

# SLUGS

**Garden slug:** *Arion hortensis*

**Little gray slug:** *Deroceras reticulatum*



## Description and Damage

- 0.5-0.75 inches (12-19 mm) in length
- Mottled gray color
- Found during the night or early morning
- Hide under plastic or in other wet environments during the day
- Feed on fruit and leaves. Produce holes in fruit



## How to Control Slugs

### Non-Chemical Controls

- Clean up garbage, weeds, boards, and other hiding places from your field.
- Remove slugs from plants.

### Chemical Control

#### Sluggo Bait

- Use in fall or spring
- Apply 22-44 lbs/acre
- Scatter bait around base of plants and under plastic
- If dry, irrigate field after applying
- Best if applied at night when they eat
- Reapply every 2 weeks
- REI- 0 hours
- PHI- 0 days

# APHIDS

**Strawberry aphid:** *Chaetosiphon fragaefolii*



## Description and Damage

- Use hand lens to identify
- Yellow-green, covered with hairs
- Peak in late March
- Causes black mold
- Cause severe damage if more than 30 per plant

Black sooty mold caused by aphids



## How to Control Aphids Non-Chemical Control

- Natural biological control: The syrphid fly and green lacewing larvae eat aphids.
- Row covers (ex. Agribon)
- Control dust around farm
- Don't over fertilize with nitrogen

## Chemical Control

Provado 1.6

- Apply 3.75 fluid ounces/acre
- REI-12 hours
- PHI-7 days

Actara

- Apply 1.5-3 oz/acre
- REI-12 hours
- PHI-3 days

M-Pede:

- Apply 2.5 oz/gal water.
- REI-12 hours
- PHI-0 days

# ANTS

## Argentine Ant: *Linepithema humil*



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### Description and Damage

- Nest in the soil
- Will burrow deeper in dry conditions
- Form one large super colony
- Eat berries



**Boric acid bait placed along building foundation**

### How to Control Ants Non-Chemical Control

- Locate the nest by following the trail of ants back to their point of origin
- Remove nest
- Determine what the ants are attracted to and remove the food source
- Locate nests and caulk openings or plug with petroleum jelly

### How to Control Ants with Baits

- Boric acid- a sweet bait. Use low concentrations.
- Protein baits- fipronil or hydramethylnon are useful in the spring when ants reproduce.
- Place bait stations in late spring or early summer.
- Place baits outdoors; avoid indoor baiting as that may attract more ants into the farm stand.
- Place baits near nests, trails, or along foundations.
- Baits should be placed in protected areas away from children and pets.
- Try small portions of each bait to see which one works best.
- Follow up regularly to make sure bait is working and refill bait stations.
- Be patient! Baits take time to work well.

# CUTWORMS

**Black cutworm:** *Agrotis ipsilon*

Larva



Adult



**Variegated cutworm:** *Peridroma saucia*

Larva



Adult



## Description and Damage

- Larvae 1.5 inches long, brown or gray
- Cutworms come out to eat at night
- Found at the base of the plant or in the soil during the day
- A problem in the fall and spring

Larvae cut stems and chew holes in leaves



## How to Control Cutworms

### Non-Chemical Controls

- Monitor the edges of the fields for cutworm damage
- Control weeds around the field.
- Cut back second year strawberries in the winter

### Chemical Control

- Use spot treatment- spray damaged plants only.
- If 1 or 2 plants out of 100 show damage, spray.

Sevin 5% bait-

- Apply to beds around the base of the plant where damage occurs.
- REI-12 hours. PHI- 7 days.

Entrust (Spinosad)-

- Apply 1.25-1.5 oz per acre.
- REI-4 hours. PHI- 1 day.
- Apply when fruit feeding is observed.

Success (Spinosad)-

- Apply 6 fluid oz per acre.
- REI- 4 hours. PHI-1 day.
- Apply when fruit feeding is observed.

# FLEA BEETLES

Adult flea beetles: *Altica ignata*



## Description and Damage

- Very Small (1.5–3 mm)
- Can live through winter on weeds or crop
- Chew small holes in the leaves

Damaged leaf  
with small  
holes.



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## How to Control Flea Beetles

### Non-Chemical Control

- Monitor new transplants, young plants, and the borders of the fields in the springtime when damage is high
- Rotate fields with other crops to reduce overwintering
- Control weeds in and around fields to eliminate breeding areas
- Consider spot treatments in areas that show heavy signs of flea beetle feeding
- Row covers (for example, Agribon or fabric)

### Chemical Control

Pyganic EC

- Apply 16 oz/acre.
- REI-12 hours.
- PHI- 0 days

Asana XL

- Apply 9.6fl oz/acre.
- REI-12 hours
- PHI- 1 day

# THRIPS

Adult western flower thrips: *Frankliniella occidentalis*



## Description and Damage

- Slender
- Approximately 0.8 mm long
- Vary in color: yellow to brown
- Found in plants, including weeds, in spring
- Eat strawberry blossoms which causes the flowers to wither early.
- Thrips eat mites, so they can be beneficial
- Rarely cause severe economic damage



Tan, bronze area on shoulder of strawberry caused by thrips.

