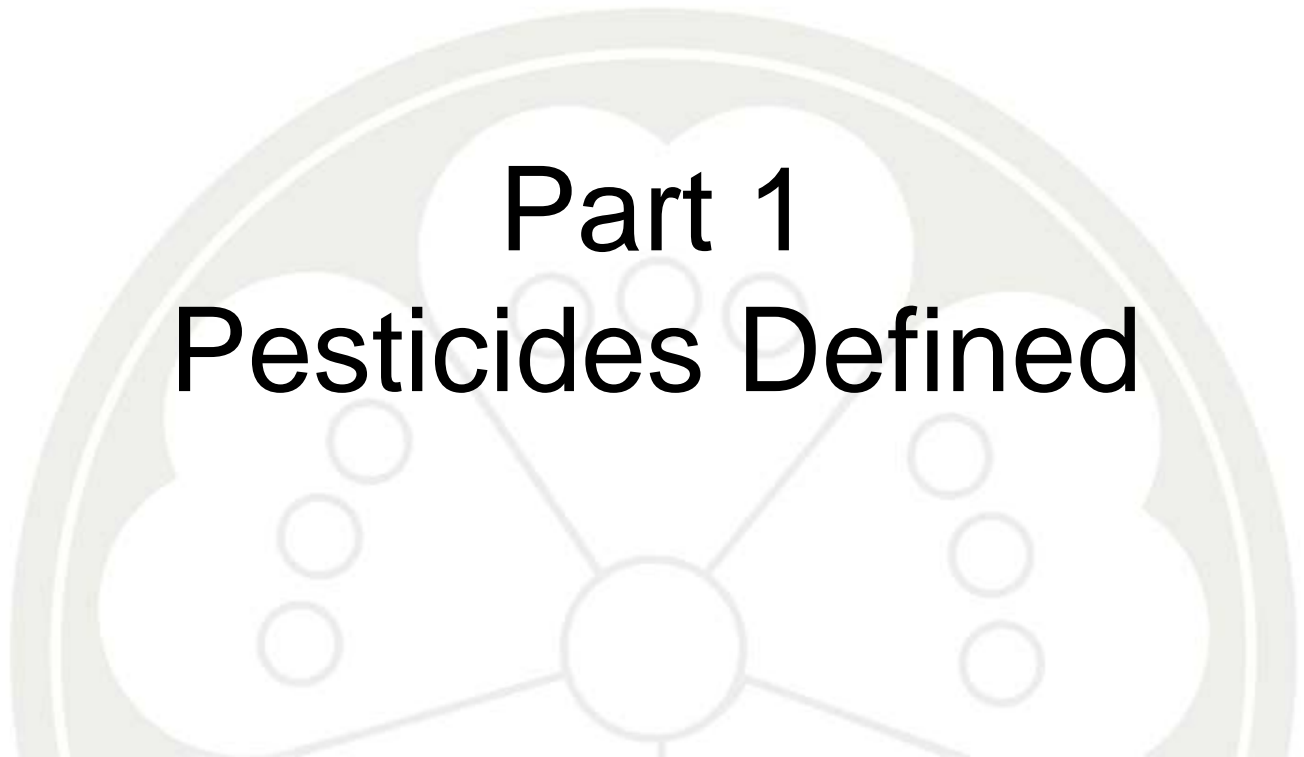




Understanding Pesticides

Part 1 Pesticides Defined



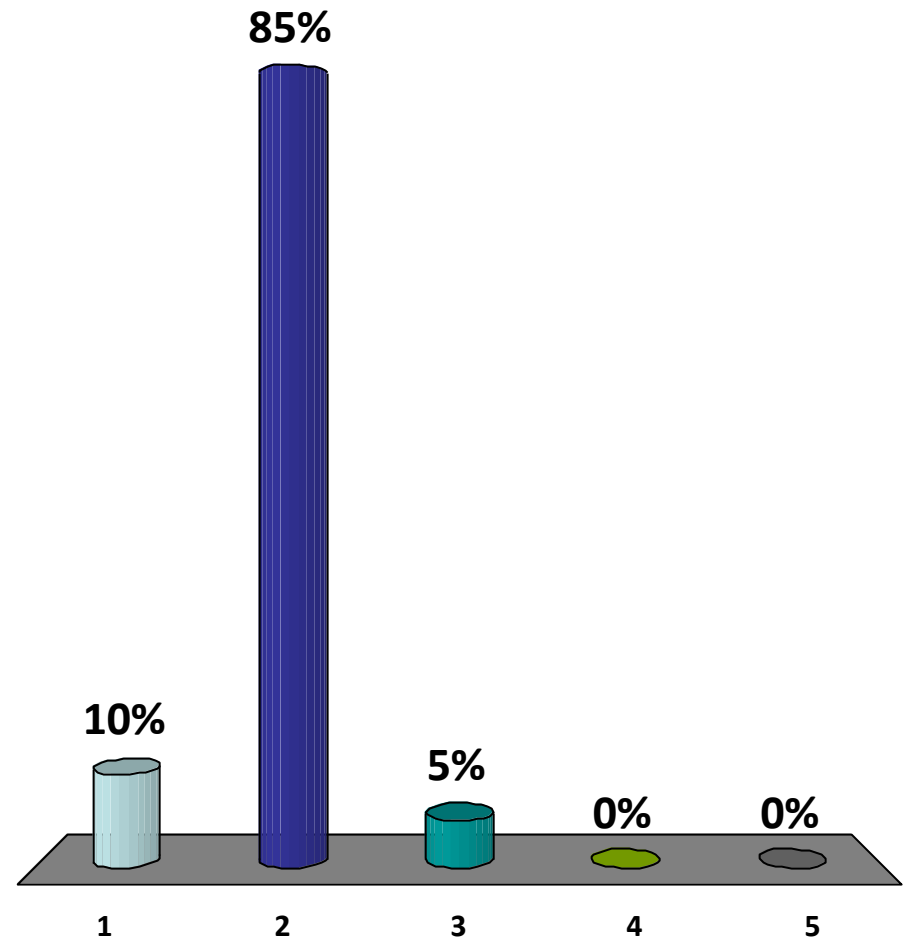
Disclaimer



- OSU Extension Service does not endorse the use of any of the products listed or mentioned in this module.
- Product trade names are listed purely to provide examples of certain types of pesticides that you may come across in your home and garden store.

Which Federal Agency Regulates Pesticides

1. Oregon Dept. of Agriculture
2. EPA
3. FIFRA
4. OWEB
5. None of the above



Federal **I**nsecticide, **F**ungicide and **R**odenticide **A**ct

Aka FIFRA, was the legislation first enacted in the 1947 to administer and regulate pesticides and their use.

FIFRA Provisions

- EPA regulates pesticides/uses
- EPA classifies Restricted Use Pesticides
- Allows each state to govern pesticides/uses with their own laws – may be more strict than federal program, but not less
- In our state, Pesticide use is regulated by Oregon Department of Agriculture (ODA)

What is a pesticide?



