Home Pesticide Use Risks & Benefits

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Which type of gardener are you?

1. Black thumb
2. Novice
3. Intermediate
4. Experienced
5. Greenest thumb
Have you ever heard of the Board of Pesticides Control (BPC)?

1. Yes
2. No
What is your opinion of the BPC?

1. Strongly favorable
2. Favorable
3. Neutral
4. Unfavorable
5. Strongly unfavorable
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
Which are pesticides?

1. A.
2. B.
3. C.
4. D.

No endorsement intended or implied
Maine pesticide use more common than perceived

No endorsement intended or implied
Have we finally hit the top of the curve?

Pounds of Home Use Pesticides Distributed into Maine

Includes lawn and tree care company applications
What are pesticides?

- Bleaches, *Lysol*, pine oil
- Weed & Feed, *Roundup*
- Rat & mouse baits
- Plant disease controls

No endorsement intended or implied
What are Pesticides?

- Sevin, Pyrethroids, Raid
- “Organics” like pyrethrum
- Biological Controls
- Wood preservatives

No endorsement intended or implied
These are Pesticides?

- Plant incorporated protectants
  - Have the *Bt*. Crystalline protein engineered into them

No endorsement intended or implied
EPA exempt pesticides

- Some pesticides have been deregulated by EPA
  - Exempt from Federal registration
  - Must be registered by State of Maine
  - Exempt from toxicity testing
  - NOT risk free

Ingredients in some of these products:
- Rosemary oil
- Peppermint oil
- Thyme oil
- Clove oil
- Wintergreen oil
- Cinnamon oil

No endorsement intended or implied.
What are the risks?

- **Wintergreen oil** –
  - highly toxic,
  - not recommended during pregnancy,
  - causes dermatitis,
  - inhalation hazard

- **Cinnamon oil** –
  - powerful irritant and
  - even worse sensitizer
What about home remedies

- Home chemistry is not recommended by the BPC
- Many of the materials used seem “safe” because we eat them or use them on our skin
- Exposure routes may be different
- What we eat may not be safe to breathe

Example

6. Eucalyptus oil
A great natural pesticide for flies, bees and wasps. Simply sprinkle a few drops of eucalyptus oil where the insects are found. They will all be gone before you know it.
Eucalyptus oil is **UNSAFE** when it is either taken by mouth or applied directly to the skin without first being diluted. Taking 3.5 mL of undiluted oil can be fatal. Signs of eucalyptus poisoning might include stomach pain and burning, dizziness, muscle weakness, small eye pupils, feelings of suffocation, and some others. Eucalyptus oil can also cause nausea, vomiting, and diarrhea.

**Pregnancy and breast-feeding:** Eucalyptus seems to be safe for pregnant and breast-feeding women when used in food amounts. But don’t use eucalyptus oil. Not enough is known about safety during pregnancy or breast-feeding.

**Children:** Eucalyptus oil is **UNSAFE** for children. It should not be taken by mouth or applied to the skin. Not much is known about the safety of using eucalyptus leaves in children. It’s best to avoid use in amounts larger than food amounts.
What products are NOT pesticides?

- Insect parasitic nematodes
- Rodent or insect traps
- Beneficial insects or mites

No endorsement intended or implied
What does registration mean?

- Not a safety guarantee
- Reasonable certainty of no harm, but NOT risk free
- Must read and follow the label to manage the risk
Risk assessment

Prior to 1996 FQPA

Aggregate and Cumulative Risk Cup

After 1996 FQPA
What are the benefits?

- Healthy saleable plants & produce
- Aesthetics
What are the benefits?

- Bountiful harvest

- Nuisance or public heath pest control

OH FOR CRYING OUT LOUD ETHEL, STOP SCREAMING, JUST HOW BIG CAN ONE GYPSY MOTH BE?
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
  - Death

- **Chronic**
  - Cancer
  - Birth defects
  - Allergies
  - Organ damage
  - Endocrine effects
How are the risks determined?

REMEMBER THE GOOD OLD DAYS WHEN WE ONLY HAD TO SMOKE A FEW CIGARETTES AND EAT SACCHARIN?
All pesticides have risks!!!

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

No endorsement intended or implied
Even natural or organic products are toxic!

