For Lab

- Aesthetics
- Read labels and fill out sheets.
Pesticide use and delivery

- Concepts of toxicity, hazard
- The label and the law (restricted vs general use)
- Reading the label for personal safety protection
- Choosing pesticides of least toxicity to human
  - Minnesota book lists, Ohio lists
- Reading the label to find out how much to use
- Web resources (Purdue pesticide label program)
  - Minnesota guide, Ohio, Cornell Recommends..
Which of the following is a poison:

- Table salt
- Aspirin
- Malathion
- Sevin

“The dose makes the poison” (Paracelsus)
How to compare hazards of pesticides?

- What properties of a pesticide makes it hazardous?
  - **Acute Toxicity** - innate property of material
    - Rat Oral LD 50 – Lethal oral dose to 50% of population of rats (mg pesticide/kg body weight)
    - Dermal LD 50 – Lethal dermal dose as above
    - Respiratory LD 50 – Lethal inhaled dose as above
  - **Exposure** – extent to which subject is exposed to pesticide.

Hazard = toxicity * exposure
Kinds of exposure

- Acute – single exposure
- Chronic – long term repeated exposure
The Pesticide Label- a legal document

- Use Restriction
- Brand (Trade Name)
- Formulation
- Concentration of material
- Common name of active ingredient
- Chemical name of active ingredient
- Signal word

http://www.btny.purdue.edu/Pubs/PPP/PPP20.html#label
<table>
<thead>
<tr>
<th>Signal Word</th>
<th>Dermal LD 50 mg/kg</th>
<th>Skin Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>Up to 200</td>
<td>corrosive</td>
</tr>
<tr>
<td>Warning</td>
<td>&gt;200 to 2000</td>
<td>Severe irritation at 72 hrs</td>
</tr>
<tr>
<td>Caution</td>
<td>&gt;2000</td>
<td>Mild to moderate irritation</td>
</tr>
</tbody>
</table>
### Signal words and toxicity

<table>
<thead>
<tr>
<th>Signal Word</th>
<th>Oral LD 50 mg/kg</th>
<th>Amount which might kill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger</td>
<td>Up to 50</td>
<td>A taste to a teaspoon</td>
</tr>
<tr>
<td>Warning</td>
<td>&gt;50 to 500</td>
<td>A teaspoon to an ounce</td>
</tr>
<tr>
<td>Caution</td>
<td>&gt;500</td>
<td>Greater than an ounce</td>
</tr>
</tbody>
</table>

**Oral LD 50 (mg/kg)**:
- **Danger**: Up to 50
- **Warning**: >50 to 500
- **Caution**: >500

**Amount which might kill**:
- Danger: A taste to a teaspoon
- Warning: A teaspoon to an ounce
- Caution: Greater than an ounce
The Pesticide Label

- Re-entry information
- Identifies target pests
- Tells how and where it can be used
- Mixing instructions

http://www.btty.purdue.edu/Pubs/PPP/PPP20.html#label
Formulations

- Dusts (D)
- Liquid concentrates (E or EC)
- Wettable (W or WP)
- Flowables (F)
- Granules (G)
- Oil emulsions
- Aerosol sprays
- Baits
- Fumigants

http://ohioline.osu.edu/b504/b504_9.html
Concentration of pesticides

- Dry formulations are usually % active ingredient (ai) by weight
  - 20 WSP = 20% ai; eg 20 gm ai in 100 gm
  - 10 G = 10% ai; eg 1 lb ai in 10 lb product
- Wet formulations are usually in lbs ai per gallon
  - 4 EC = 4 lbs ai in 1 gallon
- RTU = Ready to use
Kinds of Rates

- Spray a given concentration of active to run-off.
- Deliver a liquid at a rate of ai per acre or per 1000 sq ft
- Deliver a granule at a rate per acre or per 1000 sq ft
Toxicity of common insecticides

National Pesticide Information Retrieval System (Label and MSDS Source)
- [http://state.ceris.purdue.edu/](http://state.ceris.purdue.edu/)

Toxicity of common insecticides
- [http://www.entomology.umn.edu/cues/IPM-Pesticides/IPM-pesticides.html](http://www.entomology.umn.edu/cues/IPM-Pesticides/IPM-pesticides.html)

Pesticides and personal safety

Personal protective equipment (REI)

- [http://www.btny.purdue.edu/Pubs/PPP/PP38.html](http://www.btny.purdue.edu/Pubs/PPP/PP38.html)

Common safety tips

- [http://www.btny.purdue.edu/Pubs/PPP/PP20.html#safety](http://www.btny.purdue.edu/Pubs/PPP/PP20.html#safety)
Injectables

- Somewhat controversial, but can be effective

  Into tree injections: Mauget and others
  - [http://ohioline.osu.edu/b504/b504_5.pdf](http://ohioline.osu.edu/b504/b504_5.pdf)

  Into soil injection: low volume (Kioritz), high volume (standard soil injection)
Example 1: Apply as liquid at a given concentration to runoff.

1. Read the label to determine rate of application
   Eg 0.1 lb ai/100 gal
2. Determine concentration of material in the purchased bag of product. 10WP = 10% by weight
3. Determine amount product needed in to get 0.1 lb.
   \[ X \times 0.1 \text{ ai/lb product} = 0.1\text{lb product} \]
   \[ X = 1\text{LB needed} \]
Example 1: Apply as liquid at a given concentration to runoff.

Determine amount product needed to put into 10 gal when rate is given per 100 gal

Set up and solve for X

\[
\frac{1 \text{ lb product}}{100 \text{ gal}} = \frac{X \text{ lb product}}{10 \text{ gal}}
\]

Cross multiply to solve for x

\[
10 = 100X
\]

\[
0.1 = X = \text{pounds product needed in 10 gal}
\]
Example 2. Applying rate of pesticide to per unit area

Rate is 0.1 lb ai/acre and you have 10 WP

- See this link
  http://www.btny.purdue.edu/Pubs/PPP/PPP-47.pdf

Principles pp 6-8
Details pp 24-27
Determine amount of product you need to treat an area 66’ x 66’.

How big is your area? 4,356 sq ft

How does that relate to label rate?

Solve for X

\[
0.1 \text{ lb ai} = \frac{X \text{ lb ai needed}}{43560 \text{ sq ft}}
\]

\[
0.01 \text{ lb ai} = \frac{X}{4356 \text{ sq ft}}
\]
Applying on a per area basis
0.1 lb ai/acre

- How long does it take to cover your area with application equipment when walking or riding at constant speed while delivering a given rate of product per minute.
- Put enough ai in tank to match this time.