


## Home Pesticide Use Risks & Benefits

**Gary Fish**  
 Maine Board of Pesticides Control  
 28 State House Station  
 Augusta ME 04333-0028  
 (207)287-2731  
 gary.fish@maine.gov



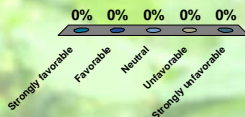
## Have you ever heard of the Board of Pesticides Control (BPC)?

- Yes
- No





## What is your opinion of the BPC?

- Strongly favorable
- Favorable
- Neutral
- Unfavorable
- Strongly unfavorable



## Pesticides are still Man's primary defense against Pests

How we see ourselves using pesticides







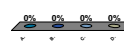
Unfortunately, a not so uncommon result from our use of pesticides

## Even in Canada people still rely on pesticides



## Choose the pesticide(s)?

- A.  No endorsement intended or implied
- B. 
- C. 
- D. 





## What are the benefits?



- Aesthetics

- Healthy saleable plants & produce



## What are the benefits?



- Bountiful harvest

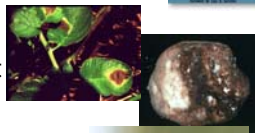


- Nuisance or public health pest control



## Risk vs. Risk

- West Nile Virus & EEE  
Malaria
- Potato Late Blight Disease
- Lyme Disease



## What are the human risks?

### ■ Acute

- Rash
- Nausea
- Eye ticks
- Stomach cramps

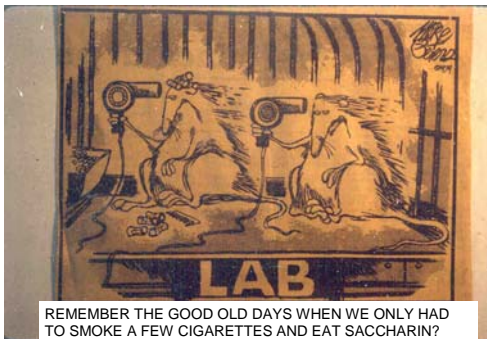


### ■ Chronic

- Cancer
- Birth defects
- Allergies
- Organ damage
- Endocrine effects



## How are the risks determined?



## What are the environmental risks?

- Wildlife effects



- Water contamination



- Plant damage



- Residues on food



## Remember "Silent Spring"

**SILENT SPRING**  
A WARNING BY  
**RACHEL CARSON**

"I feel I should warn you, I'm shot through with pesticides."

*"DDT is good for meeee!"*

THE NATURES EXTINCT BIRD

**\*Biomagnification of chlorinated hydrocarbons like DDT or Dieldrin**

## All pesticides have risks!!!

- Organic ≠ Safe
- Synthetic ≠ Highly toxic
- Natural ≠ Safe

No endorsement intended or implied

## Even natural or organic products are toxic!

How Many Pesticides in Human Exposure Than the Dose That Causes Rodentic Care Margin of Exposure, MCE (Federal Center Environmental Exposure)

**TABLE 1.102** Organics from Food of the United States and Small Farms by Year: Lower than Estimated Human Risk Exposure 2007

**TABLE 1.103** Oral LD<sub>50</sub> Values for Some Pesticides Used in Small Farms and Gardens.

CHEMICAL	COMMON TRADE NAMES	ORAL LD <sub>50</sub> <sup>a</sup>	ER <sup>b</sup>	TYPE OF PESTICIDE
Nitrofen	Black Leaf 40	35	40 <sup>c</sup>	insecticide
Rotenone <sup>d</sup>		132	33	insecticide
Permethrin <sup>e</sup>		300	48	insecticide
Diazinon		300	43	insecticide
2,4-D		375	17	herbicide
Cyfluthrin	Seris	500	21	insecticide
Acifluorfen	Orthene	866	23	insecticide
Copper hydroxide <sup>f</sup>	Kocide	1000	33	fungicide
Copper oxyphosphate <sup>g</sup>	C-O-C-S	1000	33 <sup>h</sup>	fungicide
Pyrethrin <sup>i</sup>		1300	55	insecticide
Methidathion		1375	24	insecticide
Permethrin <sup>j</sup>		1300	18	insecticide
Propargite	Omite	2300	43	acaricide
Sabudite <sup>k</sup>		4000	36	insecticide
Cyfluthrin	Round-up	4300	15	herbicide
Cyfluthrin <sup>l</sup>	Kryocide	10,000	21	insecticide
Benazol <sup>m</sup>	Bonide	>10,000	53	fungicide
Bacillus thuringiensis <sup>n</sup>	Dipel	15,000	8	insecticide

NOTE: Some materials on this list may not be currently registered as pesticides or their use may be restricted.