### Oral LD₅₀ Values for Some Pesticides Used in Small Farms and Gardens.

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>COMMON TRADE NAMES</th>
<th>ORAL LD₅₀</th>
<th>EIC&lt;sup&gt;a&lt;/sup&gt;</th>
<th>TYPE OF PESTICIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicotine</td>
<td>Black Leaf 40</td>
<td>55</td>
<td>45&lt;sup&gt;1&lt;/sup&gt;</td>
<td>insecticide</td>
</tr>
<tr>
<td>Rotenone&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td>132</td>
<td>33</td>
<td>insecticide</td>
</tr>
<tr>
<td>Bordeaux&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td>300</td>
<td>68</td>
<td>fungicide</td>
</tr>
<tr>
<td>Diazinon</td>
<td></td>
<td>300</td>
<td>43</td>
<td>insecticide</td>
</tr>
<tr>
<td>2,4-D</td>
<td></td>
<td>375</td>
<td>17</td>
<td>herbicide</td>
</tr>
<tr>
<td>Carbaryl</td>
<td>Sevin</td>
<td>500</td>
<td>21</td>
<td>insecticide</td>
</tr>
<tr>
<td>Acephate</td>
<td>Orthene</td>
<td>866</td>
<td>23</td>
<td>insecticide</td>
</tr>
<tr>
<td>Copper hydroxide&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Kocide</td>
<td>1000</td>
<td>33</td>
<td>fungicide</td>
</tr>
<tr>
<td>Copper oxychloride sulfate&lt;sup&gt;d&lt;/sup&gt;</td>
<td>G-O-C-S</td>
<td>1000</td>
<td>33&lt;sup&gt;1&lt;/sup&gt;</td>
<td>fungicide</td>
</tr>
<tr>
<td>Rynia&lt;sup&gt;e&lt;/sup&gt;</td>
<td></td>
<td>1200</td>
<td>55</td>
<td>insecticide</td>
</tr>
<tr>
<td>Malathion</td>
<td></td>
<td>1375</td>
<td>24</td>
<td>insecticide</td>
</tr>
<tr>
<td>Pyrethrum&lt;sup&gt;f&lt;/sup&gt;</td>
<td></td>
<td>1500</td>
<td>18</td>
<td>insecticide</td>
</tr>
<tr>
<td>Propargite</td>
<td>Omite</td>
<td>2200</td>
<td>43</td>
<td>acaricide</td>
</tr>
<tr>
<td>Sabadilla&lt;sup&gt;g&lt;/sup&gt;</td>
<td></td>
<td>4000</td>
<td>36</td>
<td>insecticide</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>Round-up</td>
<td>4300</td>
<td>15</td>
<td>herbicide</td>
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<tr>
<td>Cryolite&lt;sup&gt;h&lt;/sup&gt;</td>
<td>Kryocide</td>
<td>10,000</td>
<td>21</td>
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<tr>
<td>Benomyl</td>
<td>Benlate</td>
<td>&gt;10,000</td>
<td>53</td>
<td>fungicide</td>
</tr>
<tr>
<td>Bacillus thuringiensis&lt;sup&gt;i&lt;/sup&gt;</td>
<td>Dipel</td>
<td>15,000</td>
<td>8</td>
<td>insecticide</td>
</tr>
</tbody>
</table>

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

<sup>a</sup>Estimates indicate chemical was acceptable for organically grown produce.

<sup>b</sup>LD₅₀ indicates the amount of pesticide that will kill half of a group of test animals. These values are for milligrams of pesticide per kilogram of body weight. These figures do not provide a clear indication of the chronic health risk or persistence in the environment.

<sup>c</sup>EIC or Environmental Impact Quotient is a measure of the environmental impact of most common fruits and vegetable pesticides (insecticides, acaricides, fungicides, and herbicides) used in commercial agriculture. The values obtained from these calculations can be used to compare different pesticides and pest management programs to ultimately determine which programs are likely to have the lower environmental impact.

<sup>d</sup>Estimated EIC.
“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
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/index.htm)
- Does the dose make the poison?? What about hormesis?
  - [http://www.belleonline.com/index.htm](http://www.belleonline.com/index.htm)
No endorsement intended or implied
One way to quickly assess the risk?

