Using IPM in your Ag Program- Understanding Texas Laws
What we will cover

• Basics of School IPM regulations
• IPM for Greenhouses
  – What are biocontrols
  – Exclusion
  – Cultural controls
  – Sanitation
  – Scouting
  – Identifying
What is School IPM

- 72\textsuperscript{nd} Legislature Adopted Law
- Implemented by all ISD in 1995
- Requires all schools to have IPM Coordinator
- IPM policy adopted by school board
- Requires pre-notification, posting, and use of IPM principles in all areas of pest control
- Updated during the 80\textsuperscript{th} Legislature – with changes
Your role as Ag Teacher

• May be asked to be coordinator
• Assist with pesticide applications
  – Only persons with a non-commercial license with TDA or SPCB can make applications on school property (Ag programs exempt)
• Assist with insect identification
  – Ability to identify certain species to assist coordinator in relaying information to pest control company
How you can help your IPM Program

• Find out who your IPM Coordinator is
• Identify areas that are part of your program
  – Greenhouses, barns, planting beds, etc
• Identify other areas that are in contact with your program
• Ensure that students and parents are aware of your program and treatments
Keep good records

• Maintain copies of inspections and monitoring reports
• Plant or animal information
• Maintenance records
  – Weeding, pruning, etc
• Pesticide purchases and storage
• Pesticide applications
  – Trade name, AI, EPA reg, % used, solution, etc.
# Texas Department of Agriculture

**Todd Staples, Commissioner**  
**Pesticide Applicator Record**

<table>
<thead>
<tr>
<th>Business Name</th>
<th>Address</th>
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<tr>
<th>Application Date</th>
<th>Time Started</th>
<th>Name of the person for whom the application was made</th>
<th>Location of Land Treated</th>
<th>Site Treated</th>
<th>Wind Direction</th>
<th>Wind Velocity</th>
<th>Air Temp</th>
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<tr>
<th>Product Trade Name</th>
<th>EPA Registration Number</th>
<th>Target Pest</th>
<th>Rate of Product Per Unit</th>
<th>Equipment ID #</th>
<th>Spray Permit Number</th>
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<tr>
<th>Licensed Applicator’s Name and License Number</th>
<th>Unlicensed Applicator’s Name, if applicable</th>
<th>Total Acres or Volume of Area Treated</th>
<th>Total Volume of Spray Mix, Dust, Granules or Other Materials Applied Per Unit</th>
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**Additional Information**
What is IPM

- The best alternative to traditional pesticide-herbicide based pest control services.
- Provides effective control of insect and other pests while protecting the safety and health of children and preserving the environment.
- IPM is a decision making process to manage pest problems.
The IPM pyramid

- Pesticides
- Biological controls
- Physical / Mechanical controls
- Cultural / Sanitation Practices
Essential Ingredients for IPM

- Know your pest
- Establish thresholds
- Inspect
- Use multiple control tactics
Biocontrol

• Enlists predators, parasites, or pathogens of pest organisms to help manage pests.
• Allows growers to use less chemicals and provide quality products
Biological control agents

- Living organisms used to control pests
IPM for Greenhouses

- Scouting
- Thresholds
- Understanding life cycle & insect behavior
Scouting

- Cornerstone of successful IPM program
- Regular intervals
  - *Insects, diseases, and cultural problems*
- Uses sticky traps, pheromone traps, baits and visually inspecting plants
- Report forms, sample vials, forceps, pH meter
Know your thresholds!