## How to Control Thrips

- Only treat if you have 10 thrips/flower
- Shake out one flower blossom onto paper and count thrips. If more than 10 thrips per flower, then spray.



## Chemical Control

Entrust (Spinosad)-

- Apply 1.25- 1.5 oz per acre.
- REI- 4 hours. PHI- 1 day.

Success (Spinosad)-

- Apply 6 fluid ounces per acre.
- REI- 4 hours. PHI- 1 day.
- Best if used only 2 times per year, so the thrips don't build resistance to sprays.

# BEET ARMYWORM

**Strawberry Beet Armyworm:** *Spodoptera exigua*

Larva

Adult



## Description and Damage

- Worms are green with black spot on side above second leg
- Moths are gray and brown
- Worms eat leaf, crown first, and then berries
- Worms eating the crown will kill new transplants

Small worm eats shoulder of berry



## How to Control

### Non-Chemical Controls

- Control weeds (very important- Adult moths lay their eggs in the weeds)
- Monitor young plants
- Monitor populations with pheromone traps

### Chemical Control

- Armyworms rarely cause extreme damage in Sacramento County.
- Don't spray unless large populations

Entrust (Spinosad)-

- Apply 1.25- 1.5 oz per acre.
- REI- 4 hours. PHI- 1 day.

Success (Spinosad)-

- Apply 6 fluid ounces per acre.
- REI- 4 hours. PHI- 1 day.

Xentari (Bacillus Thuringiensis)

- Apply 0.5 -2 lbs per acre
- REI- 4 hours. PHI- 0

# SQUASH BUGS

## *Squash Bugs: Anasa tristis*



## Description and Damage

- Adults 5/8 inch long and 1/3 wide
- Adults grayish brown with a flat back
- Edges and underbelly are orange
- Smell bad when crushed
- Adults and nymphs found near crown
- Plants wilt and turn black and break easily

## How to Control

### Non-Chemical Control

- Place wooden boards in garden and in the morning check underneath for bugs -kill the bugs with hands
- Remove old plants after harvest
- Clean up garbage and wood around fields
- Pick off and destroy eggs
- Row cover (Agribon)

### Chemical Control

- Difficult to control using chemicals
- Spray Nymphs

### Neemix (Neem Oil):

- Follow directions on label

### M-Pede:

- Apply 2.5 oz/gal water.
- REI-12 hours
- PHI-0 days

# GOOD BUGS

- Not all insects you see in your field are bad.
- There are many good bugs that eat the bad bugs.
- It is important to be able to identify the bugs so you don't spray and kill the good bugs.



Pupa

Larva

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Adult

**Ladybugs**  
Adults and Larva eat aphids and mites



Adult

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**Phytoseiulus persimilis**, a red mite, eats the two spotted spider mite (on the left)



Adult

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**Green Lacewing**  
Adults eat aphids

**Minute Pirate Bug** eats Thrips



Adult

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**Syrphid Fly** larva eat aphids



Larva

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Adult

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# GOOD BUGS

•Not all insects you see in your field are bad.  
There are many good bugs that eat the bad bugs.

Minute  
Pirate Bug  
eats Thrips

Ladybugs  
Adults and  
Larva eat  
aphids and  
mites

Green  
Lacewing  
Adults eat  
aphids

*Phytoseiulus  
persimilis*, a  
red mite,  
eats the two  
spotted  
spider mite  
(on the left)

Syrphid Fly  
larva eat  
aphids



# Integrated Pest Management (IPM)

**Integrated Pest Management:** using a combination of different methods to find long term solutions to pest problems.

## **IPM in Strawberries:**

### **Monitor your Field and Identify Pests**

- It is important to monitor your field and be able to identify the insects that are a problem for you.
- It is expensive, illegal, and dangerous to your health to spray chemicals if you don't know what you are spraying for.

### **Certified Transplants**

- Using certified transplants prevents weeds and diseases from being transferred to your field

### **Biological Control**

- Use natural enemies (the good bugs) to control the bad bugs

### **Pesticides:**

- Chemicals are a common way to control insects
- Repeated use of one type of pesticide may allow the bug to build up resistance to that chemical.
- Alternate chemicals
- Follow label instructions