Signal Words

Danger

Warning

Caution

No endorsement intended or implied
Please choose the two pesticide formulation types with the lowest exposure potential

<table>
<thead>
<tr>
<th>Formulation Type</th>
<th>Percent Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Granular</td>
<td>3 - 15%</td>
</tr>
<tr>
<td>2. Ready to Use Baits, Gels or Liquids</td>
<td>1 - 15%</td>
</tr>
<tr>
<td>3. Dust</td>
<td>5 - 10%</td>
</tr>
<tr>
<td>4. Aerosol</td>
<td>1 - 5%</td>
</tr>
<tr>
<td>5. Wettable Powder</td>
<td>50 - 85%</td>
</tr>
<tr>
<td>6. Liquid Concentrate</td>
<td>40 - 90%</td>
</tr>
</tbody>
</table>
Reduce exposure by using targeted materials

- Enclosed baits & gels
- Spot treatments
- Broadcast treatments
Which product do you think is the better choice?

1. A
2. B
3. C
4. D

No endorsement intended or implied.
How is risk reduced? - PPE
What are some “environmental” risks?

- Wildlife effects
- Residues on food
Remember “Silent Spring”

*Biomagnification of chlorinated hydrocarbons like DDT or Dieldrin was a problem in the 60’s & 70’s.
Today’s wildlife concerns

- Biomagnification is not a big issue any more – the old persistent products were cancelled

- Pollinators are now a focus area

http://www.extension.org/pages/24315/managed-pollinator-cap:-coordinated-agricultural-project
Multiple Universities’ Pollinator Project

- The answers are only beginning to emerge, but current research has revealed some results
  - Mites and viruses appear to be the main culprits along with the mite controls
  - For honey bees low levels of pesticides have been shown to reduce associative learning of individual bees in laboratory studies
    - These changes in learning and behavior can potentially alter normal colony level functions, yet colony-level impacts remain to be verified
  - Neonicotinoids like this one can be expressed in ornamental plant pollen and nectar at levels much higher than in agricultural uses

No endorsement intended or implied
Toxicity of Common Organic-Approved Pesticides to Pollinators

<table>
<thead>
<tr>
<th>PESTICIDE</th>
<th>NON-TOXIC</th>
<th>LOW TOXICITY</th>
<th>HIGHLY TOXIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insecticides/Repellants/Pest Barriers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacillus thuringiensis (Bt)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beauveria bassiana</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cydia pomonella granulosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diatomaceous Earth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garlic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticidal Soap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kaolin Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neem</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticultural Oil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrethrins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotenone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sabadilla</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinosad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Herbicides/Plant Growth Regulators/Adjuvants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjuvants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn Gluten</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gibberellic Acid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horticultural Vinegar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fungicides</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper Sulfate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lime Sulfur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Soaps and Oils, only when directly sprayed upon the pollinator.
Pesticide residues are found on all types of food

- Samples are randomly chosen near the point of consumption, and
- reflect what is typically available to the consumer throughout the year
- Samples are selected without regard to country of origin, variety, or organic labeling
2010 USDA-PDP Sampling

- USDA – PDP 2010 sampling shows that 99.75% of all samples are well below the tolerances set by EPA

- In baby food no residues were found above the tolerance levels

- A few samples contained extremely low levels of pesticides for which there is no tolerance which are not a food safety risk

http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=stelprdc5098550
PDP also detects pesticide residues on organic produce

- According to the 2008 USDA Pesticide Data Program Report:
  - 43% of organic spinach samples were positive for spinosad (13 of 30 samples positive)

- According to the 2010 USDA Pesticide Data Program Report:
  - 52% of organic baby food pear samples were positive for spinosad (16 of 31 samples)

- Spinosad is NOP approved and is derived from a naturally occurring soil bacteria

No endorsement intended or implied
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

<table>
<thead>
<tr>
<th>Commodity Group</th>
<th>Number of Samples Collected</th>
<th>Number of Samples with Positive Detections</th>
<th>Percent of Samples with Positive Detections</th>
<th>Detections Above a Health Advisory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potatoes</td>
<td>47</td>
<td>100</td>
<td>87</td>
<td>8</td>
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<tr>
<td>Corn</td>
<td>49</td>
<td>51</td>
<td>28</td>
<td>7</td>
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<tr>
<td>Blueberries</td>
<td>21</td>
<td>22</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Small Grains</td>
<td>3</td>
<td>9</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Orchards</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Christmas Trees</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Strawberries</td>
<td>None</td>
<td>3</td>
<td>6</td>
<td>---</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td>129</td>
<td>194</td>
<td>157</td>
<td>31</td>
</tr>
</tbody>
</table>

*Homeowner application of diazinon to control ants – 10x over MCL*
Groundwater monitoring results

- We sampled wells near blueberry fields in 2011
  - the number of wells with detections dropped to 38%
  - 2 different herbicides found
    - hexazinone
    - terbacil
Pesticides Can Run-off Into Surface Waters
BayScaping Project


- 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

– Pesticide residues detected in sediments

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

**Values in red exceed Aquatic Life Criteria
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
Based on signal word, which product is most risky to handle?

