



# **Pesky Garden Pests - Fruits and Veggies**

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# Got Pests?

Japanese Beetle



Black Cutworm

Insects &  
Mites



Wildlife

Powdery Mildew

Pathogens

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)
- BBS | Bacterial Brown Spot | Bacterium | *Pseudomonas syringae* pv. *syringae* (Bean)
- BLS | Bacterial Leaf Spot | *Xanthomonas campestris* pv. *vesicatoria* (Pepper)
- BMV | Bean Mosaic Virus (Bean)

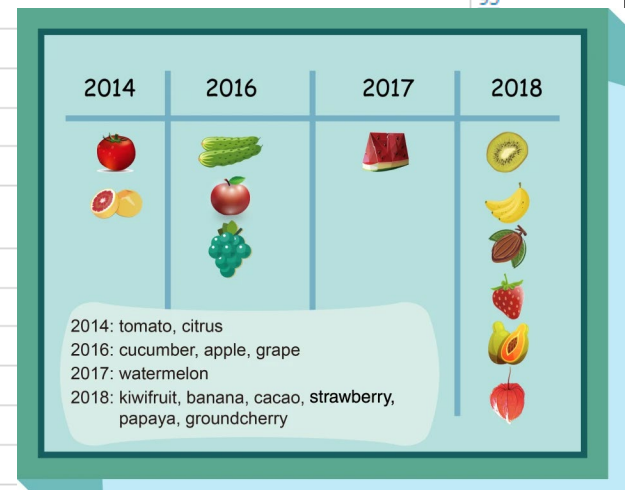


Chat With

# Don't be afraid of gene editing

## Current applications of CRISPR-Cas9 in fruit crops

Crop species	Target genes	Target traits	Refs.
Resistance to biotic stresses			
Tomato	<i>CP</i> and <i>Rep</i> of virus	Resistance against tomato yellow leaf curl virus	<a href="#">83</a>
Tomato	<i>DCL2</i>	Susceptibility to potato virus X, tobacco mosaic virus, and tomato mosaic virus	<a href="#">84,85</a>
Tomato	<i>DMR6</i>	Resistance against downy mildew	<a href="#">86</a>
Tomato	<i>MLO1</i>	Resistance against powdery mildew	<a href="#">87</a>
Tomato	<i>PMR4</i>	Resistance against powdery mildew	<a href="#">88</a>
Tomato	<i>Solyc08g075770</i>	Susceptibility to <i>Fusarium</i> wilt disease	<a href="#">89</a>
Tomato	<i>MAPK3</i>	Susceptibility to gray mold disease	<a href="#">90</a>
Tomato	<i>JAZ2</i>	Resistance against bacterial speck disease	<a href="#">91</a>
Banana	ORF region of virus	Resistance against banana streak virus	<a href="#">92</a>
Cucumber	<i>eIF4E</i>	Resistance against cucumber vein yellowing virus, zucchini yellow mosaic virus, and papaya ring spot mosaic virus	<a href="#">93</a>
Grape	<i>MLO7</i>	Resistance against powdery mildew	
Grape	<i>WRKY52</i>	Resistance against gray mold disease	
Cacao	<i>NPR3</i>	Resistance against <i>Phytophthora tropicalis</i>	
Papaya	<i>aIEPIC8</i>	Resistance against <i>Phytophthora palmivora</i>	
Citrus	<i>LOB1 promoter</i>	Resistance against citrus canker	
Apple	<i>DIPM1, 2, 4</i>	Resistance against fire blight disease	
Resistance to abiotic stresses			
Tomato	<i>BZR1</i>	Decrease in heat stress tolerance	
Tomato	<i>CBF1</i>	Decrease in chilling stress tolerance	
Tomato	<i>MAPK3</i>	Decrease in drought stress tolerance	
Watermelon	<i>ALS</i>	Resistance against herbicide	



# PLANT SPACING

## Extra Large

1 Plant

Placed 12 inches apart:

Broccoli



Cabbage



Pepper



## Large

4 Plants

Placed 6 inches apart:

Leaf Lettuce



Swiss Chard



Marigold



## Medium

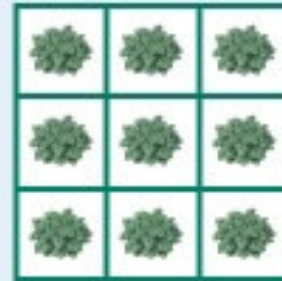
9 Plants

Placed 4 inches apart:

