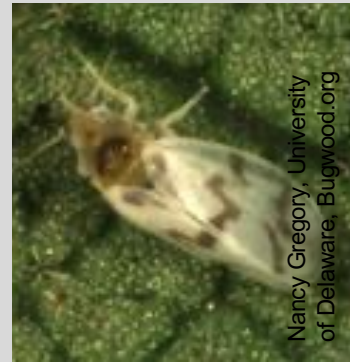
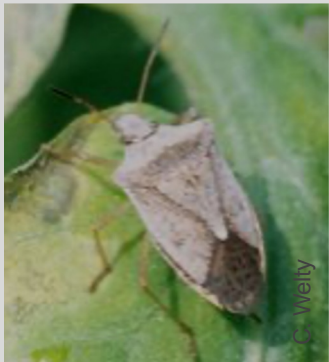


# Insect Management on Garden Tomatoes



**Celeste Welty**  
**Extension Entomologist**  
**Ohio State University**  
**July 2012**

# Topics

- How to identify pests
- How to manage pests



# Tomato Pests

<b><i>Pest category</i></b>	<b><i>Fruit</i></b>	<b><i>Leaves or stems</i></b>
<b>Key</b>	<b>?</b>	<b>?</b>
<b>Common</b>	<b>?</b>	<b>?</b>
<b>Occasional</b>	<b>?</b>	<b>?</b>

# Pest categories

- **“Key”**: Cause significant damage in most gardens in most years
- **“Common”**: in many gardens in most years but damage often not significant
- **“Occasional”**: not every year

# 1) KEY Pests

- On tomato fruit:
  - None! (in north central USA)
- On tomato leaves or stems
  - None!

## 2) COMMON Pests

- On tomato fruit:
  - Hornworms
  - Stink bugs
- On tomato leaves or stems:
  - Aphids
  - Whiteflies
  - Hornworms

### 3) OCCASIONAL Pests

- On tomato fruit
  - Caterpillars
  - Grasshoppers
- On tomato leaves or stems:
  - Spider mites
  - Beetles
    - Flea beetles
    - Colorado potato beetle
    - Blister beetles
  - Stalk borer

# Tomato Pests

<i><b>Pest category</b></i>	<b>Fruit</b>	<b>Leaves, stems</b>
<b>Key</b>	<b>None!</b>	<b>None!</b>
<b>Common</b>	<ul style="list-style-type: none"><li>• <b>Hornworms</b></li><li>• <b>Stink bugs</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Aphids</b></li><li>• <b>Whiteflies</b></li><li>• <b>Hornworms</b></li></ul>
<b>Occasional</b>	<ul style="list-style-type: none"><li>• <b>Caterpillars</b></li><li>• <b>Grasshoppers</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Spider mites</b></li><li>• <b>Beetles</b></li><li>• <b>Stalk borer</b></li></ul>