1. A
2. B
3. C

No endorsement intended or implied
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)
- Cover susceptible plants with protective netting
- Avoid traps
- Use a trap plant (soybean, zinnia, pole beans, etc.)

Kentucky wonder pole beans
**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

- Plant resistant cultivars
  (www.hort.cornell.edu/vlb/suscept.html)
  - Some ‘resistant’ cultivars:
    - *V. cassinoides or nudum*, witherod viburnum - native
    - *V. plicatum* var. *tomentosum* (doublefile viburnum),
    - *V. carlesii* (Koreanspice viburnum),
    - *V. burkwoodii* (Burkwood viburnum),
    - *V. × juddii* (Judd viburnum),
    - *V. lantanoides* (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)
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 decreases 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

Adult
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. Basham
T.S.U. Otis L. Floyd Nursery Research Center
McMinnville, TN 37110-1367
From Point Sebago Golf Course, Casco, Maine
We love the good “bugs!”

Photo Courtesy Vincent Hickey
Welcome or Unwelcome?

1. Welcome
2. Unwelcome
Good bug in action
Welcome or Unwelcome?

1. Welcome
2. Unwelcome
Flower fly larvae eat aphids!
Science fiction monster?
Delicate beauty
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.
# Bloom Timing of Native Plants Attractive to Beneficial Insects

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

**KEY**
- * good
- ** better
- *** best
Pretty ornamentals? Or Pests?
Birds can also be our allies

http://www.bringingnaturehome.net/
On average natives support 12x more lepidopteran species

- Aliens: 6
- Natives: 70

N=69 for aliens & N=101 for natives
Who you gonna call?

PESTICIDE REGULATIONS
• Board of Pesticides Control
  207-287-2731

PEST PROBLEMS
• Cooperative Extension
  800-287-0279
• Maine Forest Service
  207-287-2431

PESTICIDE POISONING
• Northern New England Poison Center
  800-222-1222

www.thinkfirstspraylast.org • www.gotpests.org • www.yardscaping.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

Colorado potato beetle

Lace bugs
Timing is everything?
Nobody home!

Eriophyid gall mite

Oak apple gall wasp
The key to proper use

- Read the label!

**Systemic Insect Control**

TRUSTED SINCE 1926

- Controls: Aphids, Flower Thrips, Leafminers, Mealybugs, Spider Mites, Tent Caterpillars, Whiteflies, and other listed insects.

- Use on: Roses, Flowers, Ornamentals, Shrubs, and Trees.

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS & DOMESTIC ANIMALS

**CAUTION:** Harmful if swallowed. 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, polyvinyl chloride or viton), 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 HAZARDS:** 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, buyer assumes all risks of use, storage or handling of this product not in accordance with directions.

No endorsement intended or implied
Weed-B-Gon Max is a slightly hazardous pesticide.

1. True
2. False
False – Warning = moderate hazard
Weed-B-Gon Max should be applied right after mowing.

1. True
2. False
False

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read entire label before using this product. Use strictly in accordance with label precautionary statements and directions.

FOR BEST RESULTS
• Do not mow for 1 to 2 days before or after application.
• If soil is dry, water before application.
• To treat the entire lawn (broadcast application): Use a tank sprayer or hose-end sprayer. Measure lawn. Calculate square feet by multiplying length times width. Spray evenly over measured area.

BEFORE YOU APPLY
Weed-B-Gon Max can be applied under trees without risk of harm to the trees.

1. True
2. False
IMPORTANT

- For use on Bluegrass, Fescues, Rye, Bent, Bermuda, Bahia and Zoysia lawns.
- DO NOT USE on St. Augustine and Centipede lawns.
- Do not spray Carpet grass, Dichondra or desirable clovers.
- May cause temporary yellowing of some Bermudagrass turf.
- Do not exceed specified dosages for any area.
- Be particularly careful applying within the drip line of trees and other ornamental species.
- Avoid contact with exposed feeder roots of ornamentals and trees.
How much Weed-B-Gon Max and how much water should you add to your sprayer if you need to treat a lawn that is 100 feet wide and 150 feet long?

