Pesky Garden Pests - Fruits and Veggies

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Got Pests?

- Japanese Beetle
- Black Cutworm
- Insects & Mites
- Wildlife
- Pathogens
- Powdery Mildew
- Weeds
Use IPM! Integrated Pest Management

1. Prevent Pests
2. Monitor & Identify
3. Use Combos of Anti-Pest Strategies
4. Keep Records
Pest Prevention: Select Plants Wisely

- Right plant, right place
- Pest resistant species and cultivars
- Plant certified seed
- Rotate crops from same plant family to different areas
- Remove sources of disease or pest transmission
- Look for alternate hosts
Pest Prevention: Provide Optimal Growing Conditions

- Do a soil test
- Fertilize and amend according to soil test results for nutrients, organic matter, pH
- Water where/when needed
- Plant at recommended time, soil temperature, depth, spacing.
Plant Disease Prevention

- Select disease resistant varieties
- Select good site (water drainage, good soil, full sun, air movement)
- Rotate annual crops

Plant Disease Resistance Codes

An alphabetical list of disease code acronyms used on our website and in our catalog.

Note:  HR = High Resistance  IR = Intermediate Resistance

- A | Anthracnose | Fungus
  - Colletotrichum lindemuthianum (Bean)
  - C. orbiculare (Cucurbitaceae)
- AB | Alternaria Blight | Fungus | Alternaria dauci | (Carrot) [See EB for Alternaria Blight of Tomato]
- ALS | Angular Leaf Spot | Bacterium | Pseudomonas syringae pv. lachrymans | (Cucumber)
- AS | Alternaria Stem Canker | Fungus | Alternaria alternata f. sp. lycopersici | (Tomato)
- B | Bacterial Wilt | Bacterium | Erwinia tracheiphila | (Cucumber)
- BB | Bacterial Blight | Bacterium | Xanthomonas hortorum pv. carotae | (Carrot)
- BRS | Bacterial Brown Spot | Bacterium | Pseudomonas syringae pv. syringae | (Bean)
- BLS | Bacterial Leaf Spot | Xanthomonas campestris pv. vesicatoria | (Pepper)
- BMV | Bean Mosaic Virus | (Bean)
Don’t be afraid of gene editing

Current applications of CRISPR-Cas9 in fruit crops

<table>
<thead>
<tr>
<th>Crop species</th>
<th>Target genes</th>
<th>Target traits</th>
<th>Refs.</th>
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<tr>
<td>Tomato</td>
<td>CP and Rep of virus</td>
<td>Resistance against tomato yellow leaf curl virus</td>
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<tr>
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<td>DCL2</td>
<td>Susceptibility to potato virus X, tobacco mosaic virus, and tomato mosaic virus</td>
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<td>Tomato</td>
<td>DMR6</td>
<td>Resistance against downy mildew</td>
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<td>MLO1</td>
<td>Resistance against powdery mildew</td>
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<td>MAFK3</td>
<td>Susceptibility to gray mold disease</td>
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<td>JAZ2</td>
<td>Resistance against bacterial speck disease</td>
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<td>Resistance against cucumber vein yellowing virus, zucchini yellow mosaic virus,</td>
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<td>and papaya ring spot mosaic virus</td>
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<td>Papaya</td>
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<td>Resistance against Phytophthora palmivora</td>
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<td>LOB1 promoter</td>
<td>Resistance against citrus canker</td>
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<td>Apple</td>
<td>DIPM1, 2, 4</td>
<td>Resistance against fire blight disease</td>
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<td>Tomato</td>
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<td>Decrease in heat stress tolerance</td>
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<td>Tomato</td>
<td>CBF1</td>
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<td>MAFK3</td>
<td>Decrease in drought stress tolerance</td>
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<td>Watermelon</td>
<td>ALS</td>
<td>Resistance against herbicide</td>
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https://www.nature.com/articles/s41438-019-0159-x
More Ways to Prevent Disease

- Mulch prevents rain-splash of soil-borne diseases
- ‘Rogue-out’ diseased plants
- Ensure plants get the right amount of sun, water, and nutrition.
- Control/prevent disease-vectoring insects such as aphids, thrips, leaf hoppers, cucumber beetle.
Monitor and Identify Pests and Beneficials