## Toxicity of Common Organic-Approved Pesticides to Pollinators

PESTICIDE	NON TOXIC	LOW TOXICITY	HIGHLY TOXIC
<b>Insecticides/Repellents/Pest Barriers</b>			
Beetle (low exposure only)			
Bifenthrin (low exposure)			
Cyfluthrin (low exposure)			
Diazinon (low exposure)			
Permethrin (low exposure)			
Pyrethrin (low exposure)			
Rotenone (low exposure)			
Sabudite			
Spiromethrin			
<b>Herbicides/Plant Growth Regulators/Adjusters</b>			
Alfalfa			
Cyanazine			
Glyphosate			
Herbicide/Vinylcarbazole			
Triallate			
<b>Fungicides</b>			
Copper			
Copper hydroxide			
Copper oxyphosphate			
Difolconazole			

Eric Mader – The Xerces Society for Invertebrate Conservation

**"All substances are poisons; there is none which is not a poison. The right DOSE differentiates a poison from a remedy."**

—Paracelsus (1493-1541)

Even too much water can kill – over 1.5 liters/hour

Woman dies after water-drinking contest

Water consumption used to 'kill' You Was for a 100' contest death

## Endocrine effects

- EPA is just beginning to do endocrine disrupter screening for pesticide active and inert ingredients
- <http://www.epa.gov/scipoly/oscpendo/index.htm>
- [http://www.epa.gov/scipoly/oscpendo/pubs/final\\_list\\_fm\\_041509.pdf](http://www.epa.gov/scipoly/oscpendo/pubs/final_list_fm_041509.pdf)
- Does the dose make the poison?? What about hormones?
- <http://www.belleonline.com/index.htm>

**RESTRICTED USE PESTICIDE**  
 KEEP OUT OF REACH OF CHILDREN  
 DANGER POISON  
 PELIGRO

**TEMIK® 15G** ALDRICARD PESTICIDE

KEEP OUT OF REACH OF CHILDREN  
 DANGER POISON  
 PELIGRO

**R I S K = X**

No endorsement intended or implied

One way to quickly assess the risk?

**Signal Words**

Danger  
 Warning  
 Caution

No endorsement intended or implied

**Pesticide exposure potential**

Formulation Type	% Active Ingredient
Granular	3 - 15%
RTU Baits, Gels or Liquids	1 - 15%
Dust	5 - 10%
Aerosol	1 - 5%
Wettable Powder	50 - 85%
Liquid Concentrate	40 - 90%

Reduce exposure by using targeted materials

- Enclosed baits & gels
- Spot treatments
- Broadcast treatments

**Best**

**Worst**

Which product do you think is the better choice?

- A
- B
- C
- D

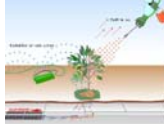
No endorsement intended or implied

0% 0% 0% 0%

How is risk reduced?- PPE

## Other pesticide risks

- Drift
- Water contamination
- Storage
- Disposal



## Drift

- Check for sensitive areas first!
- Watch the wind speed
- Keep the spray low
- Spray with the breeze
- Don't apply when over 85°F