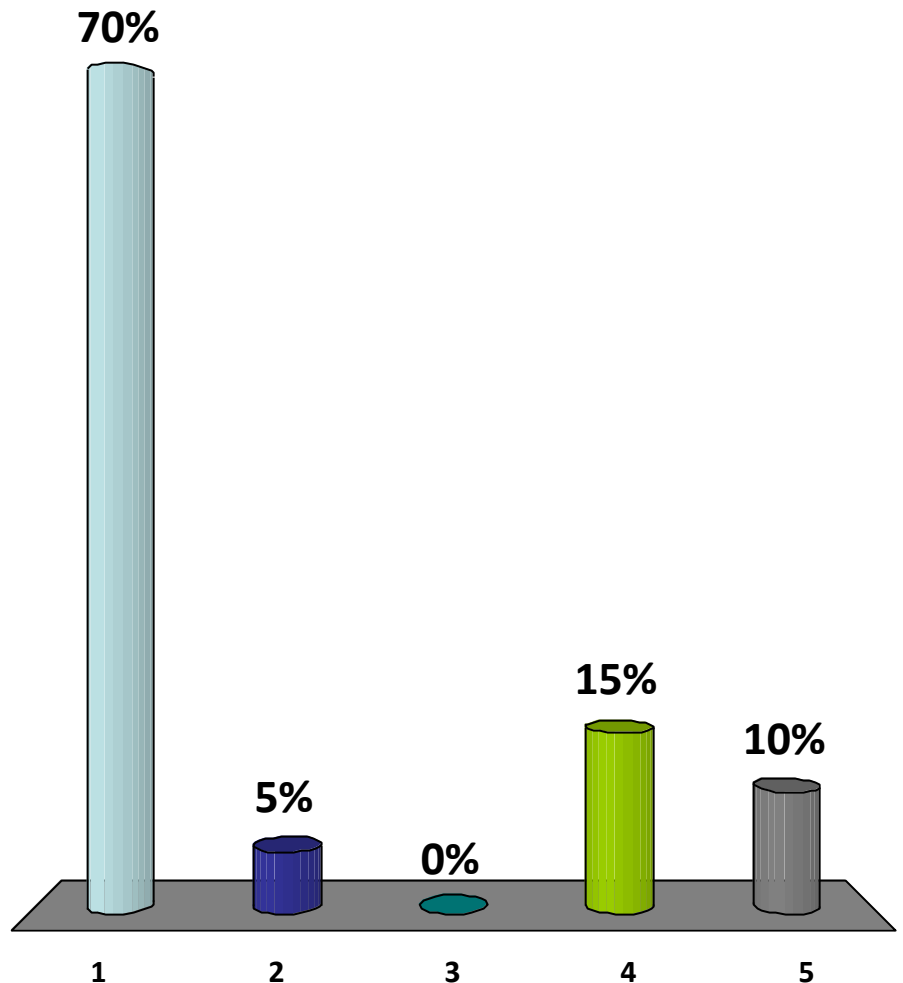
US Environmental Protection Agency definition:

A pesticide is any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.

- Pests can be
 - Insects, mice, or other animals
 - weeds
 - fungi, bacteria, & viruses

Which one of these is not a pesticide?

1. Home detergent
2. Rat bait
3. Roundup
4. Neem oil
5. Frontline plus



Types of Pesticides



- Acaricides/Miticides
- Bactericides
- Fungicides
- Herbicides
- Plant Growth Regulators (PGRs)
- Insecticides
- Larvicides
- Molluscicides
- Nematicides
- Rodenticides
- Scalecides
- Repellents

What is not a pesticide?



- Fertilizers and other substances used to promote plant growth and health (*when not combined with pesticides*).
 - This includes Mycorrhizal fungi.
 - This DOES NOT include weed and feed products
- Biological control agents (*except some microorganisms*).
 - This includes beneficial insects such as ladybugs, parasitoids and nematodes that eat insect pests.
 - This does not include *Bacillus thuringiensis*, spinosad, etc., which are regulated as pesticides.

Minimum Risk Pesticides



- Products listed as “Minimum Risk Pesticides” by the Environmental Protection Agency (EPA) are exempt from the requirements of FIFRA. These products...
 - Do not have an EPA Registration Number
 - Must be labeled with:
 - The name and weight percent of each active ingredient
 - The name of each inert ingredient
- Examples: castor oil, corn gluten meal, citronella
- A complete list of Minimum Risk Pesticides can be viewed at:
 - http://www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm
 - Note: products on this list may or may not be considered *organic*.

Pesticide Formulations



- The formulation describes the physical attributes of a pesticide product. It is comprised of:
 - active ingredient(s) (ai)
 - Inert ingredients
- *The formulation of a pesticide can have significant implications for safety and effective use.*

Pesticide Ingredients



- **ACTIVE** – responsible for killing the pest
- **INERT** – makes the formulation safer, more effective and easier to handle
- **ADJUVANT** – may or may not already be present in the product; used for the same reason as the inert ingredients

Pesticide Formulations for Home Use

- Liquids
 - Aerosols (A)
 - Solutions (S)
 - Emulsifiable Concentrates (E or EC)
 - Liquid Concentrates (C or LC)
 - Ready-To-Use (RTU)

Raid™ House and Garden – an Aerosol (A) pesticide that is effective against a wide range of insects



