Common Pests of Greenhouses and Ag Barns

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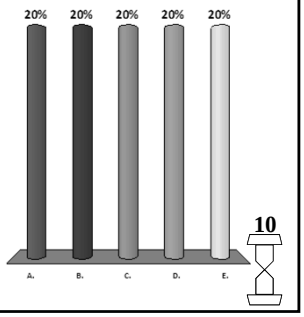
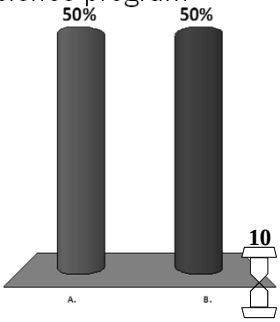
Our ag science program is in compliance with our district's school IPM standards.

A. Completely agree
B. Somewhat agree
C. Not sure
D. Somewhat disagree
E. Strongly disagree



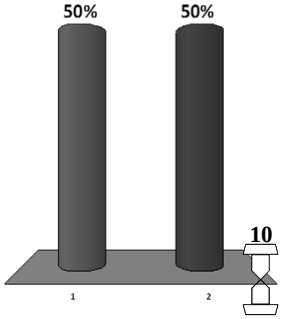
Our school district maintains greenhouse or other plant-growing facilities for the ag science program

A. Yes
B. No



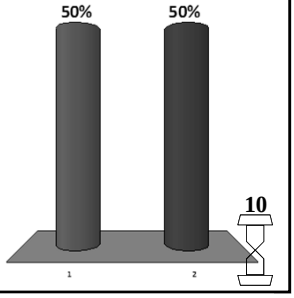
Our district maintains an ag barn as part of our ag science program.

1. Yes
2. No



I am aware of parental questions about the use of pesticides in our ag science program

1. Yes
2. No



Outline: Greenhouse and Ag Barn IPM

- Pesticide safety
  - Safety principles
  - Green category products for greenhouse and Ag programs
- Plant pests
  - Aphids
  - Whiteflies
  - Scales and mealybugs
  - Shore flies
  - Caterpillars
- Barns
  - House flies
  - Mosquitoes

Insecticide chemical classes commonly used in ag programs

- Soaps and oils
- Botanicals
- Insect growth regulators
- Low toxicity inorganics
- Organophosphates
- Pyrethroids
- Neonicotinoids
- Others

Botanicals

- Pesticides derived from plants
  - pyrethrins
  - neem extracts & oils
  - rotenone
  - pine oils
  - citrus oils
  - clove oil
  - other essential oils
- Green category with CAUTION signal word

Pyrethrum

- A natural combination of four compounds: pyrethrins I and II, and cinerin I and II
- More uses approved than any other insecticide
- Usually includes a "synergist" to keep insects from detoxifying it (check synergist level)
- *Green category products*

Insect growth regulators

- Disrupt the growth and development of insects by upsetting natural hormone levels
- Excellent safety record
  - Buprofesin (Talus)
  - Novaluron (Pedestal)
  - S-kinoprene (Enstar)
  - Cyromazine (Citation)
- Usually Green Category

Note the Warning Label!

Low toxicity inorganics

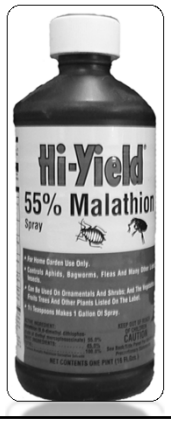
- Dusting sulfur
  - Disease and insect control
  - Thrips and spider mite control
- Green Category

Pyrethroids

- Broad spectrum residual insecticides
  - permethrin
  - cyfluthrin
  - bifenthrin
  - allethrin
  - sumithrin
  - esfenvalerate
- Contact and stomach poison
- Low in toxicity to birds and mammals, but hazardous to fish
- Usually *Yellow Category*

Organophosphates

- Older chemistry, now mostly discouraged by EPA
- Wide range in toxicity of different active ingredients
- Malathion, acephate most commonly used remaining actives
- Older products on shelves include Dursban, diazinon, disyston

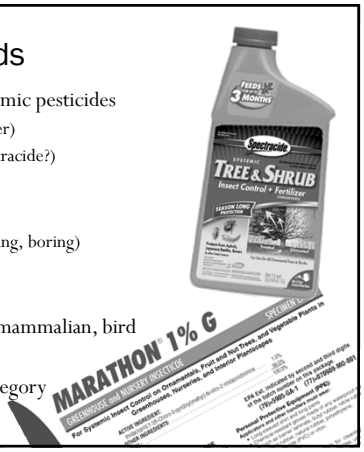


Pyrethroids

- Recognize by suffixes: -thrin or –ate
- Examples:
  - Cyfluthrin
  - Esfenvalerate
  - Permethrin
  - Bifenthrin
  - Resmethrin

