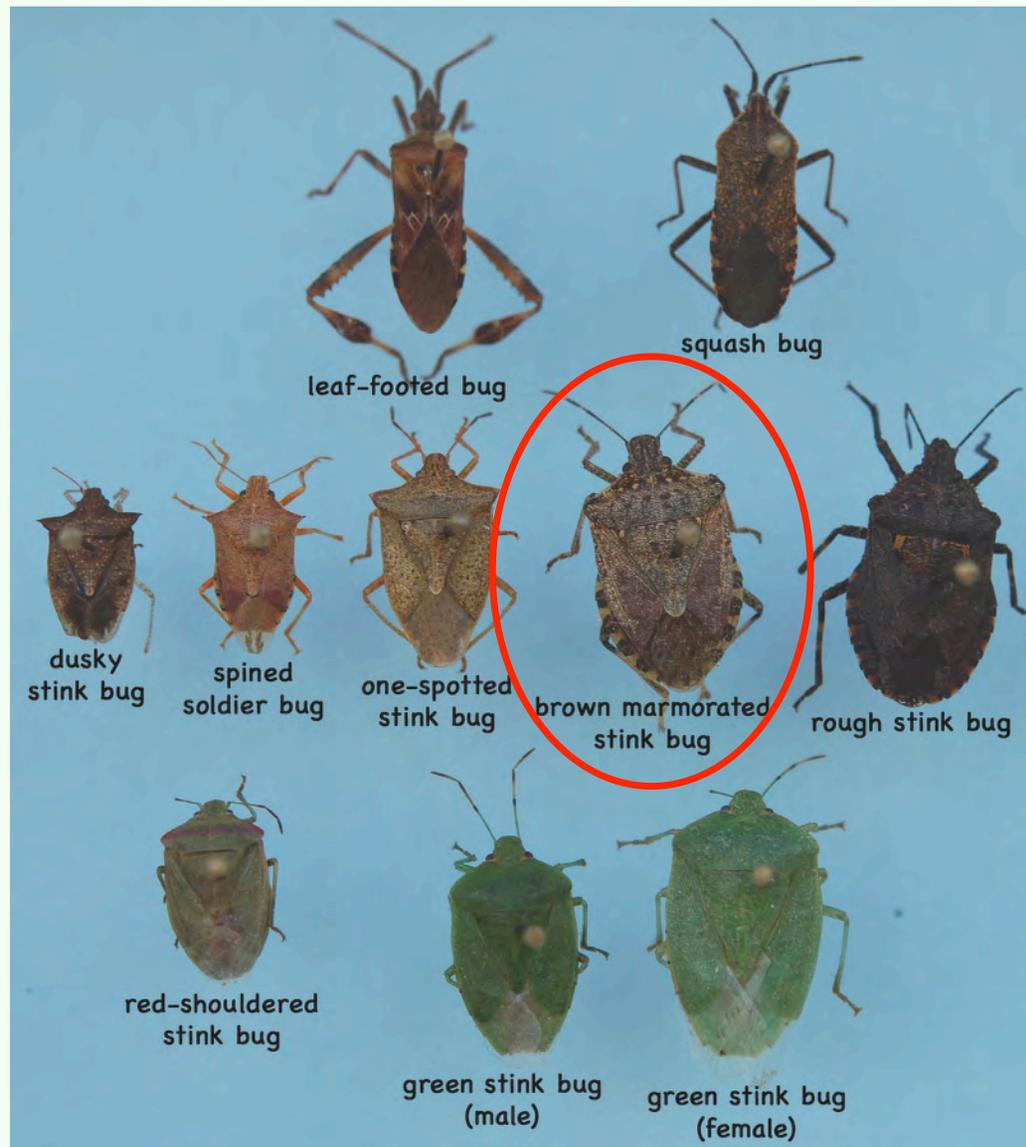
tomato



beans



G. Brust



Note differences in size & shape in pinned specimens side-by-side

Mechanical control of stink bugs



- **Lightweight row covers**
- **The preferred tactic in small plantings**

Stink bug control in gardens

<i>Category</i>	<i>Ingredient</i>	<i>Common brand</i>
pyrethroids	bifenthrin	Ortho Max Bug-G-Gon Lawn & Garden Insect Killer
	permethrin	Bonide Eight Insect Control Veg Fruit & Flower
	cyfluthrin	Bayer Advanced Garden, Triple Action Insect Killer for Lawns & Gardens
	gamma-cyhalothrin	Spectricide Triazicide Insect Killer Once & Done!
neonicotinoid	acetamiprid	Ortho Max Flower Fruit & Vegetable Insect Killer
deterrent	kaolin	Surround At Home
for nymphs, not adults	spinosad	Bonide Captain Jack's Deadbug Brew

**For beginners:
Which veg crops have fewest pests?**

- **Lettuce**
- **Peas**
- **Parsley**
- **Basil**

the end



Info on fruit & veg. pests
u.osu.edu/pestmanagement

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