

Ten Ways to Keep Gardens Healthy and Pest-free



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www.gotpests.org**

Got Pests?

Japanese Beetle



Lily Leaf Beetle



White Grubs



Viburnum Leaf Beetle



Some Common Garden Pests

- **Insects & Mites:** beetles, caterpillars, bugs, aphids, scales, spider mites
- **Slugs and Snails**
- **Plant Diseases:** fungi, bacteria, viruses
- **Vertebrate Animals:** birds, deer

Use IPM!

Integrated Pest Management

- **Monitor** for pests and ‘pest-conducive’ conditions
- **Prevent Pests:** Use sanitation, maintenance and good horticultural practices
- **Determine your Threshold:** Is it really a pest? How many is too many?
- Use **multiple pest control methods** that eliminate pest access to food, water, shelter.
- **Keep records:** use a garden notebook

10 Things You Can Do

1. Get to Know your enemies and friends.
 - Send samples to UM Pest Management Office or local Extension office for identification or
 - Gotpests.org, umaine.edu/ipm/, bugguide.net, bugwood.org



Know your (Natural) Enemies

Lady bug
larva.
Eats
aphids!



Most insects are NOT pests! Use books, websites or Cooperative Extension for insect/plant/pathogen identification.

Got Pests? - Windows Internet Explorer
http://www.maine.gov/agriculture/pesticides/gotpests/BeneficialPage.html
bed bugs

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ASK THE EXPERT

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Beneficial Organisms

A beneficial organism is any living thing that benefits the environment around us, including insects, spiders, mites, nematodes, reptiles, mammals, plants, bacteria, fungi, and viruses. The benefits they provide include pest management, pollination, maintenance of soil health. The opposite of beneficial organisms are pests. These living things can be detrimental to humans if they may damage plants, sting, bite or spread diseases.

[More About Beneficial Organisms](#)

Below are pictures of some beneficial bugs that you might see in Maine. Adults are usually pictured, because that is what is seen by homeowners; keep in mind, however, that other stages of the insects may be providing the benefit.

Predators

Insects that feed on nuisance insect or plant species

Assassin Bugs
[Info at Univ. of Kentucky](#)
[\[PDF\] Beneficial Insects: True Bugs](#)

Big-eyed Bugs
[\[PDF\] Beneficial Insects: True Bugs](#)

Brown Lacewing
[Info at Univ. of Kentucky](#)

2. Do a Soil Test

- Check organic matter levels.
Optimal OM: 5-8%
- Add amendments (compost, fertilizer, lime) as recommended
- Retest every 3 yrs.

3. Plant Smart to Avoid Plant Diseases and Insect Pests

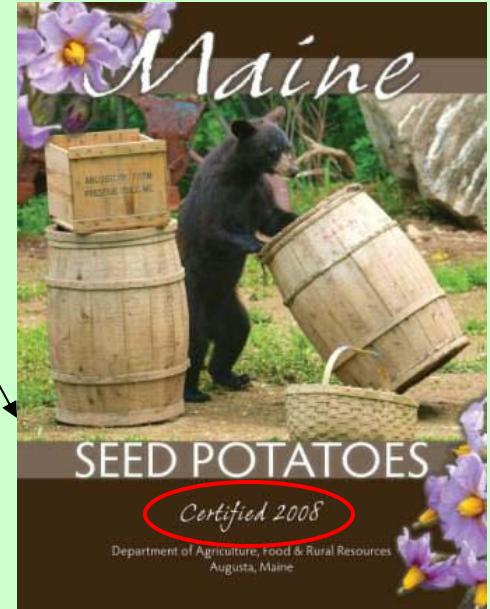
- Select good site (water drainage, good soil, full sun, air movement)
- Select right plants for right places
- Plant certified disease-free, weed-free seed
- Select resistant varieties
- Provide plants with optimal sun, nutrition, water and spacing
- Maintain good plant spacing and orient rows to allow air movement
- Mulch prevents rain-splash of soil-borne diseases
- 'Rogue-out' diseased plants. Clean up crop debris.
- Eliminate 'volunteers' from garden and compost

Keep Plants Disease-Free

- Select resistant varieties
- Plant certified disease-free seed
- Select good site (water drainage, good soil, full sun, air movement)
- Maintain good plant spacing to allow air movement
- Mulch prevents rain-splash of soil-borne diseases
- 'Rogue-out' diseased plants. Clean up crop debris.
- Eliminate 'volunteers' from garden and compost
- Ensure plants get the right amount of sun, water, and nutrition.