- **Health / stress threshold**
  - Threshold reached when pest damage causes a perceived health threat to humans or significant stress to plant (landscape)

- **Aesthetic threshold**
  - Threshold reached when aesthetic pleasure is affected by damage
Know your thresholds

• Economic
  – Number of pests whose injury to the plants cause a crop loss in dollars greater than the amount of money managing the pest would cost.
  – The level that actually produces damage that is more expensive than intervention
  – When this threshold is met, it’s time to treat.
IPM Techniques - Prevention

- Clean transplants
  - #1 problem comes from infected plants
  - Know your grower and know your plants
  - Inspect plants immediately prior to planting
  - Ensure that greenhouse floors are not soil
  - Use insect screens on doors and ventilating systems
  - Keep outside doors closed at all times
IPM Techniques - Prevention

- Cultural controls
  - Manipulates the greenhouse environment
  - Varying time of planting or harvesting, applying water and fertilizer, and rotating crops can all aid in healthy plants
  - Proper growing medium, controlling temperature & humidity, maintain nutrients at appropriate levels
IPM Techniques - Prevention

• Sanitation
  – Weed management is essential – weeds hide pests
  – Maintain a weed-free zone surrounding the greenhouse
  – End of year clean-up in and around the house will help keep the area pest free

• Pressure wash inside with disinfectant
• Increase temp to over 80F – back them out
IPM Techniques - Prevention

• Sanitation
  – Eliminate standing water
  – Remove areas of algae
    • Good source for fungus gnats & flies
  – Consider installing screens over vents
  – Soil or growth medium should be treated for pests and diseases through crop rotation and/or steaming
    • Will reduce carryover of pests like thrips or spider mites
Between seasons

• Place yellow sticky cards in empty greenhouse to monitor for flying pests
• If pesticides are needed
  – Choose insect specific
  – Have short residual
    • pyrethrins
    • Insecticidal soap
    • Horticultural oils
    • Insect growth regulators
Types of sticky cards

- Bright yellow cards most common
  - Trap majority of insects
- Blue cards to monitor for thrips
- Change every other week
- One card for 1,000 sq ft
- Reduce # of cards if using winged beneficial's
- Place cards 1 to 2 inches above plant canopy and move as plants grow
Insect Identification

- Correct identification aids in correct control techniques
- Will need hand lens with 10x magnification
Types of greenhouse pests

- Aphids
- Fungus Gnats
- Leaf miners
- Parasitoid wasps
- Shore flies
- Thrrips
- Whiteflies
Aphids
Aphid natural enemies

Syrphid fly

Lady beetle
Aphid natural enemies-immature forms

- Syrphid fly larva
- Lady beetle larva
- Lacewing larva
Aphid natural enemies - parasitoids

Emerging parasitoid
Thrips

• Very tiny
• Meristem feeders
• Damage:
  – delay in growth
  – darkening of flowers
  – puckering and stunting
• Treat with systemics, spinosad
Whiteflies

- Larvae are sap feeders
- High reproductive rate
- Found on undersides of leaves
- Often difficult to control
Whitefly control

- Soaps and oils
- Systemics
  - Neonicotinoids
- Insect growth regulators
- Multiple treatments may be needed on 7-14 day cycle
- May arise as a secondary pest
Spider mites

- Fast reproductive rate
- Live on leaf undersides
- Hot, dry conditions favor outbreaks
- Can be worsened by some insecticides
  - permethrin
  - imidacloroprid
Mite control

- Water streams
- Soaps and oils
- Bifenthrin
- Avermectin (Avid)
- New miticides
Types of Biocontrol Organisms

• Predators
  – Beetles, mites, mantids, and flies can be introduced

• Parasitoids
  – Develop within the body of the host
  – Usually smaller than their prey
  – As the parasitoid matures, host is slowly killed
Types of Biocontrol Organisms

• Parasites
  – Commonly referred to as nematodes
  – Symbiotic association with bacteria lethal to soil-dwelling insects
  – 2 types – *Steinerema* and *Heterorhabditis*
  – Need moist soil and temp between 60 – 90F

• Pathogens – fungal spores
  – *Beauveria bassiana* – whiteflies, thrips, aphids
Review

• Indicator plants
  – Can provide early detection of predators
• Proper pest identification
• Thresholds met
• Proper tactic selection
  – Cultural, sanitation, biological or chemical
• Recordkeeping
• Evaluation
For more information

• Janet Hurley ja-hurley@tamu.edu
• 877-747-6872
• PA IPM program – Greenhouse IPM with an Emphasis on Biocontrols