Pesticide Formulations for Home Use

- Solids
 - Baits (B)
 - Dusts (D)
 - Granules (G)
 - Pellets (P or PS)



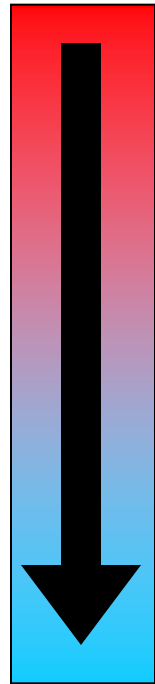
Dipel™ – a Dust (D) pesticide for control of chewing caterpillars



Sluggo™ – a Bait (B) pesticide for control of slugs and snails

Relative Safety Hazards

Most Risk



Less Risk

- ← commercial (many, not all)
- ← Emulsifiable Concentrates
- ← Liquid Concentrates
- ← Aerosols, RTU's
- ← Dusts
- ← Granules
- ← Baits, Pellets

Terms Used to Describe Pesticides



- Commercial/home use
- Organic/Synthetic
- Broad/narrow spectrum
- Contact/Systemic/Residual
- Curative/Protectant
- Preemergent/Postemergent
- Pesticide Class/Family

Pesticide Terminology



- Commercial - Restricted Use Pesticides (RUPs)
 - or are packaged in quantities that are too large (and too expensive!) for home use
- Home - not designated as RUPs and are readily available in small packaging.
 - Some non-RUP pesticides have labels preclude use by unlicensed applicators

Organic and Synthetic

- Organic: Derived from an organic source
 - Botanicals (pyrethrum, Neem™, Rotenone™)
 - Microbials (Bt sprays)
 - Naturalytes (Spinosad™)
from actinomycetes
- Synthetic: Manufactured pesticides



Synthetic
Pyrethroid



Organic
Pyrethrin

Broad Spectrum / Non-Selective

- Controls a wide range of pest organisms
 - Organophosphates (a.i. malathion)
 - Carbamates (a.i. carbaryl (or sevin), methomyl)



Examples of Broad Spectrum Insecticides

Narrow Spectrum / Selective

- Controls a narrow range of pest organisms
 - Insect Growth Regulators (Intrepid™),
 - *Bacillus thuringiensis* (*B.t.*), Bt-k (Dipel™) and Bt-t (Novodor™)



Colorado potato beetle
Leptinotarsa decemlineata.
Bt-t toxin is effective against
This pest of potatoes, tomatoes
and other solanaceous crops

Contact Pesticide



- Pesticide must be sprayed or applied directly on the target (weed, disease, insect, etc.).
 - e.g., pyrethrins, pyrethroids



Short Term versus Residual

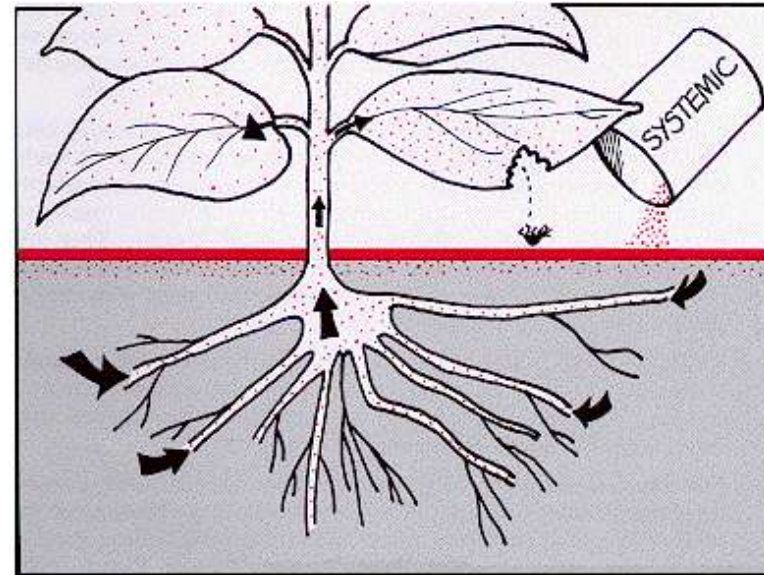


- Short Term
 - Pesticide quickly breaks down into nontoxic by products e.g. pyrethrins
- Residual
 - Pesticide will persist after application, offering control for a period of time.
 - Control of termites in wooden structures (**Termidor**)
 - CasoronTM (a.i. dichlobenil): long term control of weeds
 - Delta DustTM (a.i. deltamethrin): long term control of insects