Neonicotinoids

- New class of systemic pesticides
  - imidacloprid (Bayer)
  - dinotefuran (Spectracide?)
- Effective against
  - Homoptera
  - Coleoptera (chewing, boring)
  - Thysanoptera
  - Diptera
- Relatively low in mammalian, bird toxicity
- Usually Yellow category



Different types of insect damage to plants

- Chewing
  - Mining
  - leaf feeding
  - root feeding
  - Boring
- Sucking
  - Meristem feeding
  - Phloem feeding
  - Mesophyll feeding
- Gall making

Chewing pests

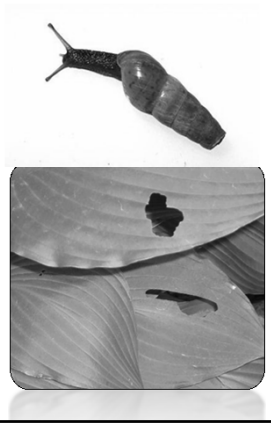
- Caterpillars
- beetles
- grasshoppers
- snails and slugs

Chemical caterpillar control

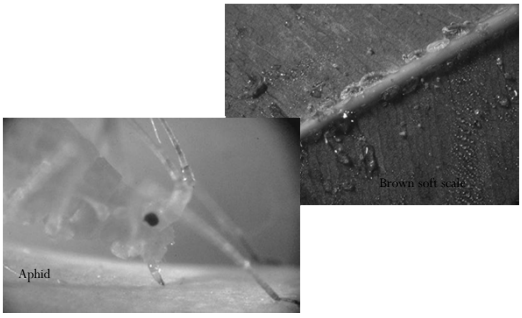
- soaps and oils
- *Bacillus thuringiensis*
- Spinosad
- Pyrethroids

Snails and slugs

- Sanitation
- Traps
- Barriers
- Baits
  - metaldehyde
  - iron phosphate

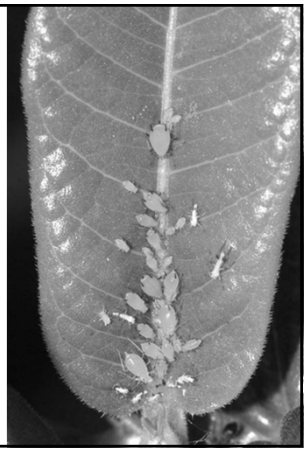


Sap-feeding insects

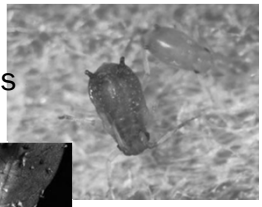


Phloem feeders

- Feed on the phloem (sap) of plants
  - Aphids
  - Whiteflies
  - Plant bugs
  - Scales
  - Mealybugs
  - Thrips



Diagnosing aphids



- Aphids (with or without wings)
- Cast skins
- honeydew

Aphid control

- protect natural controls
- water streams
- soaps and oils
- pyrethrins
- Systemics (neonicotinoids)

USDA

Whiteflies

- Nymphs are sap feeders on leaf undersides
- Adults small, whitish flying insects
- High reproductive rate
- Often difficult to control in greenhouse due to few natural enemies
- *Encarsiaformosa*in warm greenhouses (>70 degrees)

Whitefly control

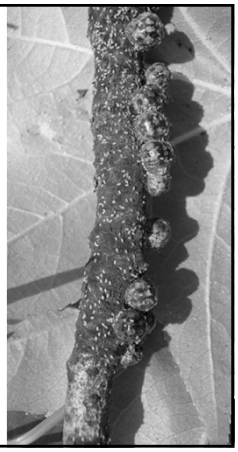
- Soaps and oils
  - good coverage essential
- Pyrethrins/neem
- Insect growth regulators
- Systemic insecticides
  - acephate (Orthene)
  - Imidacloprid
  - Other neonicotinoids
- Multiple treatments may be needed on 7-10 day cycle

Scale insects

- Armored scale
  - Most difficult to kill
- Soft scale
  - Produce honeydew

Scale insect control

- Soaps and oils
- Horticultural oils
- Insect growth regulators
- Systemic insecticides
- Sprays timed to kill crawler stage



Thrips

- Very tiny
- Feed on meristem tissue
- Damage:
  - delay in growth
  - darkening of flowers
  - puckering and stunting

