IPM for Greenhouse Tomato Production

Rich Trinklein
Trinklein Greenhouses
Presentation Overview

- IPM concept
- History of Trinklein Greenhouses (or 54 years of battling pests)
- Key components of present IPM practices
- Conclusions
Integrated Pest Management (IPM)

IPM is a pest management program that attempts to:
1. Keep pest populations below damaging levels.
2. Reduce economic losses by pests.
3. Minimize environmental impact.
What IPM is NOT!

- IPM does **NOT** preclude the use of pesticides
- IPM is **NOT** merely a biological or “organic” pest control program
- IPM **NOT** a stringent, rigid management regime
- IPM **IS** a flexible process based on keen observation and decision making
Brief History of Operation
Current Production Practices
## 54 Years of Battling Pests

<table>
<thead>
<tr>
<th>Growing Protocol</th>
<th>Key Pests</th>
<th>Solution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field tomatoes</td>
<td>Early blight</td>
<td>Grow under plastic</td>
</tr>
<tr>
<td></td>
<td>Soil-borne</td>
<td></td>
</tr>
<tr>
<td></td>
<td>production</td>
<td></td>
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<tr>
<td></td>
<td>Greenhouse</td>
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<tr>
<td></td>
<td>Soilless mix—</td>
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<tr>
<td></td>
<td>bag culture</td>
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<tr>
<td></td>
<td>Aphids, whitefly</td>
<td>Spray, spray, spray</td>
</tr>
<tr>
<td></td>
<td>mites</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humidity control</td>
<td>Biologicals</td>
</tr>
<tr>
<td></td>
<td>Bag culture in</td>
<td>IPM</td>
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<tr>
<td></td>
<td>Gutter-connected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>concrete floors</td>
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</tr>
</tbody>
</table>
Key Components to Current IPM Program

- Planning
  - Keep good records to update protocols yearly
Key Components to Current Program (cont.)

- Physical barriers
  - Screen all vents
  - Maintain buffer strips outside
Key Components to Current Program (cont.)

- Concrete floors
  - Best investment we ever made!
Key Components to Current Program (cont.)

- Sanitation
  - Remove plants/media between crops
  - Disinfect with bleach and laundry detergent
Key Components to Current Program (cont.)

- Scouting
  - Delegate employees who handle plants on daily basis
  - Offer bonuses
Key Components to Current Program (cont.)

- Encourage visitors
  - Clean up when company is coming
  - See your operation through eyes of others
IPM Practices by Production Stage

Seedling Stage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mice</td>
<td>Bar bait</td>
</tr>
<tr>
<td></td>
<td>Mouse traps</td>
</tr>
<tr>
<td></td>
<td>Pet cat</td>
</tr>
</tbody>
</table>
## IPM Practices by Production Stage

### New Transplant Stage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damping off</td>
<td>Zerotol®, Rootshield®</td>
</tr>
<tr>
<td>Mice</td>
<td>Same as previous</td>
</tr>
<tr>
<td>Thrips</td>
<td>Leaf removal (LR)</td>
</tr>
<tr>
<td>Whitefly</td>
<td>Air blast (fan)</td>
</tr>
<tr>
<td>Cutworms</td>
<td>Hand picking</td>
</tr>
</tbody>
</table>
## IPM Practices by Production Stage

### Early Production Stage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem rot</td>
<td>Banrot® drench</td>
</tr>
<tr>
<td>Thrips</td>
<td>Conserve®, Sevin®</td>
</tr>
<tr>
<td>Cut worms</td>
<td>Hand picking</td>
</tr>
</tbody>
</table>
# IPM Practices by Production Stage

## Fruiting Stage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinworms</td>
<td>LR, bug zapper, Conserve® pheromone traps</td>
</tr>
<tr>
<td>Whitefly</td>
<td>LR, <em>Encarsia formosa</em></td>
</tr>
<tr>
<td>Aphids</td>
<td>LR, indicator plants, fumigants, sprays</td>
</tr>
<tr>
<td>Spider mites</td>
<td>Indicator plants, paraffinitic oil, Floramite®</td>
</tr>
<tr>
<td>Cut worms</td>
<td>Bug zapper, Sevin®</td>
</tr>
</tbody>
</table>
# IPM Practices by Production Stage

## Post-harvest Stage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit fly</td>
<td>Sticky tape; jar traps</td>
</tr>
<tr>
<td>Fruit rot</td>
<td>Air movement, sunlight, bleach</td>
</tr>
</tbody>
</table>
Conclusions

- Pest control perhaps greatest challenge for tomato production
- For most problems there is no single solution
- IPM strategy is to employ a combination of tactics, used as needed
Questions?
Philosophies

<table>
<thead>
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<th>Conventional Control</th>
<th>IPM</th>
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<tbody>
<tr>
<td>Eradicate pests</td>
<td>Manage pests</td>
</tr>
<tr>
<td>Single pest approach</td>
<td>Whole system approach</td>
</tr>
<tr>
<td>Preventative or calendar spraying</td>
<td>Combination of tactics (as needed)</td>
</tr>
<tr>
<td>Whole area treatment</td>
<td>Individual plants (groups)</td>
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<tr>
<td>Broad-spectrum pesticides</td>
<td>Narrow range (specific) control measures</td>
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Components of an IPM Program

- Prevention (exclude pests when possible)
- Monitoring and Sampling (inspect)
- Pest Identification (what pest)
- Decision-making (what action)
- Intervention (take action)
- Follow-up (re-inspect)
- Record-keeping (write it down, history)
- Education (learn)
### IPM Practices by Production Stage

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<td>Mice</td>
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<td>Sunlight</td>
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<td></td>
<td>Bleach</td>
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