## Pesticides Can Leach Into Groundwater



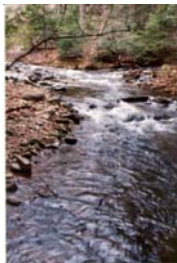
## Home pesticide use - Worst case

Groundwater monitoring results

Commodity Group	Number of Samples Collected			Number of Samples with Positive Detections			Percent of Samples with Positive Detections			Detections Above a Health Advisory		
	1994	1999	2005	1994	1999	2005	1994	1999	2005	1994	1999	2005
Potatoes	47	100	87	8	4	1	17%	4%	1%	None	None	None
Corn	49	51	28	7	0	4	14%	0%	14%	None	None	None
Blueberries	21	22	13	15	13	7	75%	59%	54%	None	None	None
Small Grains	3	9	17	0	0	1	0%	0%	6%	None	None	None
Orchards	1	5	3	1	0	0	100%	0%	0%	* One	None	None
Christmas Trees	5	4	3	0	0	0	0%	0%	0%	None	None	None
Strawberries	None	3	6	---	0	0	---	0%	0%	---	None	None
<b>Totals:</b>	<b>129</b>	<b>194</b>	<b>157</b>	<b>31</b>	<b>17</b>	<b>13</b>	<b>23.3%</b>	<b>9.0%</b>	<b>8.3%</b>	<b>---</b>	<b>---</b>	<b>---</b>

\*Homeowner application of diazinon to control ants – 10x over MCL

## Pesticides Can Run-off Into Surface Waters



## BayScaping Project

- Friends Of Casco Bay did some detective work in 2001, 2002, 2003, 2005, 2006, 2008 and 2009
- Sampled runoff water from intensive lawn care areas in Cumberland, S Portland, Westbrook, Falmouth, Yarmouth, Brunswick, Freeport, Portland and Cape Elizabeth & Back Cove area



## Friends of Casco Bay Sampling

– Pesticide residues detected in surface water

- Diazinon up to (2.6 ppb)\*\*
- 2,4-D up to (36.4 ppb)
- Dicamba up to (4.1 ppb)
- MCPP up to (26 ppb)
- MCPA up to (0.45 ppb)
- Clopyralid up to (0.91 ppb)
- Propiconazole up to (0.075 ppb)
- Chlorothalonil up to (0.22 ppb)
- Found Excess Nitrogen & Phosphorous in most samples



\*\*Values in red exceed Aquatic Life Criteria

– Pesticide residues detected in sediments

- Bifenthrin up to (37 ppb)
- Permethrin up to (47 ppb)

## Aquatic Life Effects



■ Aquatic life criteria proposed by various sources for fresh water (from EPA & USGS Fact Sheet 097-99)

- 2,4-D – 4 ppb      Dicamba – 10 ppb
- MCPA – 2.6 ppb      Diazinon – 0.1 ppb
- Carbaryl – 0.02 ppb      Chlorpyrifos – 0.001 ppb

■ California study found bifenthrin in 80% of sediment samples at levels toxic to aquatic invertebrates (437 ppb)

■ Also found it at a concentration 15 times greater than in the sediments of creeks running through agricultural lands (from Environmental Science & Technology Dec. 15, 2005)

## USGS National Water Quality Assessment



■ Sampled urban streams

- Insecticides occurred more frequently in urban streams than they did in agricultural area streams
- Herbicides detected in 99% of Urban stream samples
- Phosphorous found at same levels as in agricultural streams
  - 70% of those samples exceeded the EPA desired goal for reducing nuisance plant growth (algae)

## Prevent water contamination



- Locate & stay away from wells
- Stay away from ledge
- Stay away from wetlands & water
- Do not apply to slopes near water
- Do not apply before heavy rains
- Spot applications
- Vegetative buffers



## Storage

- Buy *only* what you need
- Keep them out of reach of children & lock them up
- Keep in original containers
- Never store in basement!





## Disposal

- Follow label
- Rinse containers
- Apply extra mix to labeled site
- Call BPC about obsolete pesticides



### Which product is most risky to handle?


- A → 
- B →  No endorsement intended or implied
- C → 

### Think First.... Spray Last

■ “The quick fix is neither!”

**Make the benefits**

**Outweigh the risks**





### 1997 Legislative Mandate

■ It is the policy of the State to Minimize reliance on pesticides!








### Look at the big picture



Make plans to manage specific problems

### Do you need a pesticide?

- First identify the pest 
- Is it *really* a problem 
- Try cultural or sanitary controls 
- Encourage the “Good bugs”
- Replace with resistant varieties

### Diagnosis murder??

- Is it a pest problem?
  - Often what’s normal for the plant is mistaken for a pest or disease
  - Variegation
  - Reproductive structures

Is this a disease?