Systemic Pesticide



- Pesticide is translocated throughout the target plant
- Protection (fungicides, insecticides)
 - Imidacloprid - insecticide
 - Disulfoton - insecticide
- Remediation (herbicides)
 - Glyphosate (e.g. Roundup™ and Finale™)



Pesticide Terminology



- Curative / Eradicant - can kill target pests if present.
 - e.g., Funginex™ (a.i. triforine) for scab and rust eradication
- Protectant - protects healthy plant parts from attack by pest organisms.
 - e.g., Daconil™ (a.i. chlorothalonil) or sulfur

Pesticide Terminology



- Preemergent
 - Prior to emergence.
 - e.g., Preen™ (a.i. trifluralin)
- Postemergent
 - After emergence (weeds *or* plants).
 - Roundup™ (a.i. glyphosate)



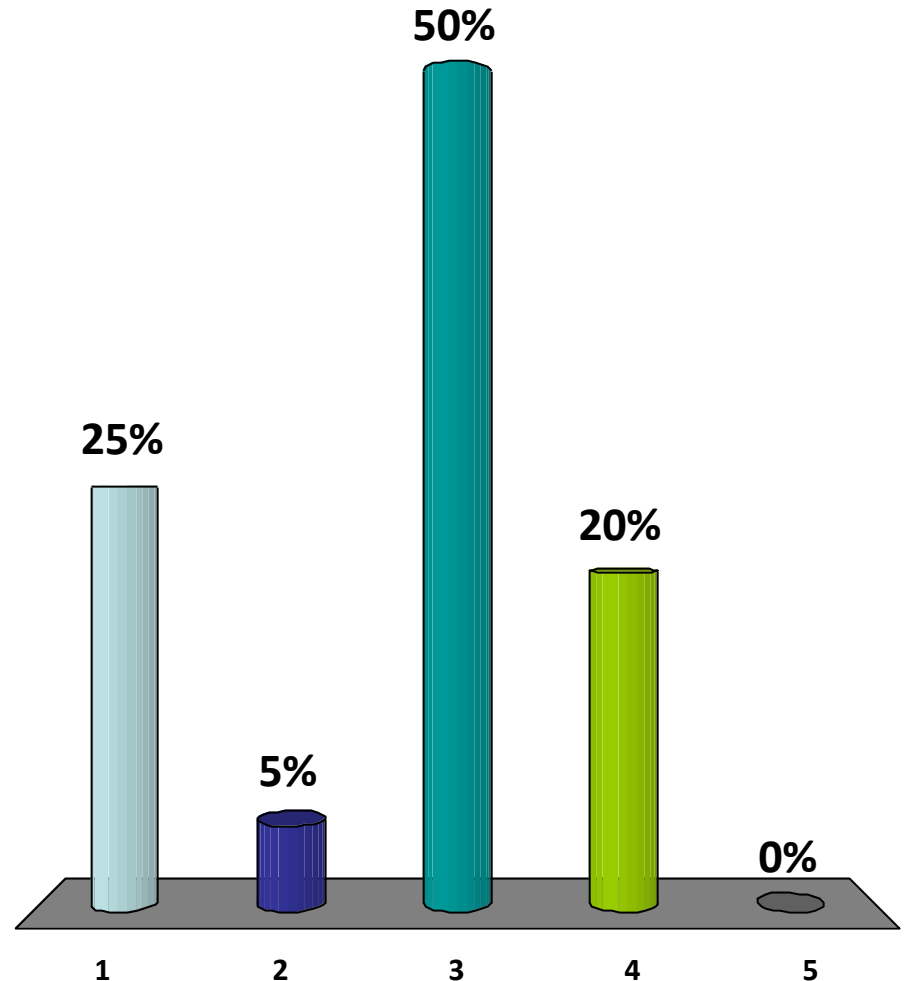
Understanding Pesticides

Part 2 Hazards and Risks



If you took a large dose of Tylenol all at once, what toxicity can you induce?