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**



4. Protect and Encourage Natural Enemies

- Spare the (pesticide) sprays
- Plant succession of flowering plants or leave areas unmown, to attract and support natural enemies (tiny insects that eat or parasitize pests). See Lady Bird Johnson Wildflower Center (wildflower.org) or nativeplants.msu.edu/pdf/E2973.pdf

Spare the Sprays to Protect Beneficial Insects



- Dragonflies
- Spiders
- Small parasitic wasps
- Predatory mites
- Syrphid flies
- Ground beetles



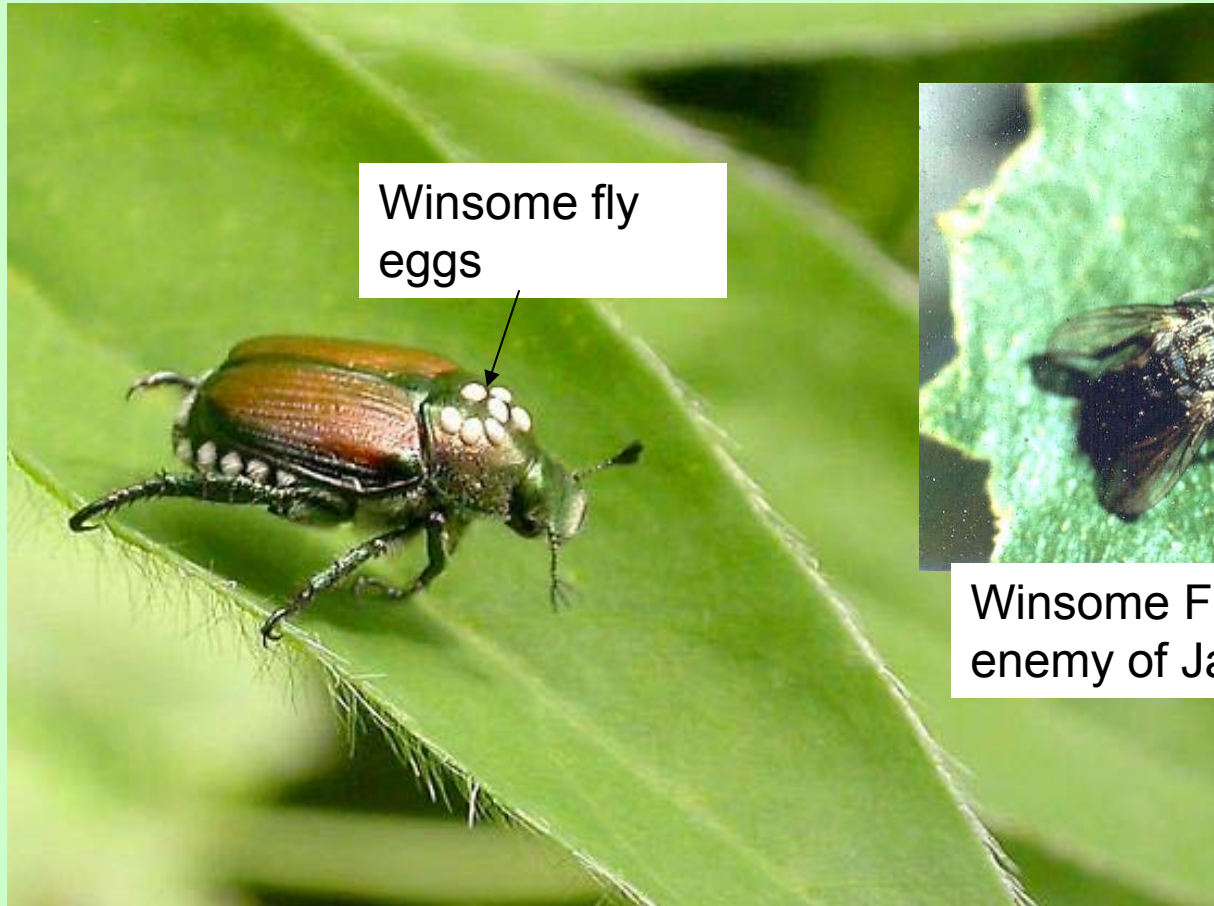
Bloom Timing of Native Plants Attractive to Beneficial Insects

