



UNIVERSITY of NEW HAMPSHIRE  
COOPERATIVE EXTENSION

# Pesticide Use & Safety



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Agricultural Resources  
Belknap County



# Regulation



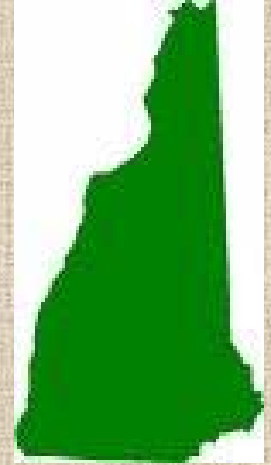
- **Federal**  
*Environmental Protection Agency*



- **State of New Hampshire**  
*Division of Pesticide Control,  
NH Dept. of Agriculture*



# Pesticide:

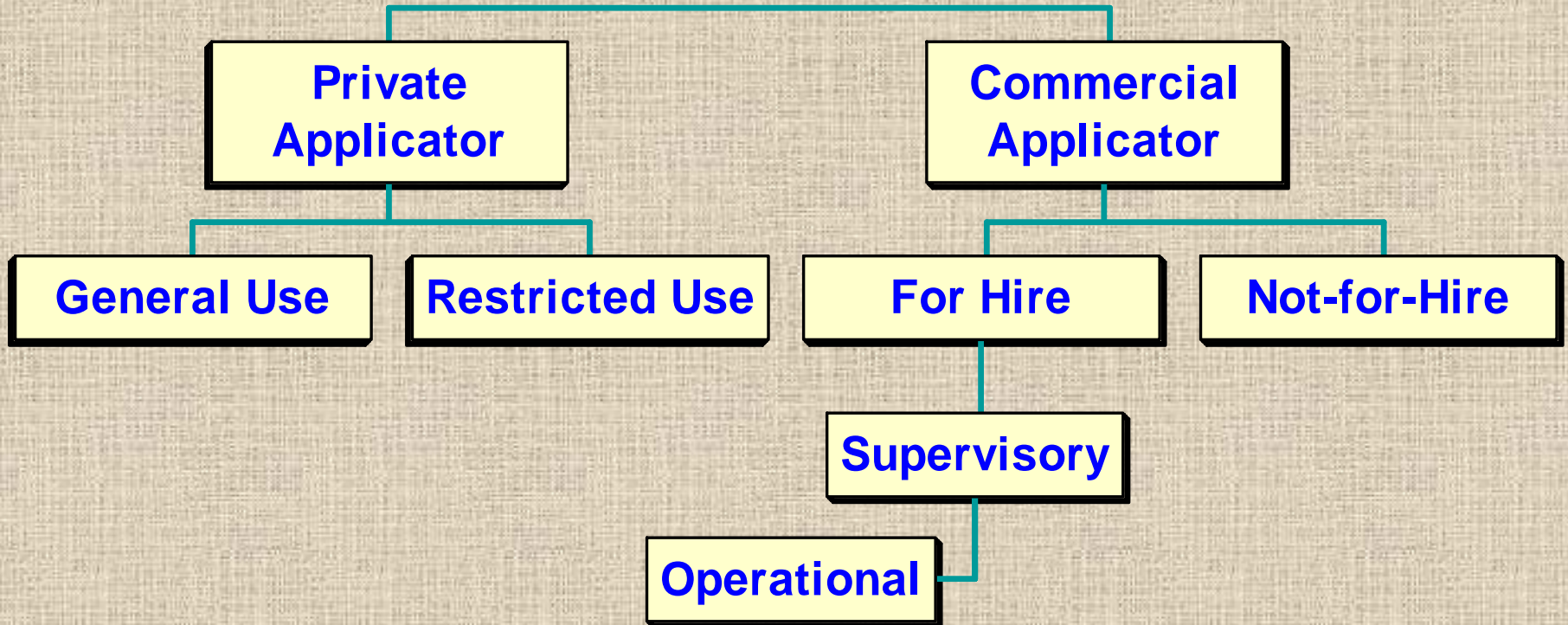


*“Any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any insects, rodents, fungi, weeds or other forms of plant or animal life or viruses which the board declares to be a pest...”*