1. Instant toxicity
2. Chronic toxicity
3. Acute toxicity
4. Delayed toxicity
5. None of the above



Toxicity



- Acute toxicity – damage resulting from a one-time or limited exposure.
- Chronic toxicity – damage resulting from long-term (repeated) exposure.
 - Carcinogenicity
 - Mutagenicity
 - Teratogenicity
 - Oncogenicity
 - Liver Damage
 - Reproductive Disorders
 - Nerve Damage
 - Allergenic sensitization

How is toxicity determined?



- Acute toxicity is usually determined by animal testing in a *dose-response study*.
 - LOEL = Lowest Observed Effect Level
 - Lowest dose with any observable effect.
 - NOEL = No Observed Effect Level
 - Highest dose with no observable effect.
 - Basis for tolerances (residue levels in food or feed crops).
 - LD₅₀ = “lethal dose fifty”
 - Dose that killed half of the test animals.
 - Basis for *Signal Words* on pesticide labels.
 - The smaller this number, the more poisonous the pesticide.

Examples of LD₅₀



- Table salt 3750 mg/kg
- Aspirin 1750 mg/kg
- Diazinon 1250 mg/kg
- Caffeine 200 mg/kg
- Rotenone 130 mg/kg
- Nicotine 55 mg/kg

The smaller this number, the more poisonous the substance.

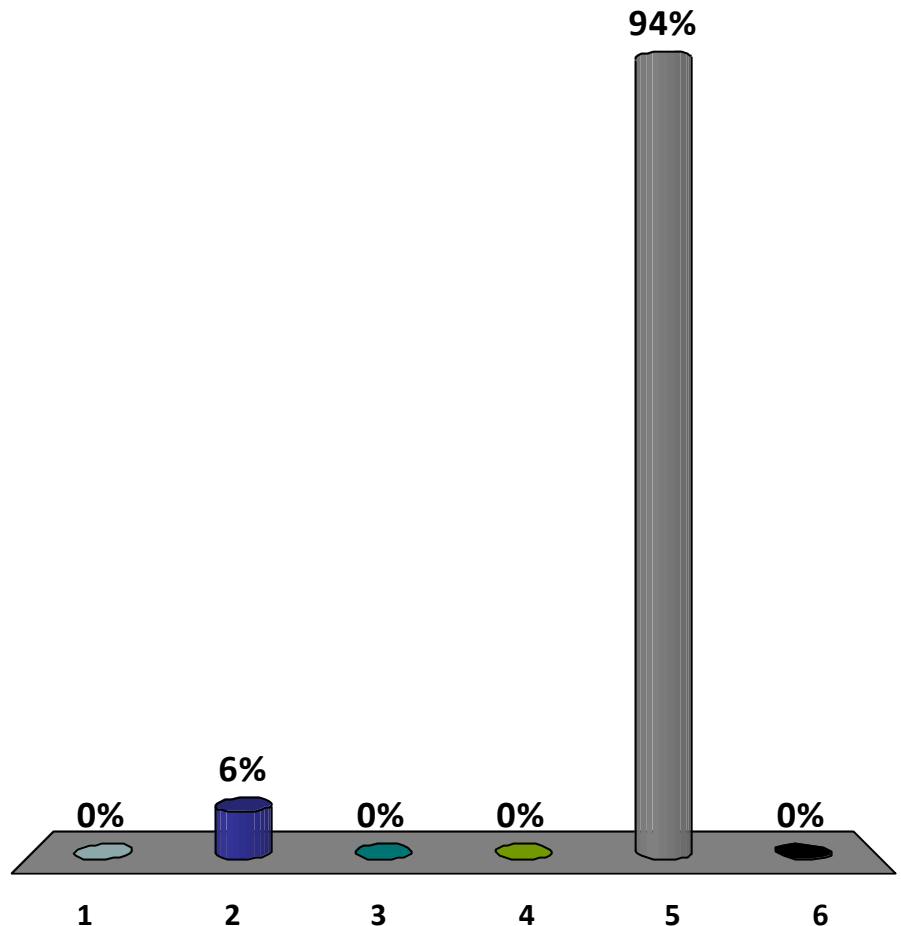
How much is that?