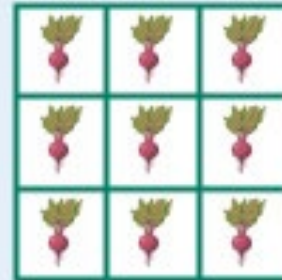
Bush Bean



Spinach



Beet

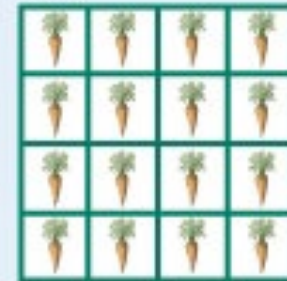


## Small

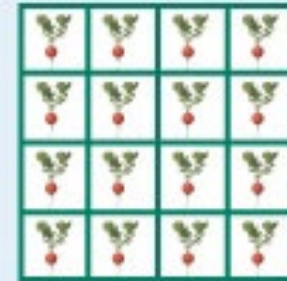
16 Plants

Placed 3 inches apart:

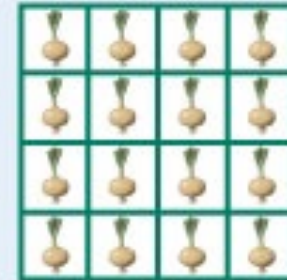
Carrot



Radish



Onion





# 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](http://www.GotPests.org)
  - [www.Bugguide.net](http://www.Bugguide.net)
  - <https://extension.umaine.edu/home-and-garden-ipm/>

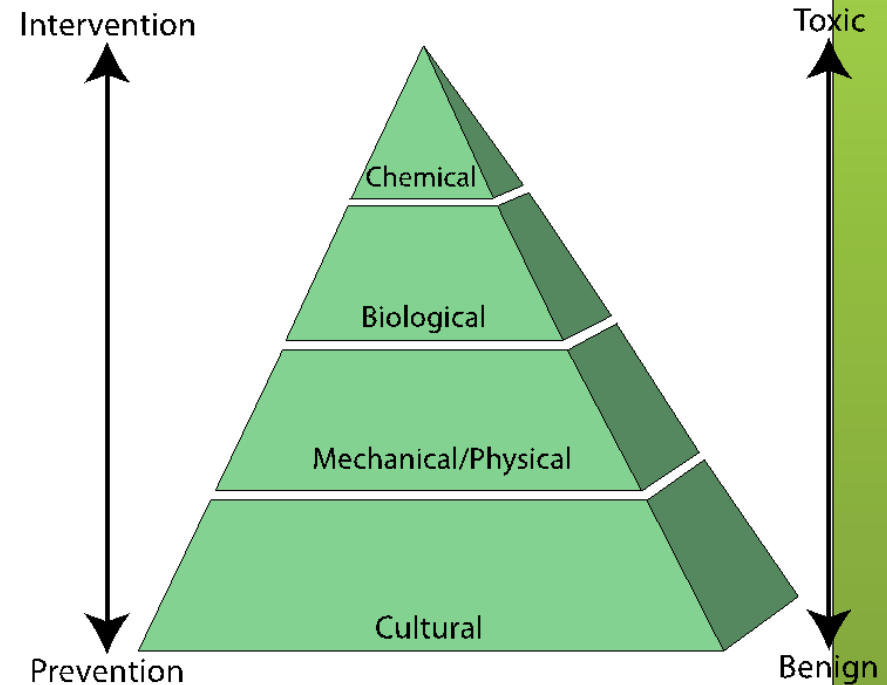


The screenshot shows the website for the University of Maine Cooperative Extension, specifically the 'Pest Identification and Management for People in Maine' section. The page features a navigation bar with links for Home, Critter ID, Photo Gallery, Fact Sheets, Alphabetical List of Critters, Frequent Specimens and Inquiries, Invasive Species, and More. Below the navigation bar, there is a main heading 'Pest Identification and Management for People in Maine' and a paragraph explaining the intent of the pages: 'The intent of these pages is to help people in Maine identify pests (and other curious critters) that are found in and around the home and garden, and to provide information on how to control them, if necessary.' Below this text, there are four circular icons representing different resources: 'Critter Identification' (a magnifying glass over a bug), 'Photo Gallery' (a monarch butterfly), 'Alphabetical List of Critters' (a grid of letters), and 'Information / Fact Sheets' (a stack of papers). At the bottom of the page, there is a footer with the text: 'Information you can use, research you can trust. University of Maine Cooperative Extension is your doorway to University of Maine expertise. For more than 100 years, we've been putting university research to work in homes, businesses, farms, and communities—in every corner of Maine.'