nativeplants.msu.edu/pdf/E2973.pdf

Native plant	Natural enemies	Bees	Bloom Period					
			May	Jun	Jul	Aug	Sep	Oct
wild strawberry	**	*	May	Jun				
golden Alexanders	***	**	May	Jun				
Canada anemone	***	*	May	Jun	Jul			
penstemon	**	**		Jun	Jul			
angelica	***	*		Jun	Jul			
cow parsnip	***	*		Jun	Jul			
sand coreopsis	***	*		Jun	Jul	Aug		
shrubby cinquefoil	***	*		Jun	Jul	Aug	Sep	
Indian hemp	***	*		Jun	Jul	Aug		
late figwort	**	**		Jun	Jul	Aug		
swamp milkweed	**	**			Jul	Aug		
Culver's root	**	***			Jul	Aug		
yellow coneflower	***	**			Jul	Aug		
nodding wild onion	*	**			Jul	Aug	Sep	
meadowsweet	***	**			Jul	Aug	Sep	
yellow giant hyssop	**	***			Jul	Aug	Sep	
horsemint	***	**			Jul	Aug	Sep	
Missouri ironweed	**	**			Jul	Aug	Sep	
cup plant	***	***			Jul	Aug	Sep	
pale Indian plantain	**	**			Jul	Aug	Sep	
boneset	***	**			Jul	Aug	Sep	
blue lobelia	***	***			Jul	Aug	Sep	
pale-leaved sunflower	***	**			Jul	Aug	Sep	
Riddell's goldenrod	***	***				Aug	Sep	Oct
New England aster	***	**					Sep	Oct
smooth aster	**	**					Sep	Oct

KEY
 * good
 ** better
 *** best

Biological IPM Methods Rely on Natural Enemies



Winsome fly eggs



Winsome Fly: natural enemy of Japanese Beetle

5. Control Weeds

- **Mulching**

- **Can suppress weeds, conserve moisture, provide habitat for natural enemies**
- **Mulch types: cardboard, newspaper, old carpeting, straw, sawdust, black or colored plastic sheeting, etc.**
- **pull mulch away from the tree trunks to decrease pest/disease potential**





Weed Control

Mulch

- Newspaper covered w straw or black plastic around plants & between rows
- Living mulches (eg annual ryegrass) between rows (keep it mowed)

Tillage

- Reduced Tillage (avoid bringing weed seeds to soil surface): plant in beds to avoid soil compaction.
- Stale seed bed method: deep till followed by shallow tillage just after weeds germinate, then plant crop.

Control weeds before they go to seed!

- Cultivate
- Mulch
- Hand-pull

6. Keep Insects and Other Animals Out

- Exclusion by screens, barriers (example: bird netting, row covers)
- Fencing





Slugs and Snails

- Control weeds
- Keep grass mown low or consider gravel strip around gardens
- Traps (beer cups or wooden boards)
- Copper foil ribbon around raised beds or pots.
- Organic Pesticide: Iron Phosphate bait (eg Sluggo)



7. Pull on Your Work Gloves and Use Your Hands

- **Rake out, pull out plant debris to remove disease and insects**
- **Prune and rogue out diseased plants and branches (carry off site in sealed bag)**
- **Hand-pick or knock off insects into bucket of soapy water**
- **Pull out or till out weeds**

Lily Leaf Beetle

- Plant daylilies instead of true lilies
- Hand pick beetles and larvae. Squish eggs (lines of red eggs, underside of leaf).
- Space plantings to allow good sunlight penetration.
- Least-risk pesticide: neem (example Neemix, BioNeem) if needed.



Japanese Beetle

- Select non-preferred shrubs and trees (see avoid linden, roses, crabapples, grapes, raspberries)
- Hand-pick beetles or knock them into bucket of soapy water
- Don't water lawn
- Grub Control: *Heterorhabditis bacteriophora* (Hb) nematodes, water them in, apply to infested lawns in early-mid August.
- Organic pesticides: repel beetles from plants for 3-4 days. Neem extract (eg Azatrol, BioNeem) or pyrethrins (eg Pyganic but test it on small area first, can damage plants)
- Avoid Japanese beetle traps

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



Landscape Plants Seldom Damaged by Adult Japanese Beetles

Scientific name and Common name

Acer negundo Boxelder*

Acer rubrum Red maple

Acer saccharinum Silver maple

Buxus sempervirens Boxwood

Carya ovata Shagbark hickory*

Cornus florida Flowering dogwood

Diospyros virginiana Persimmon*

Euonymus species Euonymus (all species)

Fraxinus americana White ash

Fraxinus pennsylvanica Green ash

Ilex species Holly (all species)

Juglans cinerea Butternut*

Liriodendron tulipifera Tuliptree

Liquidamar styraciflua American sweetgum*

Magnolia species Magnolia (all species)

Morus rubra Red Mulberry

Populus alba White poplar

Pyrus communis Common pear*

Quercus alba White oak*

Quercus coccinea Scarlet oak*

Quercus rubra Red oak*

Quercus velutina Black oak*

Sambucus canadensis American elder*

Syringa vulgaris Common lilac

Most evergreen ornamentals, including *Abies* (fir),
Juniperus, *Taxus*, *Thuja* (arbor vitae), *Rhododendron*,
Picea (spruce), *Pinus* (pine) and *Tsuga* (hemlock)

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.