- LD₅₀ values for a 175 lb (80 kg) person:
 - table salt 3750 mg/kg = 300 g
 - aspirin 1750 mg/kg = 140 g
 - diazinon 1250 mg/kg = 100 g
 - ➔ – caffeine 200 mg/kg = 16 g = 160 cups
 - rotenone 130 mg/kg = 10.4 g
 - nicotine 55 mg/kg = 4.4 g

What are the common routes of entry of pesticides for humans?

1. Oral
2. Dermal
3. Inhalation
4. Ocular
5. All of the above
6. None of the above



Routes of Entry



- There are 4 main routes:
 - Dermal
 - Inhalation
 - Ocular
 - Oral
- Dermal and inhalation are the most common routes of pesticide exposure.
- Once a pesticide enters your body, it doesn't matter how it got there!
- Symptoms of pesticide poisoning can be removed from the point of contact (e.g., systemic).

Signal Words*

- **DANGER/POISON** - Extremely Toxic
- **DANGER** – highly toxic
- **WARNING** – moderately toxic
- **CAUTION** – slightly toxic

***Acute toxicity**

Signal Words



| | Caution (Cat. IV) | Caution (Cat. III) | Warning (Cat. II) | Danger Danger – Poison (Cat. I) |
|--------------------------------|----------------------|------------------------|----------------------|--|
| Oral LD ₅₀ | > 5000 mg/kg | 500-5000 mg/kg | 50-500 mg/kg | < 50 mg/kg |
| Inhalation LD ₅₀ | > 20 mg/l | 2-20 mg/l | 0.2-2 mg/l | < 0.2 mg/l |
| Dermal LD ₅₀ | > 5000 mg/kg | 2000-5000 mg/kg | 200-2000 mg/kg | < 200 mg/kg |
| Eye Effects | No Irritation | Reverses in 7 Days | More than 7 Days | Corrosive |
| Skin Effects | Mild Irritation | Moderate Irritation | Severe Irritation | Corrosive |

Risk



- **Risk = toxicity x exposure**
 - High toxicity x good management = Low risk
 - Low toxicity x poor management = High risk
 - Zero exposure = zero risk

Common Symptoms of Pesticide Poisoning



Mild or early symptoms:

- Fatigue
- Headache
- Dizziness
- Blurred vision
- Excessive sweating
- Excessive salivation
- Nausea and vomiting
- Stomach cramps
- Diarrhea

Moderate symptoms:

- Inability to walk
- Weakness
- Chest discomfort
- Muscle twitches
- Pupil constriction

Severe symptoms:

- Unconsciousness
- Convulsions
- Difficulty breathing
- Death

Pesticide Poisoning



- Plainly and simply, beware of ANY unusual symptoms!
- Read labels carefully prior to use so that you know what to expect and how symptoms may be treated.
 - Statement of practical treatment
- Call 911 for immediate medical attention
 - Keep label accessible
 - EPA registration number
- Poison Control Center: 1-800-222-1222



Understanding Pesticides

Part 3 The Product Label

Pesticide Labels



- Brand name
- Product/Trade name
- Chemical name
- Ingredient statement
- Type of formulation
- Net contents
- Name and address of manufacturer
- Registration number
- Establishment number
- Precautionary statements
- Environmental hazards
- Physical & chemical hazards
- Signal words and symbols
- Statement of practical treatment
- Directions for use
- Preharvest interval
- Restricted entry interval
- Storage & disposal directions
- Misuse statement

The format of pesticide labels is not standard!

Labels/Labeling*

- Label – on or attached to the container
- Labeling – label plus other manufacturer information
- *must be approved by and registered with EPA

Pesticide Names



- Several names appear on pesticide labels:
 - Brand name/Product/Trade name (e.g., Sevin™, Roundup™)
 - Common chemical name (e.g., carbaryl)
 - International Union of Pure and Applied Chemistry (IUPAC) chemical name e.g. 1-naphthyl N-methylcarbamate
- Different manufacturers may market the same active ingredient under different trade names.
- Never choose or recommend products based on brand or trade names alone. Read the active ingredients on the label.