# 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

1557047

# Physical Control Methods for Insects and Vertebrates

- Exclusion: screens, row covers, fencing, netting
- Prune out infested branches
- Hand-pick bugs



WHAT YOU NEED TO KNOW ABOUT  
**FLOATING ROW COVERS**  
— GARDENER'S PATH —



# 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



Asiatic Garden Beetle



Rose Chafer

# 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!



UGA1243070





Blackflies



Spotted wing drosophila



Apple Maggot -  
*Rhagoletis pomonella*  
(adults)



Apple Maggot

# 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



Brown marmorated stink bug



If Found: Report it!

# True Bugs

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



Squash Bug  
Adult, Eggs, and Nymph



whitefly



Leafhoppers



Tree hopper



cicada



aphid



# 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



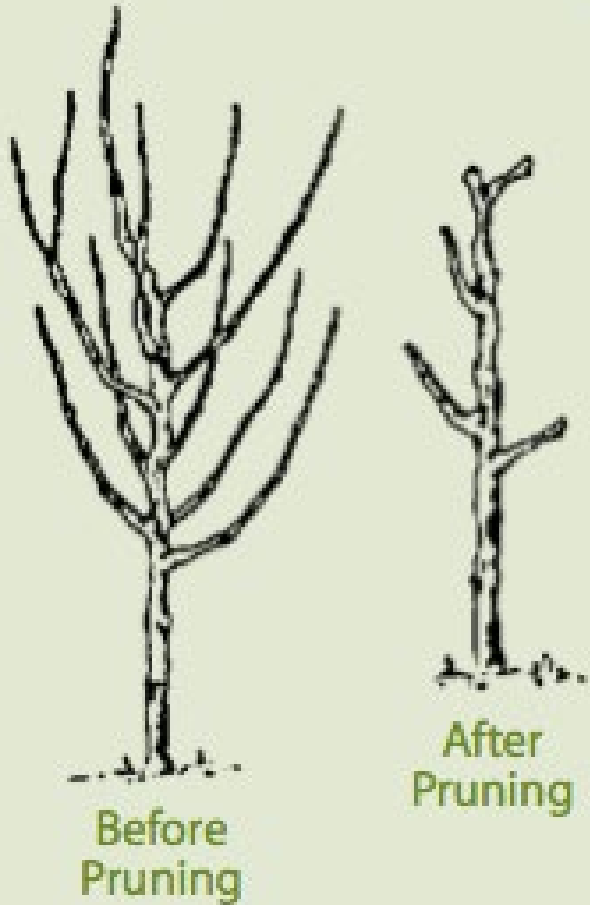
susceptible



resistant

# Air circulation is essential

Vase-Shaped Tree Training



Central Leader Tree Training



# Where to learn more

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

Cornell University Search Cornell

## Weed Ecology and Management Laboratory

**News & Announcements**

Enjoy Cornell's 'garden of weedin' [Read more](#)

Invasive Weeds Could Shed Light on Climate-Coping [Read more](#)

From Mushrooms to Dandelions, Foraged Food Finds Way to U.S. Tables [Read more](#)

Agriculture Majors Face Future with Confidence [Read more](#)

**About Us**  
Learn more about the people in our lab and their research, teaching and publications.

**Major Weeds**  
Description, photos, ecology and management of relevant weeds in New York State.

**Organic Weed Management**  
Weed Ecology  
Cultural Management  
Physical Management  
Glossary

**Weed Ecology**  
Terms and definitions of important ecological concepts.

**Herbicide Reference**  
Common and chemical names, chemical structure, sensitive weeds, mode of action and more.

Opportunities  
Contact Us  
References/Links  
T-Shirts

<https://weedecology.css.cornell.edu/index.php>

# Bacteria



**Water splash is an important means of dissemination**

**Crown gall**



**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
  - ▶ <https://www.maine.gov/dacf/php/index.shtml>
  - ▶ **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)