# Hornworms



# Hornworms

rear end

head end



# Hornworms



- **2 common species:**
  - Tobacco hornworm
  - Tomato hornworm

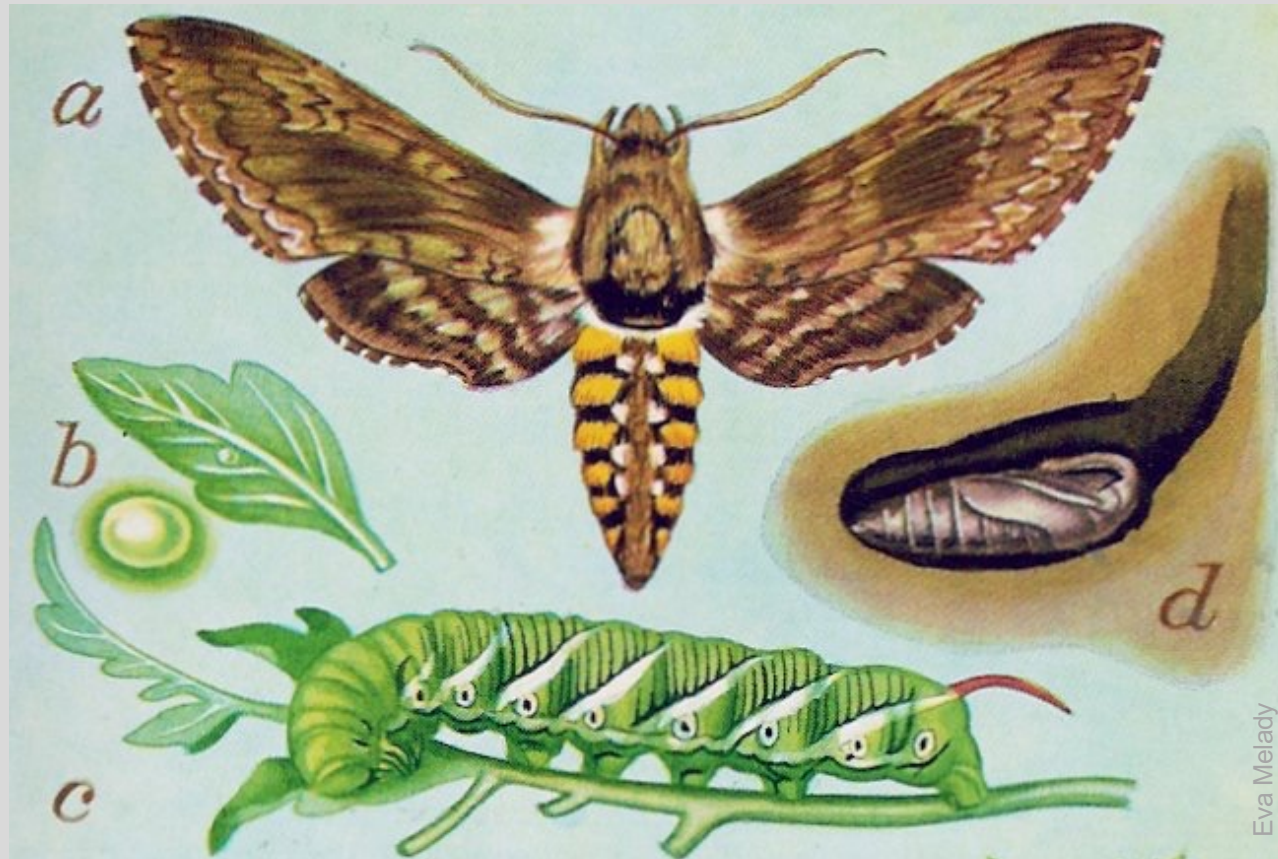
# Hornworms

Horn at  
rear end



- Tobacco hornworm (**red** horn)
- Tomato hornworm (**black** horn)

# Hornworm life cycle



- Adult is a large hawk moth
- Pupal stage in soil



# Hornworm damage



**Consume leaves**



**Gnaw on fruit**

- **Beware of camouflage**
- **Look for canopy top mowed off**

# Hornworm management



- **Mechanical: hand removal**
- **Encourage biocontrol**
- **Use microbial insecticide**

# Hornworm biocontrol



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# Hornworm biocontrol

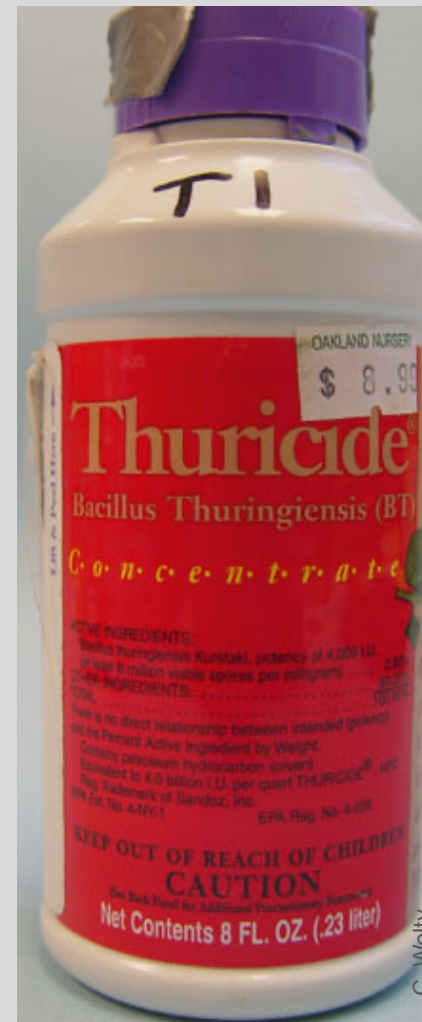


- Tiny parasitoid wasp: *Cotesia congregata*



# Microbial insecticide (B.t.)

- Kills hornworms
- Does not kill natural enemies
- Spray or dust
  - Dipel
  - Thuricide
- Need thorough coverage