1. 80 TBS & 10 gallons
2. 120 TBS & 15 gallons
3. 160 TBS & 20 gallons
4. None of these
<table>
<thead>
<tr>
<th><strong>MIXING INSTRUCTIONS</strong></th>
<th><strong>NORTHERN GRASSES:</strong> Fescues, Kentucky bluegrass, perennial rye and zoysia</th>
<th><strong>SOUTHERN GRASSES:</strong> Bent, bahia and Bermuda (DO NOT USE on St. Augustine or centipede lawns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Tablespoon (Tbs) = 3 teaspoons (tsp) 1 fl oz = 2 Tbs</td>
<td>Add 4 fl. oz. per gallon of water for each 1,000 sq. ft.</td>
<td>Add 2 fl. oz. per gallon of water for each 1,000 sq. ft.</td>
</tr>
<tr>
<td><strong>WHEN USING A TANK SPRAYER</strong></td>
<td></td>
<td><strong>WHEN USING AN ORTHO® DIAL’N SPRAY® APPLICATOR</strong></td>
</tr>
<tr>
<td>• Set dial to 4 oz.</td>
<td>• Set dial to 2 oz.</td>
<td>• Add 8 oz. of concentrate directly into sprayer jar. DO NOT ADD WATER.</td>
</tr>
<tr>
<td>• Add 8 oz. of concentrate directly into sprayer jar. DO NOT ADD WATER.</td>
<td>• Add 8 oz. of concentrate directly into sprayer jar. DO NOT ADD WATER.</td>
<td>• Spray evenly over 2,000 sq. ft.</td>
</tr>
<tr>
<td>• Spray evenly over 2,000 sq. ft.</td>
<td>• Spray evenly over 4,000 sq. ft.</td>
<td>• Any unused product should be poured back into its original container.</td>
</tr>
<tr>
<td>• Any unused product should be poured back into its original container.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This product is a good choice to use to remove dandelions just prior to planting new grass seed.

1. True
2. False
False

Page 1

- Spray when weeds are actively growing.
- Spray when temperature is below 90°F.
- Spray when air is calm to avoid drift to vegetables, flowers, ornamental plants, trees, shrubs and other desirable plants.
- Do not apply to newly seeded grasses until well established (they have been mowed 3 times).
- Rain-Proof™ BRAND — Rain or watering 1 hour after application will not wash away effectiveness.
- Reseed no sooner than 3 weeks after application.
What protective equipment must be worn when mixing Weed-B-Gon Max?

1. **goggles**
2. gloves
3. long pants & sleeves
4. All of these
Goggles must be worn... but

**WARNING:**
- Causes substantial but temporary eye injury.
- Harmful if swallowed.
- Do not get in eyes, on skin or on clothing.
- Wear goggles, face shield or safety glasses when mixing, pouring this concentrate from one container to another and when removing or reattaching container closure/spray nozzle.
- After product has been diluted in accordance with Directions for Use, eye protection is not required.
- Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.
If Weed-B-Gon Max is accidentally swallowed the victim should NOT be made to vomit.

1. **True**
2. **False**
FIRST AID STATEMENT

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

IF IN EYES

Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED

Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
Weed-B-Gon Max can be used on any type of lawn.

1. True
2. False
False - despite what it says

**KILLS WEEDS, NOT LAWNS**

**IMPORTANT**
- For use on Bluegrass, Fescues, Rye, Bent, Bermuda, Bahia and Zoysia lawns.
- DO NOT USE on St. Augustine and Centipede lawns.
- Do not spray Carpet grass, Dichondra or desirable clovers.
- May cause temporary yellowing of some Bermudagrass turf.

**PRODUCT FACT** Treats up to 16,000 square feet

<table>
<thead>
<tr>
<th>KILLS WEEDS</th>
<th>Kills over 250 weeds including: dandelion, chickweed, clover, ground ivy, (creeping Charlie), oxalis, wild violet &amp; other tough lawn weeds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHERE TO USE</td>
<td><strong>ON LAWNS</strong> Fescue, Kentucky bluegrass, perennial ryegrass, zoysiagrass, bentgrass, bahiagrass and Bermudagrass. DO NOT USE on St. Augustine or centipede lawns. For St. Augustine or centipede lawns use Weed-B-Gon Spot Weed Killer for St. Augustine Lawns or Weed-B-Gon MAX Ready-to-Use.</td>
</tr>
</tbody>
</table>
People and pets can re-enter the treated area after the spray has dried.