NH Code of Administrative Rules - Pes 101.18

# Types of licenses in NH

## NH Pesticide License Categories









# Pesticide Classifications

## *Anyone can use:*

- General use = over-the-counter

## *Pesticide license required for:*

- Restricted use
- Prohibited limited use
- Prohibited



# Pesticide Types

insecticide



herbicide



fungicide



# Pesticide Types

rodenticide



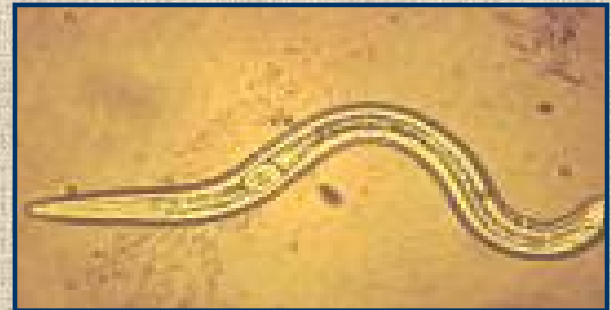
miticide/acaracide



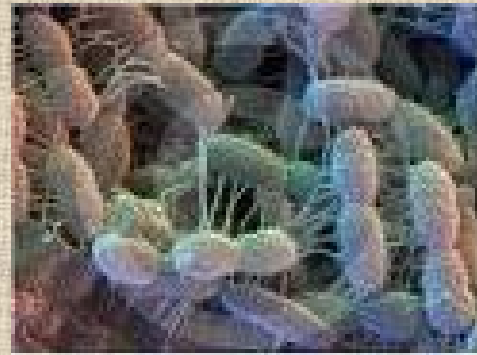
# Pesticide Types



fumigant



nematicide



bactericide

# Pesticide Types



repellent



plant growth  
regulator

disinfectant





# Herbicides control weeds

- Contact
- Translocated
- Specific action within the plant





# Insecticides control insects



- Contact
- Stomach poison
- Systemic
- Attractants
- Repellents



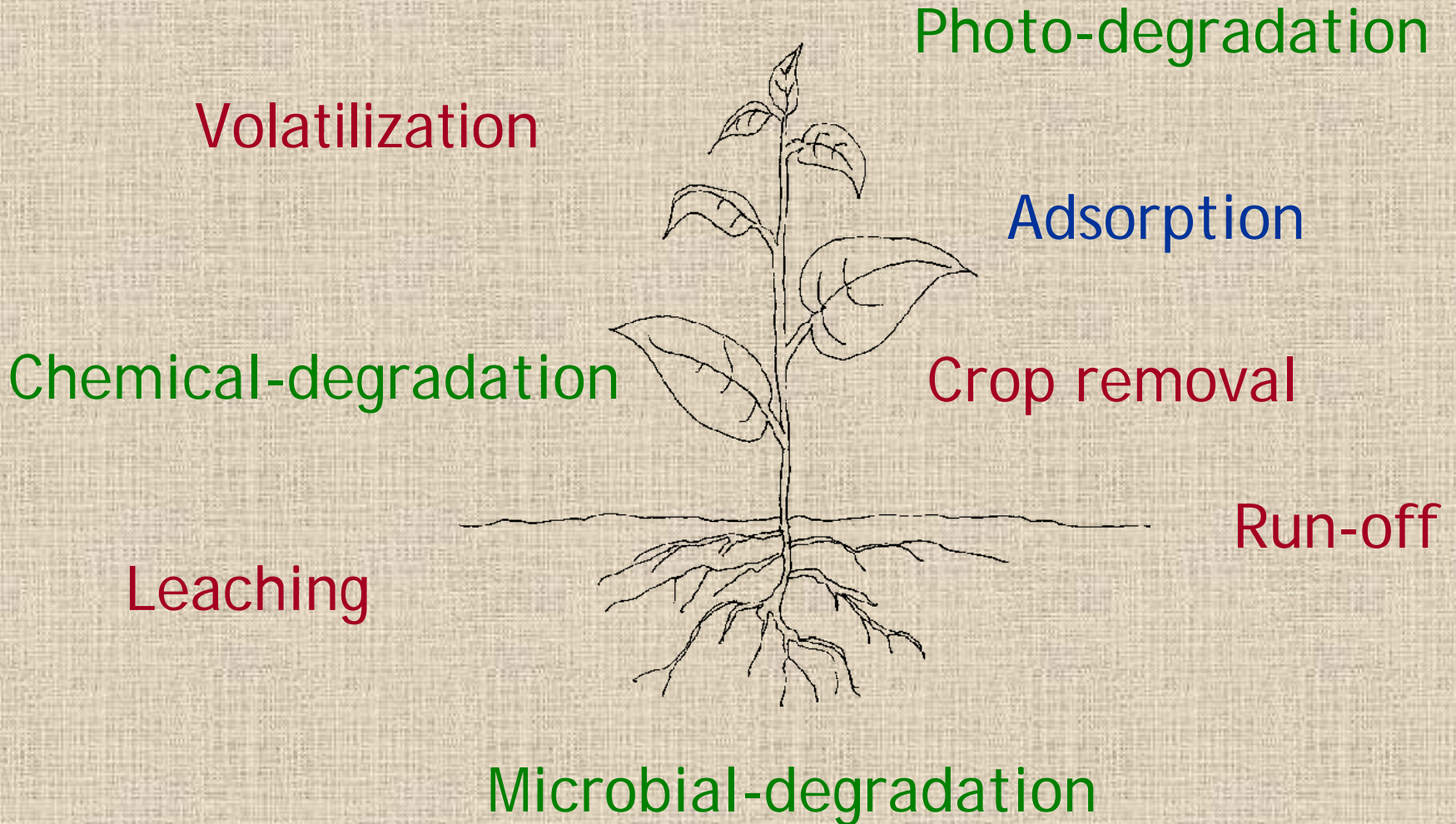
# Fungicides control fungal diseases

- Protectant
- Eradicant



photo by Tom Zitter

# Fates of Pesticides



# Residue

*the deposit of pesticide that remains on a surface (leaves, skin, soil) or in a harvested plant or animal*

controls  
pests



contaminates  
soil, water,  
food



# Tolerance

*the maximum pesticide residue that EPA allows on or in treated crops and animals or animal products sold for food or feed*