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

9. Use Pesticides Judiciously if at all

- ID pest positively.
- Decide if it really needs to be controlled
- Try other methods first
- Select the least-risk product that will control that pest – read the label, do some research, purchase small quantity
- Spot treat.

Some Organic Fungicides

<http://web.pppmb.cals.cornell.edu/resourceguide/index.php>

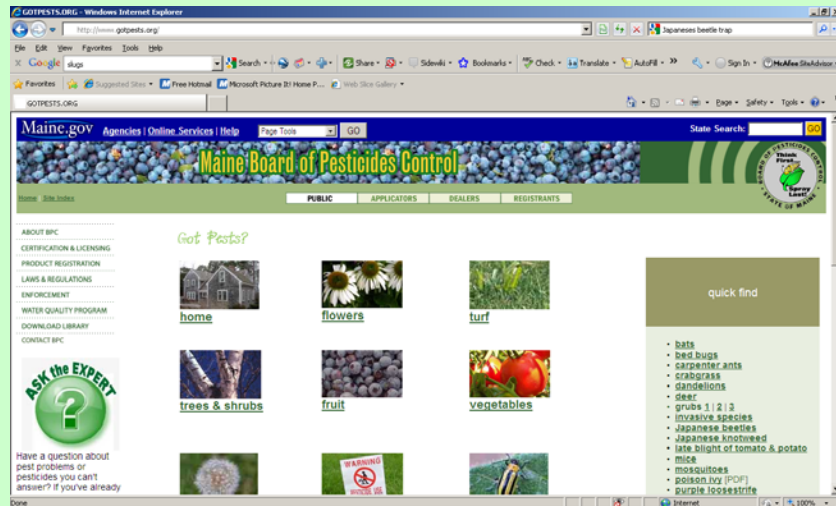
- **Pesticidal soap:** (eg M-pede) *powdery mildew*
- **Copper and sulfur based fungicides:** *late blight and many bacterial and fungal pathogens*
- **Bicarbonate fungicides:** (eg Kaligreen, MilStop) *powdery mildew*
- **Peroxide fungicides:** (eg: Bi-Carb Old Fashioned Fungicide, OxiDate) *rots, wilts, powdery mildew, leaf spots*
- **Neem oil:** *powdery mildew*
- **Microbial-based fungicides:**
 - Trichoderma (eg PlantShield, RootShield - drench, foliar spray) *root rots, botrytis, powdery mildew*
 - Bacillus subtilis (eg Rhapsody, Serenade, Kodiak) *root rots, onion diseases, powdery mildew, downy mildew*
 - Streptomyces (eg Mycostop) *root rots*

10. Enjoy Your Gardens AND the Biological Diversity they Support

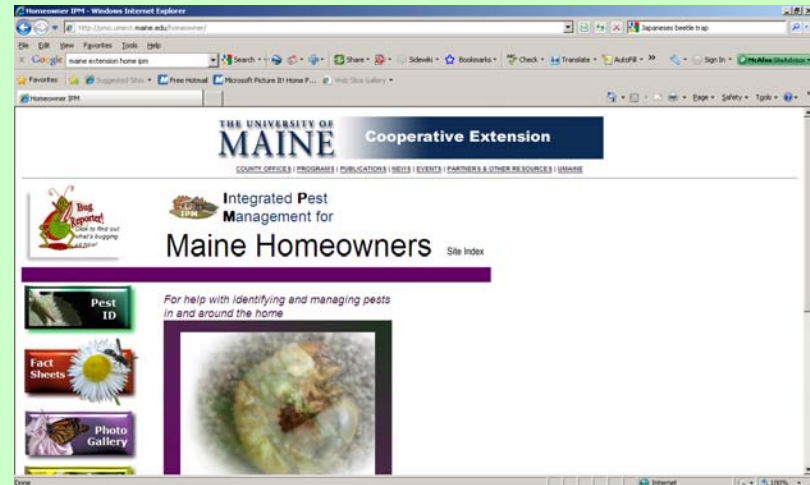
- Appreciate that pests also have a good side such as being food for birds, bats, mammals, beneficial insects and spiders.
- Use your gardens to learn more about nature in your backyard.

Resources

Maine Dept Agriculture:
Gotpests.org 207-287-2731



Local County Extension Offices: check phone book or <http://extension.umaine.edu/> county-offices/



National Pesticide Information Center:
npic.orst.edu

UMaine Extension:
<http://extension.umaine.edu/homeowner-ipm/>
1-800-287-0279

1-800-858-7378