Who's been chewing here?



They only come out at night.



The real culprit!



Black vine weevil larvae and adult near the stem of a small yew.



“The gardener’s best buddies”



### 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
- Treat turf in early August if above threshold (8-20 grubs/sq. ft)
- Avoid traps
- Use a trap plant (soybean, zinnia, pole beans, etc.)



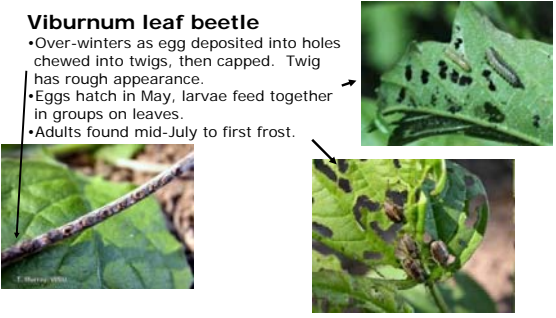
## Lily Leaf Beetle

- Plant daylilies instead of true lilies
- Hand pick beetles and larvae. Squish eggs.
- Space plantings to allow good sunlight penetration.
- Least-risk pesticide if needed.
- Maybe *Tetrastichus setifer* will save us



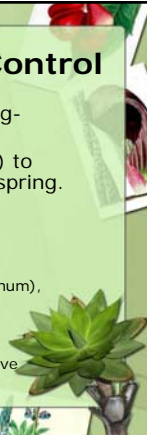
## Viburnum leaf beetle

- Over-winters as egg deposited into holes chewed into twigs, then capped. Twig has rough appearance.
- Eggs hatch in May, larvae feed together in groups on leaves.
- Adults found mid-July to first frost.




## Viburnum Leaf Beetle Control

- Prune out or apply horticultural oil to egg-infested branches in fall.
- Apply insecticidal soap (eg Safer's Soap) to larvae about 1-week after egg hatch in spring.
- Plant resistant cultivars ([www.hort.cornell.edu/vlb/suscept.html](http://www.hort.cornell.edu/vlb/suscept.html))
  - Some 'resistant' cultivars:
    - V. cassinoides*, *witherod viburnum* -native
    - V. plicatum* var. *tomentosum* (doublefile viburnum),
    - V. carlesii* (Koreanspice viburnum),
    - V. burkwoodii* (Burkwood viburnum),
    - V. x juddii* (Judd viburnum),
    - V. lantanooides* (alnifolium) (Hobblebush) - native
    - V. lentago* (Nannyberry) - native



## Cultural controls

- Landscape design
  - replace "susceptible" or chronically pest-prone plants with resistant or non-susceptible plants
  - increased plant diversity and habitat complexity can increase natural enemies present (Shrewsbury 1996)



Cranberry Viburnum

Siebold viburnum

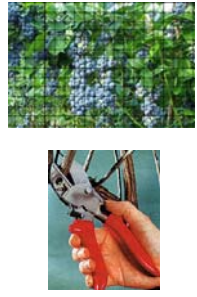
## Cultural controls

- Plant health and cultural requirements
  - fertilization: over fertilization (the "aphid effect")
    - Overfertilizing may help the pest more than the plant
  - water management: proper irrigation
  - planting site: choose the right plant for the site
  - mulching: pull mulch away from the trunk to decrease pest/disease potential
- Sanitation: raking leaves to reduce fungi



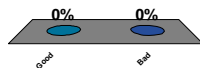
## Mechanical controls

- Exclusion by screens, barriers
- Pruning infested plants
- Hand removal
- Shake & capture



## Welcome or Unwelcome?

1. Welcome
2. Unwelcome



## Tachinid fly (the so-called “winsome fly”) laying an egg on a Japanese beetle adult

*Istocheta* (=Hyperecteina) *aldrichi*  
Introduced into US from Japan  
in 1922

Adults emerge Late June/July,  
feed on honeydew, nectar

Lay up 100 eggs in two weeks  
Eggs hatch 1 day later, dig  
into beetle

Kills beetle in 5-6 days

Just before death, beetle digs  
into ground where fly spend  
winter as pupa



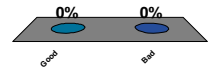
Joshua P. Blahnik  
T.S.U. Osh. I. Floyd Nursery Research Center  
McMinnville, TN 37110-1267  
From Plant Science Golf Course, Cassin, Maine