Residue studies are conducted to establish tolerance.

# Risk Cup





# Tolerance

- Negligible residue tolerance
- Preharvest intervals - "Days to Harvest"



Day of application  
10 ppm



after 4 days  
5 ppm



After 7 days  
2 ppm

# Lethal Dose 50 ( $LD_{50}$ )

*$LD_{50}$  is a measure of toxicity; for pesticides, it's expressed as mg/kg body weight*

*Dose that kills 50% of test species*

*The lower the  $LD_{50}$ , the more toxic a pesticide is.*



# Toxicity Rating for Select Chemicals

Chemical	Oral LD <sub>50</sub>	Dermal LD <sub>50</sub>
Bordeaux mix	> 10,000	> 2,000
limestone	7,300	
<i>B.t. israelensis</i>	> 5,000	> 2,000
glyphosate	5,000	> 5,000
pyrethrin	1,500	> 1,800
carbaryl	250	>4,000
caffeine	200	
rotenone	50 – 75	> 940
rotenone	50-75	285

Lower LD<sub>50</sub> = more toxic

# Symbol Words

Category	Signal word	Oral LD50 (mg/kg body weight)	Dermal LD50 (mg/kg body weight)	Approx. lethal oral dose
Highly Toxic	DANGER- POISON	0 – 50	0 – 200	few drops - 1 t.
Moderately Toxic	WARNING	50 – 500	200 – 2,000	1 t. - 1 oz.
Slightly Toxic	CAUTION	500 – 5,000	2000 – 20,000	1 oz. - 1 pt. or 1 lb.
Relatively Non-Toxic	CAUTION	> 5,000	> 20,000	>1 pt. or 1 lb.