1. True
2. False
Do not allow people (other than applicator) or pets on treatment area during application. People & pets may enter treated area after spray has dried.

True
Weed-B-Gon Max can be applied to lawns right at the edge of lakes and streams.

1. True
2. False
True – But?????

ENVIRONMENTAL HAZARDS

- Drift or runoff may adversely affect nontarget plants.
- Do not apply directly to water. When cleaning equipment, do not pour washwater on the ground; spray or drain over a large area away from wells and other water sources. Do not contaminate water when disposing of equipment washwaters.
- Do not apply this product through any type of irrigation system. Do not contaminate water used for irrigation or domestic purposes.
- Most cases of groundwater contamination involving phenoxy herbicides such as MCPA have been associated with mixing/loading and disposal sites. Caution should be exercised when handling these phenoxy pesticides at such sites to prevent contamination of groundwater supplies. Use of closed systems for mixing and transferring this pesticide will reduce the probability of spills.
- Placement of the mixing/loading equipment on an impervious pad to contain spills will help prevent groundwater contamination.
Weed-B-Gon Max will control crabgrass and quackgrass.

1. True
2. False
<table>
<thead>
<tr>
<th>WEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder, Annual yellow sweet clover, Artichoke, Aster, Austrian fieldcress, Bedstraw, Beggartick, Biden, Bindweed, Bird vetch, Bitterweed, Bitter wintercress, Black-eyed Susan, Black medic, Black mustard, Blackseed pantain, Blessed thistle, Blue lettuce, Blue vervain, Box elder, Bracted plantain, Brassbuttons, Bristly oxtongue, Broadleaf dock, Broadleaf plantain, Broomweed, Buckhorn, Buckhorn plantain, Bulbous buttercup, Bull nettle, Bull thistle, Burdock, Burning nettle, Bur ragweed, Burweed, Buttercup, Canada thistle, Carolina geranium, Carpetweed, Catchweed bedstraw, Catsear, Catnip, Chickweed, Chicory, Cinquefoil, Clover, Cockle, Cocklebur, Coffeebean, Coffeeweed, Common chickweed, Common mullein, Common sowthistle, Corn chamomile, Creeping jenny, Crimson clover, Croton, Cudweed, Curly Peppergrass, Pepperweed, Pigweed, Pineywoods bedstraw, Plains coreopsis, Plantain, Poison hemlock, Poison ivy, Poison oak, Pokeweed, Poorjoe, Povertyweed, Prairie, Prickly lettuce, Prickly sida, Primrose, Prostrate knotweed, Prostrate pigweed, Prostrate spurge, Prostrate vervain, Puncture vine, Purslane, Ragweed, Red clover, Redroot pigweed, Red sorrel, Redstem filaree, Rough cinquefoil, Rough fleabane, Roundleafed marigold, Rush, Russian pigweed,</td>
</tr>
</tbody>
</table>
Weed-B-Gon Max works best on hot summer days when the weeds are dry and dying.

1. True
2. False
False

FOR BEST RESULTS

BEFORE YOU APPLY

• Do not mow for 1 to 2 days before or after application.
• If soil is dry, water before application.
• To treat the entire lawn (broadcast application): Use a tank sprayer or hose-end sprayer. Measure lawn. Calculate square feet by multiplying length times width. Spray evenly over measured area.

WHEN TO APPLY

• Spray when weeds are actively growing.
• Spray when temperature is below 90°F.
• Spray when air is calm to avoid drift to vegetables, flowers, ornamental plants, trees, shrubs and other desirable plants.
• Do not apply to newly seeded grasses until well established (they have been mowed 3 times).
• Rain-Proof!™ BRAND — Rain or watering 1 hour after application will not wash away effectiveness.
• Reseed no sooner than 3 weeks after application.
Weed-B-Gon Max can be applied right next to vegetable gardens.

1. True
2. False
True – But???

- Spray when weeds are actively growing.
- Spray when temperature is below 90°F.
- Spray when air is calm to avoid drift to vegetables, flowers, ornamental plants, trees, shrubs and other desirable plants.
- Do not apply to newly seeded grasses until well established (they have been mowed 3 times).
- Rain-Proof™ BRAND — Rain or watering 1 hour after application will not wash away effectiveness.
- Reseed no sooner than 3 weeks after application.
The old days
“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.”