# Stink Bugs



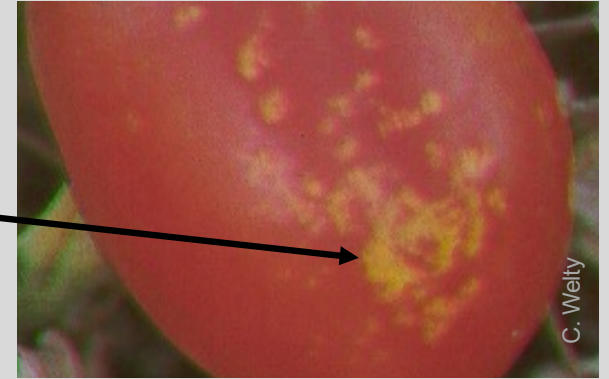
- Bugs suck on fruit
- Damage seen more often than bug itself
- Damage often not noticed until harvest



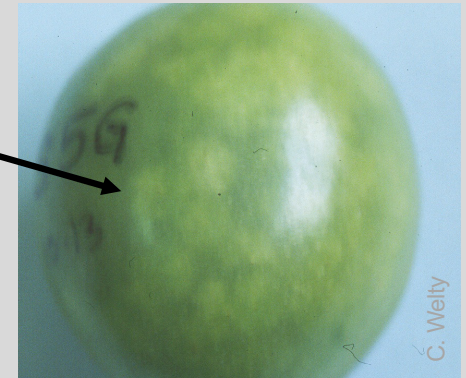


# Stink Bug Damage on Tomato

- Obvious yellow blotch:



- Develops after fruit ripens if bugs fed on green fruit



- Subtle white cloudy-spot:

- Seen after bugs fed on red fruit



# Stink Bug Damage on Tomato

- Diagnose by plugs of white tissue under the peel

yellow blotch      cloudy spot



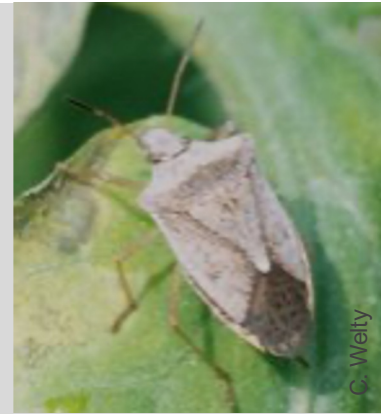


# A New Invasive Pest:

# Brown Marmorated Stink Bug



# Stink Bug Management



- **Scout:**
  - Weekly in July, August
  - Examine fruit
  - Tap plants over tray or pan
- **Insecticides:**
  - Spinosad for nymphs
  - Pyrethrins or a pyrethroid for adults

# Potato Aphid

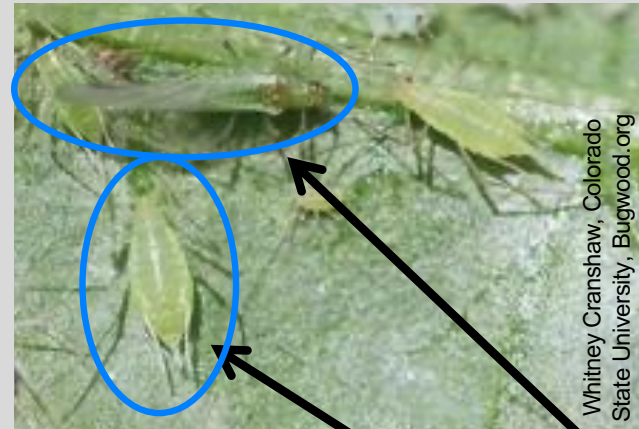


Whitney Cranshaw, Colorado  
State University, Bugwood.org

- **Appearance:**
  - Small, soft, 2 ‘tailpipes’
  - Pink or green
  - Both winged & wingless forms



# Potato Aphid



- **Appearance:**
  - Small, soft, 2 'tailpipes'
  - Pink or green
  - Both winged & wingless forms

# Potato Aphid



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- **Damage:**
  - Suck sap, cause leaf puckers
  - Deposit honeydew
  - Transmit viruses
- **Many natural enemies**



**predatory  
midge**



# Natural enemies of aphids



**ladybugs**



**parasitoid wasps**



**lace-  
wings**



**hover  
flies**





# Aphid management



- Encourage natural enemies
  - Avoid broad-spectrum insecticides
- Suffocate
  - Spray of insecticidal soap
- Reflective mulch
  - Prevents colonization by winged aphids