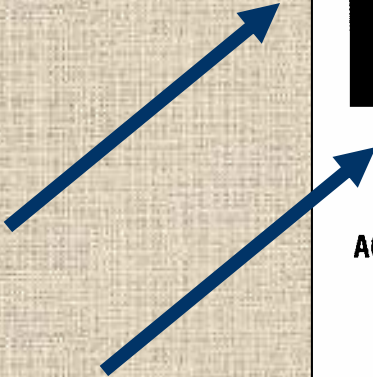
Highly toxic pesticides must be labeled with skull & crossbones.



# What's on a pesticide label?

product, brand  
or trade name

type of pesticide



**Banrot 8G**  
**Broad Spectrum Fungicide**

**ACTIVE INGREDIENTS:**

Etridiazole (5-Ethoxy-3-trichloromethyl-1,2,4-thiadiazole*) .....	3%
Thiophanate-methyl (Dimethyl [(1,2-phenylene) bis (iminocarbonothioyl)] bis [carbamate]) .....	5%
<b>INERT INGREDIENTS .....</b>	<b>92%</b>
<b>TOTAL</b>	<b>100%</b>

\*Licensed under U.S. Patents No. 3,260,588 and 3,260,725

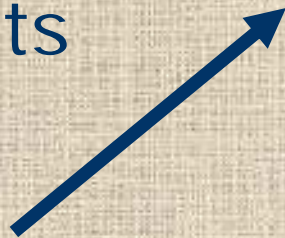
**KEEP OUT OF REACH OF CHILDREN**  
**CAUTION**

# What's on a pesticide label?

ingredients

active

inert



**Banrot 8 G**  
**Broad Spectrum Fungicide**

**ACTIVE INGREDIENTS:**  
Etridiazole (5-Ethoxy-3-trichloromethyl-1,2,4-thiadiazole\*) . . . . . 3%  
Thiophanate-methyl (Dimethyl [(1,2-phenylene) bis (iminocarbonothioyl)] bis [carbamate]) . . . . . 5%

**INERT INGREDIENTS** . . . . . 92%

**TOTAL** 100%

\*Licensed under U.S. Patents No. 3,260,588 and 3,260,725

**KEEP OUT OF REACH OF CHILDREN**  
**CAUTION**

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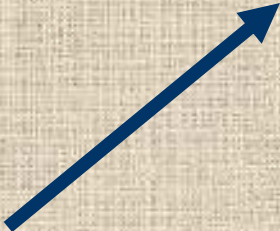
**KEEP OUT OF REACH OF CHILDREN**  
**CAUTION**

signal word



# What's on a pesticide label?

statement of practical  
treatment (first aid)



**KEEP OUT OF REACH OF CHILDREN**

**CAUTION**

**STATEMENT OF PRACTICAL TREATMENT**

**IF IN EYES:** Flush eyes with water for 15 minutes. **Get medical attention.**

**IF INHALED:** Induce coughing.

**IF ON SKIN:** Wash off with soap and water. If irritation persists, **get medical attention.**

**PRECAUTIONARY STATEMENTS**

**HAZARDS TO HUMANS AND DOMESTIC ANIMALS**

**CAUTION:** Harmful if **swallowed**. Avoid contact with skin, eyes or clothing. May cause irritation. Do not contaminate feed or food.

