Insect Management for Beginning Vegetable Farmers

Rick Foster
Department of Entomology
Vegetable Insect Management

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Integrated Pest Management

... a system in which a combination of methods is used to maintain pest populations at low levels while allowing for profitable production with minimal adverse effects on the environment.

(Foster and Flood, 2005)
Integrated Pest Management

- Combination of methods
- Profitable production
- Minimal adverse effects
  - Farm workers
  - Non-target organisms
  - Consumers
## Frequency of Insect Damage to Vegetables

<table>
<thead>
<tr>
<th>Never/Rarely</th>
<th>Sometimes</th>
<th>Usually/Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrot</td>
<td>Asparagus</td>
<td>Broccoli</td>
</tr>
<tr>
<td>Green onion</td>
<td>Beans</td>
<td>Cabbage</td>
</tr>
<tr>
<td>Lettuce</td>
<td>Pepper</td>
<td>Cantaloupe</td>
</tr>
<tr>
<td>Pea</td>
<td>Spinach</td>
<td>Cauliflower</td>
</tr>
<tr>
<td>Radish</td>
<td>Tomato</td>
<td>Cucumber</td>
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<td></td>
<td></td>
<td>Eggplant</td>
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<td></td>
<td></td>
<td>Potato</td>
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<tr>
<td></td>
<td></td>
<td>Squash</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sweet corn</td>
</tr>
</tbody>
</table>
7 Steps to Successful Insect Management

- Prevention
- Correct identification
- Understanding of pest and crop dynamics
- Monitoring
- Using economic thresholds
- Selecting a control option
- Evaluation
Prevention

- Resistant varieties
- Timing of planting or harvesting
- Tillage
- Mulches
- Conservation of natural enemies
- Proper fertilization
Choice of Varieties

- Most important consideration is what varieties your customers want to buy
- Not as many examples of resistance to insects as diseases
- Cabbage – thrips
- Sweet corn – good husk cover/earworms
Timing

- Synchrony between insect’s life cycle and plant phenology – “window of vulnerability”
- Avoid some problems by planting later – root and seed maggots
Timing

- Synchrony between insect’s life cycle and plant phenology – “window of vulnerability”
- Avoid some problems by planting later – root and seed maggots
- Avoid some problems by planting earlier – corn earworms
Cultural Effects

- A healthy, rapid growing plant can usually tolerate more damage than one under stress
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- A healthy, rapid growing plant can usually tolerate more damage than one under stress.
- Too much organic matter will attract root and seed maggots – crucifers, onions, beans, peas, corn, cucurbits.
Cultural Effects

- A healthy, rapidly growing plant can usually tolerate more damage than one under stress.
- Too much organic matter will attract root and seed maggots.
- Too much nitrogen may attract more aphids and result in faster reproduction.
- Some cultural practices make it harder to find the plants – reflective mulches, straw mulch for potato beetle, row covers.
Natural Enemies

- Predators
- Parasites
- Pathogens
Predators
Parasites
Pathogens
Examples of Using Natural Enemies

- Diamondback moth on cabbage
Understanding Pest and Crop Dynamics

- The insect life cycle is controlled by weather related factors and the biology of the insect.
- The crop life cycle is controlled by the climate and when you decide to plant.
- Each crop has a stage when it is vulnerable to its pests.
- Each pest has a particular life stage that will damage the crop.
- When the vulnerable stage of the crop and the damaging stage of the pest overlap, you have opened the “window of vulnerability.”
“Winter synchronizes pest populations by creating a common starting point”
B. R. Flood
Risk Probability of a 0°F Occurring for 4 or more Continuous Days (1948/49 to 2003/04)
Probability of Experiencing a “Hard Freeze” During the Winter (28°F Low Temperature)
Weather Effects

- “Winter synchronizes pest populations by creating a common starting point” – B. Flood
- Insect development is driven by temperatures – warmer temperatures mean faster development
- Climatic events such as rainfall or drought can have a dramatic effect on insect populations
Weather Effects

- Drought (along with hot weather) can result in outbreaks of mites
- Rainfall can wash insects and mites from plants
- Frequent rainfall may cause disease outbreaks in the insect population

Example: Green cloverworm
Monitoring

- Goal is to know when pests are present and in what numbers
- Can be accomplished by direct observations, traps, devices
Economic Thresholds

- Tells us how many are too many
- Density of insects that will cause losses greater than the cost of preventing the damage

Examples
- 1 striped cucumber beetle per cantaloupe plant
- 10 corn earworm moths/night/trap for sweet corn
- 25% defoliation from Colorado potato beetle on potato before flowering
Control Options

- Generally, an insecticide
  - Relatively inexpensive
  - Fast acting
  - Readily available
  - Easy to apply
Some Notes About Insecticides

- License required to use restricted use products
- Read the label
- Remember that pesticides are poisons
- There are potential downsides from using pesticides:
  - Direct exposure
  - Contamination of water
  - Effects on natural enemies
  - Effects on non-target organisms
  - Residues
  - Cost
A Question

If you are growing a crop that needs an insecticide application, at what point of the process, from purchasing the insecticide to spraying to harvest and consumption of the produce, at what point are you in the greatest danger of poisoning yourself?
A Little More About Insecticides

- Be sure to use the proper equipment to do the job
- Maintenance and calibration are critical
- Proper storage
- Have the proper personal protective equipment available – Read the label!
Evaluation

- After you use a pesticide, or other control method, you should determine how well it worked
- Did you get your money’s worth?
- Keep records
  - Pest density
  - Crop stage
  - Weather conditions
Where to Find Information

- [http://extension.entm.purdue.edu/topics/vegetable.php](http://extension.entm.purdue.edu/topics/vegetable.php)
- rfoster@purdue.edu
- 765-494-9572