# Whiteflies



- Suck sap
- Produce honeydew
- Some transmit viruses

# Whiteflies: several species

- **Greenhouse whitefly**

- Wings held flat



- **Banded-winged whitefly**

- Wings zig-zag pattern



- **Silverleaf (= sweetpotato) whitefly**

- Wings held roof-like

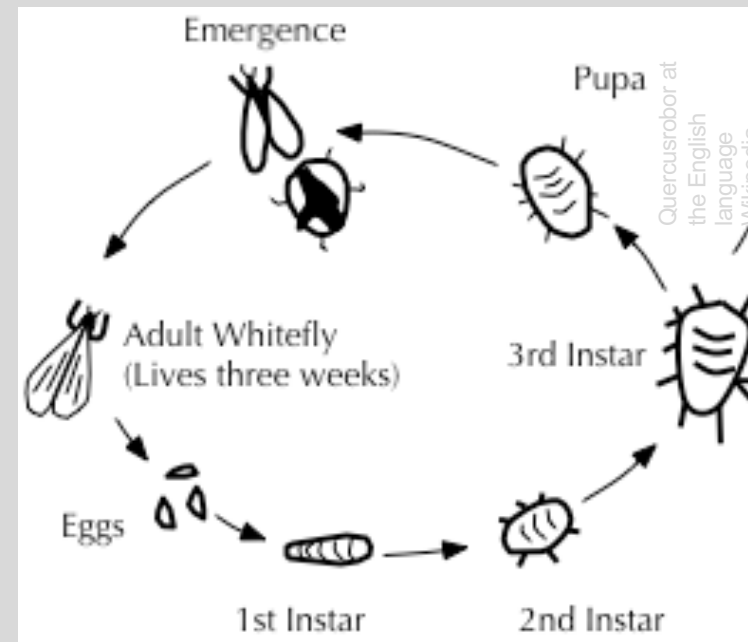


# Whitefly life cycle



## Life stages:

1. Adult
2. Egg
3. Crawler (1<sup>st</sup> instar)
4. Sessile nymphs
5. "Pupa"



Need magnifier to see eggs & nymphs!



# Whitefly damage & control



Clemson University - USDA Cooperative  
Extension Slide Series, Bugwood.org

- Damage done by immature nymphs from leaf undersides
- Immatures might not be on tomato
- Control by soap sprays



# Tomato Pests

<i><b>Pest category</b></i>	<b>Fruit</b>	<b>Leaves, stems</b>
<b>Key</b>	<b>None!</b>	<b>None!</b>
<b>Common</b>	<ul style="list-style-type: none"><li>• <b>Hornworms</b></li><li>• <b>Stink bugs</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Aphids</b></li><li>• <b>Whiteflies</b></li><li>• <b>Hornworms</b></li></ul>
<b>Occasional</b>	<ul style="list-style-type: none"><li>• <b>Caterpillars</b></li><li>• <b>Grasshoppers</b></li></ul>	<ul style="list-style-type: none"><li>• <b>Spider mites</b></li><li>• <b>Beetles</b></li><li>• <b>Stalk borer</b></li></ul>

# Caterpillars on tomato fruit



- **Variegated cutworm**
- **Tomato fruitworm**
- **Yellow-striped armyworm**
- **Fall armyworm**
- **Beet armyworm**

# Variegated Cutworm



- In soil during daytime
- Climbs up on plants at night

# Variegated Cutworm



- Many host plants
- Serious in tomatoes once every 20 years
- Brown with few pale spots

# Tomato Fruitworm



- **Attacks crops in late summer**
  - Does not overwinter in northern USA
  - Migrates from southern USA
- **In fruit day & night**

# Tomato Fruitworm



- **Worm appearance:**
  - **Body with long stripes**
    - **Yellow, green, or pink**
    - **Covered with short microspines**
  - **Head always light brown**



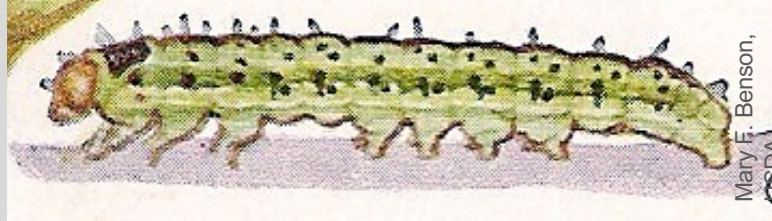


# Armyworms

- Yellow-striped armyworm
- Fall armyworm
- Beet armyworm



# Caterpillar management



- Scout weekly
  - Nibbling on leaves
  - Holes in fruit
  - The worm
- Hand removal, if only a few
- Spray, if many
  - B.t. ('Dipel', 'Thuricide')
  - Spinosad ('Captain Jack's Brew')



# Grasshoppers



Clemson University - USDA Cooperative  
Extension Slide Series, Bugwood.org

- **Problem in late summer**
  - Gnaw on fruit or leaves
  - Often worse on edge plants
- **Difficult to control**
- **Insecticide baits better than sprays**
  - ‘Sevin’ granule
  - ‘Lilly Miller Earwig & Sowbug Bait’

# Stalk Borer



- Caterpillar inside stems
- Look for drooping branch tips
- Control by pruning infested stems, destroy prunings

# Two-spotted spider mite: damage

- Suck sap
- Make webbing
- Hot dry weather



webbing





# Two-spotted spider mite: identification



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



# Two-spotted spider mite: control

- Many natural predators
- Sprays:
  - Insecticidal soap
  - Insecticidal oil



# Blister beetles



- Defoliate
- Feed in groups
- Avoid touching them!