## We love the good “bugs!”



## Welcome or Unwelcome?

1. Welcome
2. Unwelcome

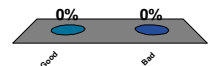


## Good bug in action



## Welcome or Unwelcome?

1. Welcome
2. Unwelcome



### Friend? Or Foe?



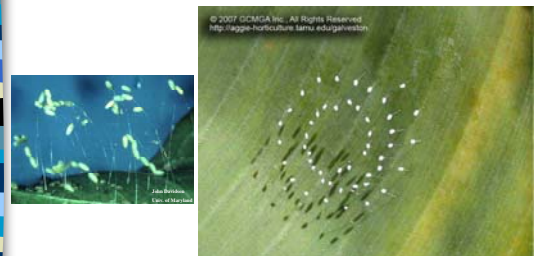
### Science fiction monster?



### Delicate beauty



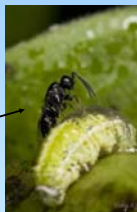
### Omelet on a stick?



### Spare the Sprays to Protect Beneficial Insects



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



### Habitat enhancement for beneficials

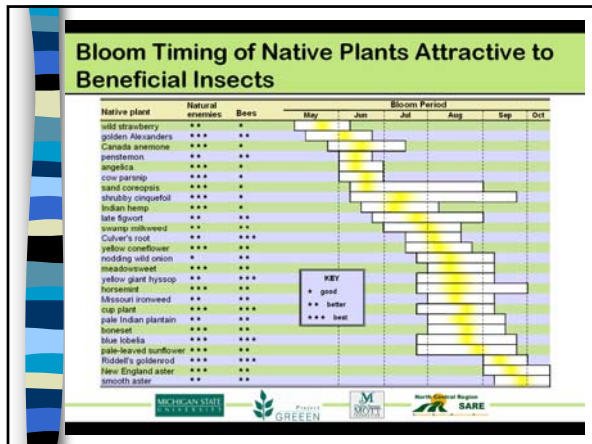


Many beneficials, as adults, larvae, or both, require pollen and/or nectar as dietary supplements

Key is to provide a series of plants that, collectively, provide continuous nectar/pollen supply

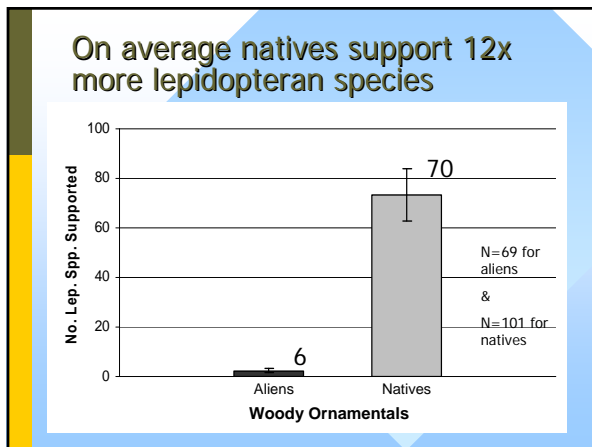
Many of the same plants that provide food and habitat for natural enemies also provide resources for pollinators





### Birds can also be our allies

<http://www.bringingnaturehome.net/>



### Pretty ornamentals? Or Pests?

### Who you gonna call?

**PESTICIDE REGULATIONS**  
 Michigan Board of Pesticides Control  
 (202) 281-2121

**PEST PROBLEMS**  
 Cooperative Extension  
 (800) 287-4279  
 Maine Forest Service  
 (207) 287-2431

**PESTICIDE APPLICATION**  
 Northern New England Pesticide Center  
 (603) 252-1222

### BPC Web Pages

[www.thinkfirstspraylast.org](http://www.thinkfirstspraylast.org)

[www.gotpests.org](http://www.gotpests.org)

## Do you need a pesticide?

- Is the pest in a susceptible stage?
- Application timing is critical
- Is the pest still present?