**PERSONAL PROTECTIVE EQUIPMENT**

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants.
- Waterproof gloves.
- Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

# What's on a pesticide label?

precautionary  
statements  
& hazards



## **USER SAFETY RECOMMENDATIONS:**

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

## **ENVIRONMENTAL HAZARDS**

**THIS PRODUCT IS TOXIC TO FISH.** Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water.

## **KEEP OUT OF REACH OF CHILDREN CAUTION**

### **STATEMENT OF PRACTICAL TREATMENT**

**IF IN EYES:** Flush eyes with water for 15 minutes. **Get medical attention.**

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### **PRECAUTIONARY STATEMENTS**

#### **HAZARDS TO HUMANS AND DOMESTIC ANIMALS**

**CAUTION: Harmful if swallowed.** Avoid contact with skin, eyes or clothing. May cause irritation. Do not contaminate feed or food.

### **PERSONAL PROTECTIVE EQUIPMENT**

Applicators and other handlers must wear:

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# What's on a pesticide label?

directions for use –  
methods of application

## **DIRECTIONS FOR USE**

**IT IS A VIOLATION OF FEDERAL LAW TO USE THIS PRODUCT IN A MANNER INCONSISTENT WITH ITS LABELING.**

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or Tribe, consult the agency responsible for pesticide regulation.

**BROADCAST AND SIDEDRESS APPLICATIONS:** Incorporate recommended amount of BANROT 8-G. When sidedressing, use sharp sand, calcined clay or similar diluent to achieve good distribution. Open furrow — apply product — close — firm with packer wheel and irrigate to activate. When broadcasting, distribute evenly using cyclone or drop spreader to apply recommended amount. Harrow or till into the soil to incorporate the granules into the upper 2 to 6 inches of soil.

**DRY SOIL MIX:** Incorporate recommended amount of BANROT 8-G in each cu. yd. when seeding or transplanting for control of Pythium, Phytophthora, Rhizoctonia, Fusarium and Thielaviopsis. Overdosage may result in phytotoxicity. If plants are suspected of being sensitive, apply fungicide to a small number to insure safety. Use in greenhouses and outdoors. Where applicable, incorporate BANROT 8-G **after** steam sterilization of soil mix.

# What's on a pesticide label?

days to harvest –  
time between application and harvest,  
determined by residue tolerance

mint

maintain control. DO NOT apply more than 3 times per season. DO NOT apply within 80 days of harvest. DO NOT feed fresh or extracted mint hay from treated fields to livestock. Based on available residue data, use of BRAVO 500 on mint is restricted to Indiana, Michigan, and Wisconsin.

onion

Use in sufficient water to obtain thorough coverage of tops. Begin applications prior to favorable infection periods and repeat at 7- to 10-day intervals for as long as conditions favor disease. Use the high rate and a 7-day schedule of applications when heavy dew or rain persist. DO NOT apply within 7 days of harvest on garlic. DO NOT apply more than 3 times per season or within 14 days of harvest on green bunching onions, leeks, or



# What's on a pesticide label?

## storage & disposal

### **STORAGE AND DISPOSAL**

**STORAGE:** Do not store near seeds or fertilizer. Keep container closed when not in use.

**PROHIBITIONS:** Do not contaminate water, food, or feed by storage or disposal. Open dumping is prohibited.

**PESTICIDE DISPOSAL:** Pesticide, spray mixture, or rinse water that cannot be used according to label instructions *must be disposed of according to applicable federal, State or local procedures.*

**CONTAINER DISPOSAL:** Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. Then dispose of liner in a sanitary landfill or by incineration if allowed by State and local authorities. If drum cannot be reused, dispose of in the same manner.



# What's on a pesticide label?

REI =  
restricted  
entry  
interval



**AGRICULTURAL USE REQUIREMENTS**

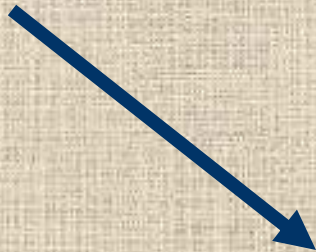
Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

**EXCEPTION:** If the product is soil-injected or soil-incorporated, the Worker Protection Standard, under certain circumstances, allows workers to enter the treated area if there will be no contact with anything that has been treated.