Contained 5% lead oxide & 47% zinc oxide
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
Why treat the whole tree?

Bronze birch borer
Why treat the whole tree?

Eastern tent caterpillar
Broadcast applications

- Broadcast applications of lawn herbicides can cause weird results.

- Broadcast applications of any pesticide are prohibited within 25 feet of any wetland or water body.
If you must apply a pesticide

- Wait long enough for the product to work

Examples

No endorsement intended or implied
If you must apply a pesticide

- Keeps records of what was used and how well it worked
- Review your records before treating again next season
If you must apply a pesticide

- Clean yourself and your equipment
- Apply rinse water to the application site
- Wash contaminated clothing separately
YardScaping… for a healthy Maine
The YardScaping Partnership

- Allen, Sterling & Lothrop
- Bar Mills Ecological
- Breakwater School
- Carroll Associates, Landscape Architects
- Casco Bay Estuary Partnership
- City of Portland
- Congress of Lake Associations
- Friends of Casco Bay
- Friends of Scarborough Marsh
- Gnome Landscapes, Design & Masonry
- Jacobs Edwards and Kelcey
- Kennebunkport Conservation Commission
- LakeSmart Program
- Libby’s Landscaping and Greenhouse
- Lisa Cowan, studioverde landscape architecture + design
- Maine Board of Pesticides Control
- Maine Department of Agriculture
- Maine Department of Environmental Protection
- Maine Landscape & Nursery Association
- Maine Organic Farmers & Gardeners Association
- Maine Soil & Water Conservation Districts
- Maine State Planning Office
- Maine Volunteer Lake Monitoring Program
- Natural Resources Conservation Service
- New England Organics
- O'Donal's Nurseries
- PJC & Company Ecological Land Care
- Portland Trails
- Shaw Brothers Construction
- Skillin's Greenhouses
- Southern Maine Community College
- Think Blue Maine Program
- Town of Brunswick
- University of Maine Cooperative Extension

The Partnership is very diverse!

www.yardscaping.org

for a healthy Maine
YardScaping

- A new paradigm?

- Some call it “Sustainable Landscaping” or “Ecological Landscaping”

- We want to keep it simple

- http://youtu.be/cwaSKjymQDc
YardScaping Mission

- YardScaping hopes to inspire Maine people to create and maintain healthy landscapes through ecologically based practices that minimize reliance on water, fertilizer and pesticides.

YardScaping Gardens at Back Cove

**LOW MAINTENANCE PLANTS**

You can grow low maintenance plants like these in your yard.

The trees, shrubs and perennials you see here:
- resist pest problems
- thrive in Maine
- are non-invasive
- grow back each year
- require less water
- require less fertilizer

Want to get involved or learn more? Visit www.yardscaping.org
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)

YardScaping Gardens at Back Cove

LOW INPUT YARD CARE

When it comes to gardening, less is usually more.

Low input yards require a little more brain, a lot less brawn and leave you with more free time:

- plant drought and pest tolerant plants
- mow lawns at the highest setting and leave the clippings
- replace lawn with shrubs or wildflowers
- mulch plants to keep moisture in and weeds out

Want to get involved or learn more? Visit www.yardscaping.org
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
  - Invasive plants harbor more infected deer ticks
Right plant, right place, right purpose

- Choose plants based on the site conditions 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
Where to learn more

www.yardscaping.org/plants/index.htm
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 water’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
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
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

MANAGE PESTS WISELY

Weed, insect and disease control products present both risks and benefits.

Follow these simple steps to protect people, pets, plants and watersheds:

- know the pest
- pull, squash or trap it
- use control products as a last resort, if at all
- spot treat only
- protect beneficial organisms

Want to get involved or learn more? Visit www.yardscaping.org
Welcome to YardScaping

Can anything be more satisfying than a fertile carpet of green grass? How about a healthy landscape that features less lawn and beautiful plantings—all grown without the excessive use of pesticides, fertilizers, and water?

Whether you've been wringing your hands over Japanese beetles or you're tired of slaving away on your lawn, YARDSCAPING is for you.

Join the growing number of Mainers who have decided to change their yard care ways—for the health of the environment, people, and wildlife.

What's New

Portland's YardScaping Gardens at Back Cove are complete and ready for your enjoyment!
Summary

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

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