## Is the pest protected?



Birch leafminer



Birch leafminer



Birch leafminer

## Don't apply when you can't hit a susceptible target

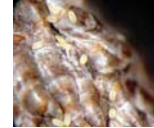
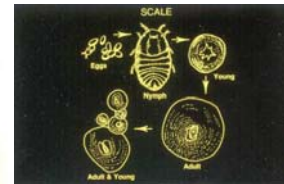


Lace bugs



Colorado potato beetle

## Timing is everything?



## Nobody home!



Eriophyid gall mite



Oak apple gall wasp

## The key to proper use

- **Read the label!**



**PRECAUTIONARY STATEMENTS**  
**HAZARDS TO HUMANS & DOMESTIC ANIMALS**  
**CAUTION:** Irritant if inhaled. Causes moderate eye irritation. Avoid contact with eyes or clothing. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. When handling this product, wear safety glasses, chemical resistant gloves (such as barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, polyurethane or vinyl, long pants, and long-sleeved shirt. When using outdoors, spray with the wind to your back and do not use when wind speeds are 10 mph or more. Wash the outside of the gloves with soap and water before removing. Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove contaminated clothing and wash clothing before reuse.  
**ENVIRONMENTAL HAZARD:** This pesticide is toxic to birds. Do not apply directly to water. Do not contaminate water by cleaning of equipment or disposal of wastes. Cover or soil-incorporate spills. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product, or allow it to drift to blooming crops or weeds, if bees are visiting treatment area.  
**PHYSICAL OR CHEMICAL HAZARDS:** Flammable. Keep away from heat and open flame.  
**NOTICE:** To the extent consistent with applicable law, Syngenta assumes all risks of use, storage or handling of this product not in accordance with directions.

No endorsement intended or implied

## The old days



## Great directions!



Contained 5% lead oxide & 47% zinc oxide

"Bug Death is a patented non-poisonous powder, and is entirely different from anything that has ever been placed on the market, and overcomes all the objections to the deadly poisons that the farmers have been obliged to use in the past. It is just as effectual as Paris Green and other dangerous insect powders. It is sure death to the potato, squash and cucumber bugs, currant and tomato worms, also other plant and vine eating pests.

The deadly effect on bugs will not always be as quick, but it is just as sure. Contrary to the arsenic preparations, it is a benefit to the plant, and the more freely used the better the plant will thrive, and for potatoes when blight is prevalent, the extra yield will more than pay all expense of Bug Death."

## Today's label



No endorsement intended or implied

## Purchase wisely

- Measure the area needing treatment
- Only purchase what you need "right now"
- Check the label for:
  - re-entry
  - site & pest
  - days to harvest
  - personal protective equipment needs



## Prepare for the application

- Read the label
- Wear all PPE
- Mix carefully
- More is NOT better
- Never use more than the label directs



## Apply properly & be cautious

- Only treat infested areas
- Spot treatments conserve beneficial organisms
- Avoid broadcast treatments
- Keep the plant's condition in mind
- Check coverage & monitor control
- Only repeat application if the label allows





# YardScaping...

for a healthy Maine



## The Maine YardScaping Partnership

The Partnership is very diverse!

- Allen, Sterling & Lothrop
- Bar Mills Ecological
- Carroll Associates, Landscape Architects
- City of Portland
- Congress of Lake Associations
- Edwards & Keiley
- Friends of Casco Bay
- Friends of Scarborough Marsh
- Kennebunkport Conservation Commission
- LakeSmart Program
- Lisa Cowan, Landscape Architecture
- Maine Board of Pesticides Control
- Maine Department of Agriculture
- Maine Department of Environmental Protection
- Maine LandscapeNursery Association
- Maine Organic Farmers & Gardeners Association
- Maine Society of Landscape Architects
- Maine Storm Water Groups
- Maine Volunteer Lake Monitoring Program
- Natural Resources Conservation Service
- O'Donal's Nurseries
- Shaw Brothers Construction
- Skillin's Greenhouses
- Soil & Water Conservation Districts
- Southern Maine Community College
- State Planning Office
- Think Blue Maine Program
- Town of Brunswick
- University of Maine Cooperative Extension

[www.yardscaping.org](http://www.yardscaping.org)



## YardScaping

- A new paradigm?
- Some call it "Sustainable Landscaping" or "Ecological Landscaping"
- We want to keep it simple



## YardScaping Mission

- YardScaping inspires Maine people to create and maintain healthy landscapes that minimize reliance on water, fertilizer and pesticides.