Thrips damage on chrysanthemum, U of Kentucky

Thrips control

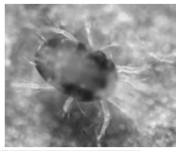
- Systemic insecticides
  - acephate (Orthene)
  - High odor not good PR in school setting
- Spinosad
- Treat before damage becomes severe

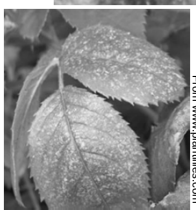
Mesophyll feeders

- Spider mites
- Lace bugs
- Leafhoppers
- Other plant bugs

Spider mites

- Fast reproductive rate
- Live on leaf undersides
- Favored under hot, dry conditions
- Can be worsened by some insecticides
  - permethrin
  - imidacloprid





From www.plantlies.com

Spider mite control

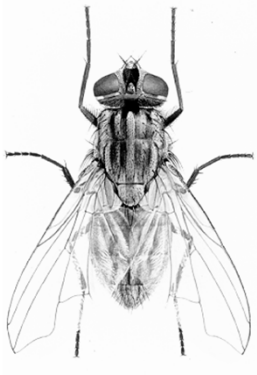
- Water streams
- Soaps and oils
- pyrethrins
- sulfur
- bifenthrin

Ag Barn pests

- House fly
- Stable fly
- Mosquitoes

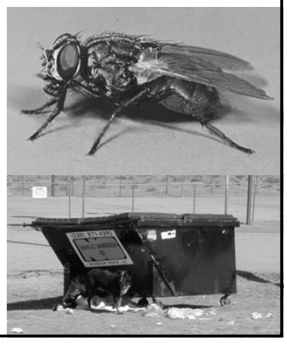
House fly, *Musca domestica*

- 4-7 mm, gray fly with 4 stripes
- Filth breeder
- Common pest of kitchens and restaurants where doors open frequently

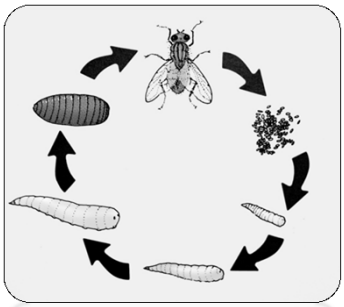


House fly, *Musca domestica*

- Commonly breeds in manure, garbage
- Minimum development time 7-10 days (7-21 days)
- Harbors over 100 different pathogens



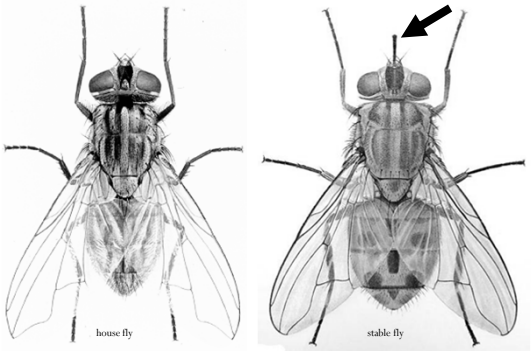
House fly life cycle (7-14 days)



Stable fly *Stomoxyscalcitrans*

- Biting fly
- Breeds in hay mixed with manure, silage, fermenting animal feed, pet feces
- Strong fliers, may travel many miles
- Difficult to control

House fly compared to stable fly

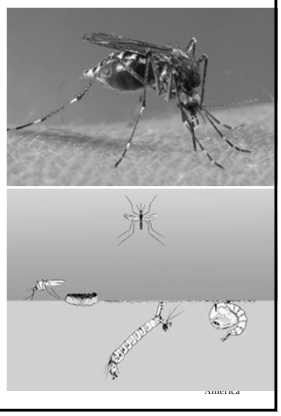


Filth fly control

- Manure management plan is essential
  - Manure removed at least weekly
    - Composting in high efficiency compost operation
    - Spreading on agricultural land away from urban sites
- Baiting for house flies
- Mister systems (last resort)
  - Pyrethrins preferable

Mosquitoes

- Aquatic-breeders
- Most important urban species breed in polluted, stagnant water
- Active mostly in evenings and at night, adults rest in shady areas during the day



Mosquitoes

- Disease transmission
  - West Nile virus
  - encephalitis
  - dog heartworm
- Control options
  - breeding site elimination
  - ULV fogging
  - installed mister systems
  - resting site treatment with residual insecticides
  - repellents

Common mosquito breeding sites

- ditches
- bird baths
- buckets, cans
- swimming pools (un-maintained)
- tires
- clogged gutters
- potted plant drainage dishes
- hollow trees
- drainage catch basins


Questions?