# Colorado potato beetle



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# Colorado potato beetle



- Adult & larva chew leaves
- Critical on plants < 8"
- Generations per year:
  - 2 on potato
  - 1 on tomato





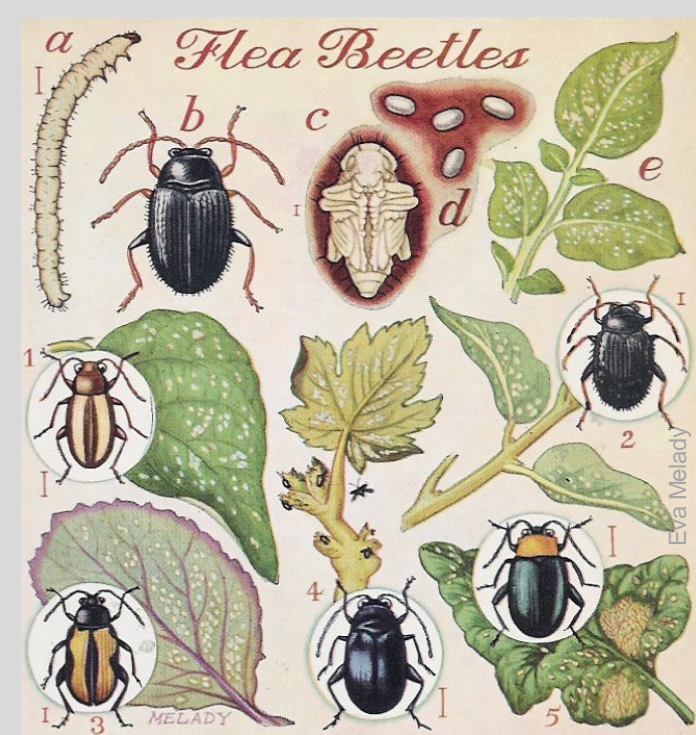
# Colorado potato beetle



- **Control:**
  - Hand removal (tapping)
  - Spray larvae with spinosad

# Flea beetles

- Chew small holes
- Damage rarely important
- Critical to seedlings
- Management:
  - Hand removal (aspirate)
  - Row covers on seedlings



# **Summary:**

## **Managing Tomato Pests**

- **Weekly scouting important**
  - **For sporadic pests**
  - **For natural enemies**

# Summary:

## Managing Tomato Pests

- **Control tactics**
  - **Hand removal useful**
    - By hand picking
    - By tapping over bucket
    - By aspirating
  - **Insecticide**
    - Generally none needed
    - Microbial (B.t.) useful
    - Insecticidal soap useful



# Scouting Tomato Pests

<i>Time</i>	<i>Sample</i>	<i>What to look for</i>
<b>Pre-fruiting (June)</b>	<b>5 <u>whole plants</u></b>	<ul style="list-style-type: none"> <li>•Defoliation</li> <li>•Wilted branches</li> <li>•Aphids on young terminal leaflets</li> </ul>
<b>After fruit set (July-Sept.)</b>	<b>5 sets of 5 <u>fruit</u></b>	<ul style="list-style-type: none"> <li>•Fruit damage</li> <li>•Pests present</li> </ul>
	<b>10 leaflets</b>	<ul style="list-style-type: none"> <li>•Webbing (mites)</li> <li>•Whitefly, aphids</li> </ul>
	<b>10 canopy taps (onto tray or pan)</b>	<ul style="list-style-type: none"> <li>•Stink bugs</li> <li>•Caterpillars</li> </ul>

# Thresholds for tomato pests

<i>Target pest</i>	<i>Threshold</i>
<b>LEAVES:</b>	
aphids	0.5 aphid per leaflet
Colorado potato beetle	0.5 adult per young plant
flea beetles	4 per young plant
<b>FRUIT (sample of 25):</b>	
hornworms	1 hornworm larva
stink bug	1 plant with fresh damage
variegated cutworm	1 plant with damage
tomato fruitworm	1 infested plant



**the end**