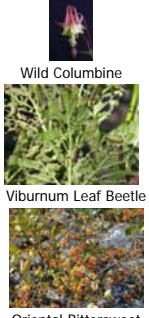


## The Ten-ets of YardScaping

- Promote buffers
- Promote appropriate plants - native plants and non-invasive alien plants
- Reduce lawn area
- Reduce runoff
- Reduce reliance on pesticides, fertilizers and water
- Promote low input lawns and landscapes
- Promote YardScape diversity
- Create wildlife habitats
- Right plant, right place, right use
- Commonsense pest management (IPM)

## Use site appropriate, non-invasive plants

- Native plants are often well adapted
  - Fewer problems, less work, more rewards, but not all are problem free, e.g., viburnums
- Invasive plants are easy to grow but crowd out native vegetation
  - Our local forest habitats are changing rapidly
  - Invasive plants can ruin wildlife habitat



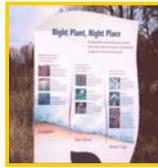
Wild Columbine

Viburnum Leaf Beetle

Oriental Bittersweet

## Right plant, right place, right purpose

- Choose plants based on the area to be planted not just for their color
- Select plants that thrive under existing conditions rather than trying to alter the conditions to meet the needs of a plant
- Minimize disturbance of the existing landscape



Wild Cranberry Bog

## Right plant, right place



Common Ninebark  
– dry sunny site



Cinnamon Fern  
– wet shady site



Smooth Sumac –  
large open dry bank

<http://orb.at.ufl.edu/TREES/index.html>

## Where to learn more



## Use a diversity of plants & grasses

- Less noticeable damage from pests and disease
- Incorporate many layers of plant types
  - Trees
  - Shrubs
  - Ground covers
  - Perennials, and
  - Lawns



## Create wildlife habitats

Diversity and plant layers go hand in hand with habitat creation

Add nectar and fruit producing plants


Strive for continuous blooms

Add water, walls, feeders, woody debris




## Reduce lawn area

- Reduces
  - Water & air pollution
  - Water usage
  - Maintenance
  - Costs
- Gives
  - More free time






Mower exhaust = 11 cars' exhaust  
 One hour of mowing = driving 400 miles  
 Mowers spew 87 lbs of greenhouse gases and 40 pounds of other pollutants annually




## Use low input plant varieties

- No-mow fescue vs Kentucky bluegrass
- Pagoda dogwood vs flowering cherry
- River birch vs paper birch


## Protect lakes & streams with buffers

- Preserve existing landscape
- Winding paths
- Don't mow to the lake's edge
- Leave the duff




## Reduce runoff

- Reduce amount of impervious (hard) surfaces
- Create rain gardens or install rain barrels
- Direct water into vegetated areas
- Irrigate properly and only when needed



A simple rain garden design with red tibetia and royal fern occupying the lowest, wettest zone.

## Reduce reliance on pesticides, fertilizers and water

- Grow plants that are resistant to insects & diseases
- Use plants that tolerate low fertility
- Use drought resistant plants




White Fir



Sweet Fern

## Use common sense pest management

- Integrated pest management
  - Know your pest
  - Pick it, trap it or exclude it
  - Know the good bugs
  - Mow, prune or water
  - Use pesticides as last resort




## Have you heard about the pesticide notification registry for aerial for air-carrier pesticide applications?

1. Yes
2. No

New Maine Pesticide Notification Registry  
 • SIGN UP • DOWNLOAD

Response	Percentage
Yes	0%
No	0%

## Please rate this presentation

1. Wow
2. Helpful
3. Ho Hum
4. Crap
5. Bull Crap

Rating	Percentage
Wow	0%
Helpful	0%
Ho Hum	0%
Crap	0%
Bull Crap	0%

## Summary

- Risk = Toxicity x Exposure
- All pesticides have risks
- Reduce risks - wear PPE
- Make the benefits outweigh the risks