- Regularly inspect garden plants
  - Look for insects, damage, off-color, poor or distorted growth
- Send samples to UM Pest Management Office or local Extension office.
- Find identification resources in websites, books, fact sheets
  - www.GotPests.org
  - www.Bugguide.net
  - https://extension.umaine.edu/home-and-garden-ipm/
Use Combos of Anti-Pest Tactics

Outsmart pests by denying them access to food and habitat conditions they need using…

- Cultural tactics
- Physical tactics
- Biological tactics
- Chemical tactics
Physical Methods for Weed Suppression

- Sheet mulch
- Hand-pulling
- Shade them out with optimal plant spacing
- Shallow tillage
Pulling or weed whacking

- Pull weeds when they are small
- Weed whack or mow before flowering or reproduction
- Know the weeds – Do not fragment stoloniferous or rhizomatous weeds like Japanese knotweed, quackgrass or bentgrass

Quackgrass

Japanese knotweed
Physical Control Methods for Insects and Vertebrates

- Exclusion: screens, row covers, fencing, netting
- Prune out infested branches
- Hand-pick bugs
Common Garden Pests and Solutions

Striped cucumber beetle

- Transplant cukes, squash, zucchini, pumpkins instead of direct seed
- Cover with spun-bonded row cover (example Remay, Typar) until flowering.
Avoid Late Blight

- Plant only certified potato seed
- Destroy any volunteer potatoes
- Plant only healthy tomato seedlings
- Bag infected plants. Have disease confirmed by Extension. Dispose of infected plant tissue. **Don’t compost**
Slugs and Snails

• Control weeds
• Keep grass mown low or consider gravel strip around gardens
• Traps (beer cups, melon rinds or wooden boards)
• Copper foil ribbon around raised beds or pots.
Japanese Beetle

Cabbage Flea Beetle

Spotted and Striped Cucumber Beetles

Golden Tortoise Beetle

Lily Leaf Beetle

Black Vine Weevil

Rose Chafer

Asiatic Garden Beetle
Japanese Beetle

- Select non-preferred shrubs and trees (avoid linden, roses, crabapples, grapes, raspberries)
- Hand-pick beetles (but leave the parasitized beetles)
- Cover susceptible plants with protective netting
- Grub Control: *Heterorhabditis bacteriophora* (Hb) nematodes. Purchase on-line, water them in.
- Avoid Japanese beetle traps

Note: Winsome fly eggs. This beetle has been attacked by a natural enemy!
Diptera flies

Where found: Every habitat (except marine). Many are aquatic or semi-aquatic in larval stage.

Habits:

Maggots: Predators, fruit, root, stem & bud feeders, leaf miners.

Adults: nectar feeders, pollinators, scavengers, blood feeders
Iris Bud Fly

Prefers Siberian Iris
Thrips and Mites
Piercing-Sucking Pests

• True bugs
True Bugs

- Many are plant sap feeders
- Some are predators
- Immatures=nymphs

If Found: Report it!
Squash Bug

- Keep plants healthy with proper fertilization and watering.
- Remove or knock off nymphs and adults. Drop into pail of soapy water. Crush eggs (attached to the undersides and stems of leaves).
- Trap squash bugs: lay out boards or pieces of newspaper. In morning, collect and destroy bugs gathered underneath.
- Remove plant debris around the garden during the growing season to reduce the potential harborages where bugs hide.
- Clean up cucurbits and other plant matter around the garden in the fall to reduce the number of overwintering sites.
Apple scab
susceptible

resistant
Air circulation is essential
Where to learn more

https://weedecology.css.cornell.edu/index.php
Bacteria

Crown gall

Water splash is an important means of dissemination

Fire blight
Viruses

Many viruses are spread by insects, some by seed & most by vegetative cuttings
8. Keep a Garden Journal

- What varieties planted where? Draw maps.
- What pest problems encountered
- What control methods used and what were results
- Soil test results and amendments applied
Resources

- Maine Department of Agriculture, Conservation and Forestry Plant Health Division
  - Apiary • Arborist • Ginseng • Horticulture • Hemp • IPM - Programs
  - 207-287-3891

- Cooperative Extension: Insect Pests, Ticks, and Plant Diseases
  - 207.581.3880 or 800.287.0279 (in Maine)
  - [extension.diagnosticlab@maine.edu](mailto:extension.diagnosticlab@maine.edu)