# What's on a pesticide label?

manufacturer



**EPA Reg. No. 58185-23**

**EPA Est. No. 62171-MS-1**

**Product of U.S.A.**

**NET WEIGHT: 40 LBS. (18 kg)**

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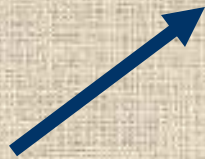
BANROT® is a registered trademark of Scotts-Sierra Crop Protection Company for its brand of Fungicide products.



Scotts-Sierra Crop Protection Company  
14111 Scottslawn Road  
Marysville, OH 43041  
**1-800-492-8255**

# What's on a pesticide label?

EPA  
registration  
&  
establishment  
numbers



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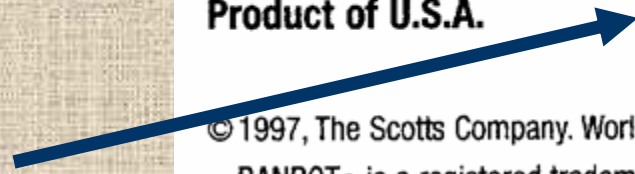
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# What's on a pesticide label?

net contents



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# Application methods

- Broadcast
- Spot treat
- Drench
- Band
- Dip
- Foliar
- Sidedress
- Aerial



# Equipment

duster



## advantages

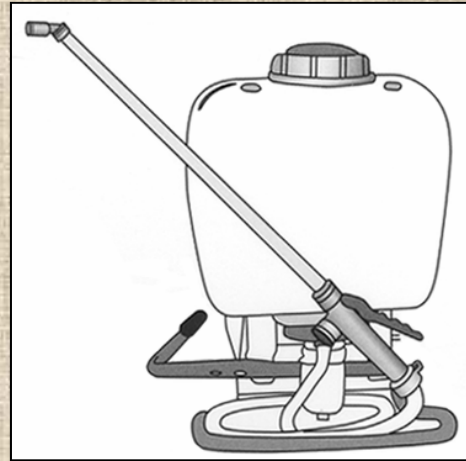
- lightweight
- inexpensive
- no water required
- reaches cracks & crevices

## disadvantages

- high likelihood of drift
- high visibility
- difficult to control

# Equipment

## hand held & backpack sprayers



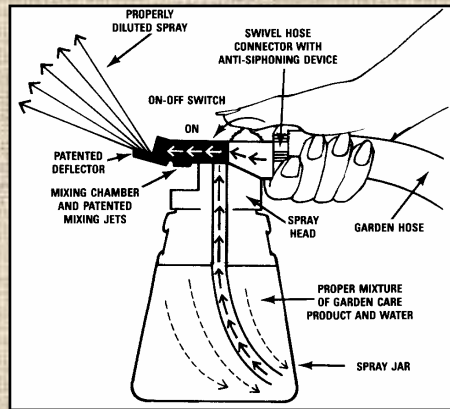
### advantages

- economical
- simple to operate
- easy to control spray

### disadvantages

- nozzles get clogged
- limited size (but heavy!)
- manual agitation req.

# Equipment



## hose-end sprayer

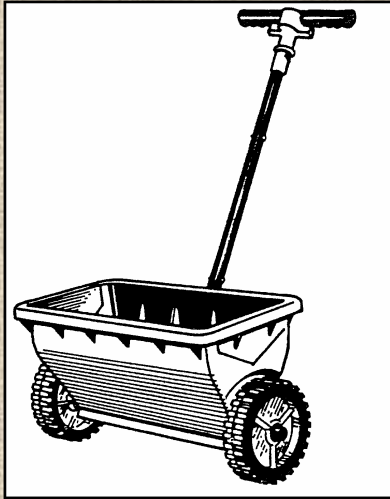
### advantages

- inexpensive
- good coverage
- easy to operate

### disadvantages

- requires garden hose
- calibration???
- high water volume = high pesticide usage

# Equipment



## drop & rotary spreaders

### advantages

- lightweight
- simple to operate
- easy to calibrate
- no water needed

### disadvantages


- limited use
- non-target contact
- openings get clogged

# Pesticide Formulations

**Merit<sup>®</sup> 75 WP**

**Scotts**  
**Zyban WSB**

**ZENECA** Ag Products  
**PIRIMOR<sup>®</sup> 50-DF**  
INSECTICIDE

**Surpass<sup>®</sup>**  **EC**  
Herbicide

# Liquid Formulations

- **Solution (S)**
  - Active ingredient (a.i.) in a liquid carrier
  - Applicator mixes it w/ water
  - Completely soluble in water
- **Ready-to-use (RTU)**
  - Low-concentrate formulation
  - Good for homeowners

# Liquid Formulations

- **Flowable (F) and Liquid (L)**
  - a.i. impregnated on clay, ground to a fine powder, powder suspended in small amount of liquid
  - Applicator mixes it w/water
  - Requires agitation to keep in suspension
  - Easily absorbed into skin
  - Thick formulation

# Liquid Formulations

- **Emulsifiable concentrate (EC)**
  - a.i. dissolved in oil, emulsifier added to enhance mixing
  - Applicator mixes it w/ water
  - Little agitation needed
  - Easily absorbed into skin
  - Cloudy when mixed with water

# Liquid Formulations

- **Aerosol**
  - a.i. mixed with a solvent
  - Ready to use - no mixing necessary
  - Low concentrate of a.i.
  - 2 types
    - RTU in pressurized sealed container
    - Smokes or fogs, not under pressure

# Dry Formulations

- Dust (D)
  - Low concentrate of a.i. mixed w/ clay, talc or ground nutshells
  - Used for seed treatments, spot treatments for cockroaches, flea control for pets
  - High potential for drift

# Dry Formulations

- Bait

- a.i. mixed with food, placed in a bait station (ant trap) or squeezed along cracks in buildings with a bait gun (pastes and gels)
- Used for control of ants, roaches, rodents, slugs

# Dry Formulations

- **Granule (G)**
  - Coarse particles of clay or nutshells containing a.i., large and heavy compared to dust
  - Applied to the soil (weeds, insects)
  - Applied to water (larval stage of mosquitoes)
  - Release a.i. slowly
- **Pellet (P)**
  - same as G but uniformly sized

# Dry Formulations

- **Wettable powder (WP)**
  - Finely ground like dust, high conc. of a.i.
  - contains wetting & dispersing agents
  - Mixed with water before using as a spray
  - Particles are suspended in water
  - Requires agitation to keep in suspension
  - Excellent residual activity
  - High risk of inhalation – very concentrated

# Dry Formulations

- Soluble powder (SP)
  - Similar to WP but dissolve into a true solution when mixed with water
  - Needs agitation to mix but stays in sol'n
  - High risk of inhalation – very concentrated

# Unique Formulations

- Microencapsulated (ME)
- Water-soluble packets or bags (WSB)
- Impregnates (pet collars)
- Pesticide/fertilizer combos (weed & feed)
- Fumigants
  - liquid under pressure turns to gas when released or solid that releases gas in high humidity

# Container Disposal

*"All pesticide containers shall be triple rinsed with an appropriate solvent...The rinsate and container shall be disposed of in a manner consistent with the **label directions** and in compliance with federal and state requirements."*

RSA 430:31 Pes 801:04

Usually, water is the solvent.

# Storage

- Follow directions on the label
- Label must be legible & attached to container
- Store away from food, seed & animal feed
- Keep away from children & pets
- Storage room should be dry & protected from temperature extremes

# Tank Mix

- Common examples
  - Fungicide and insecticide for fruit trees
  - Two herbicides for weed control
  - Insecticide and fertilizer for turf
- Compatibility
  - Usually pesticides with same formulations mix ok
  - Pesticides can be tank mixed if labels does not prohibit doing so