MATERIAL SAFETY DATA SHEET

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

FORMULATED FOR:

Loveland Products, Inc.
P.O. Box 1286 • Greeley, CO 80632-1286

PRODUCT NAME: MIRAGE® HERBICIDE 41%
CHEMICAL NAME: Glyphosate: Isopropylamine salt of N-(phosphonomethyl) glycine
CHEMICAL FAMILY: Herbicide
EPA REG. NO.: 524-445-34704
MSDS Number: 524445-05-LPI **MSDS Revisions:** Section 16

1.0 INGREDIENTS

Roundup

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine,
in the form of its isopropylamine salt 41.0%

OTHER INGREDIENTS: 59.0%
100.0%

*Contains 480 grams per litre or 4 pounds per U.S. gallon of the active ingredient glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

No license granted under any non-U.S. patent(s).

Parts of the Label



Brand Name



glyphosate

Parts of the Label – Signal Words



Signal Words*

- **DANGER/POISON** - Extremely Toxic
- **DANGER** – highly toxic
- **WARNING** – moderately toxic
- **CAUTION** – slightly toxic

*Acute toxicity

Generic Product Label



PRODUCT NAME

DIRECTIONS FOR USE

It is a violation of federal law to use
this product in a manner inconsistent
with its labeling.

PRECAUTIONARY STATEMENTS HAZARD TO HUMANS (AND DOMESTIC ANIMALS) DANGER

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL HAZARDS

STORAGE AND DISPOSAL

STORAGE _____

DISPOSAL _____

KEEP OUT OF THE REACH OF CHILDREN DANGER

FIRST AID

(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____

IF INHALED _____

IF IN EYES _____

IF ON SKIN _____

ACTIVE INGREDIENTS: _____%

OTHER (INERT) INGREDIENTS: _____%

TOTAL: _____

100.00%

THIS PRODUCT ...
CONTAINS XX LBS.
OF XXXX PER GALLON

WARRANTY STATEMENT

MANUFACTURER'S
ADDRESS _____

NET WT. / NET CONTENTS STATEMENT: _____

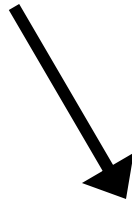
EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Directions for Use



- What the product controls
- Where, when and how to use
- Booklet or toll free number may be given for consumers use and information



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
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with its labeling.

PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL
HAZARDS

STORAGE AND
DISPOSAL

STORAGE _____

DISPOSAL _____

KEEP OUT OF THE
REACH OF CHILDREN
DANGER

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____
100.00%

THIS PRODUCT _____ **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

MANUFACTURER'S _____
ADDRESS _____

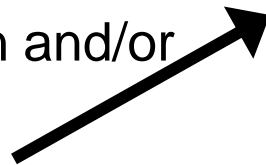
NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Precautionary Statements

- Potential hazards to people and pets
- Steps you can take to reduce hazards
- May include information on how to protect children and/or pets



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use this product in a manner inconsistent with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL HAZARDS

STORAGE AND DISPOSAL

STORAGE

DISPOSAL

**KEEP OUT OF THE REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT _____ **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

MANUFACTURER'S ADDRESS _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Environmental Hazards



PRODUCT NAME

If the product is potentially harmful to wildlife, fish, endangered plants or animals, or may adversely impact wetlands and water resources.



DIRECTIONS FOR USE
It is a violation of federal law to use this product in a manner inconsistent with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

**PHYSICAL OR CHEMICAL
HAZARDS**

**STORAGE AND
DISPOSAL**

STORAGE _____

DISPOSAL _____

**KEEP OUT OF THE
REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT _____ WARRANTY STATEMENT
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

MANUFACTURER'S
ADDRESS _____

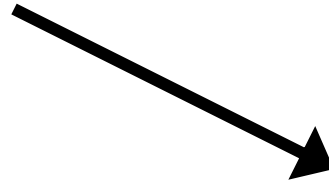
NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Physical and Chemical Hazards

Notes hazards such as
Corrosiveness or flammability



| PRODUCT NAME | |
|---|--|
| DIRECTIONS FOR USE It is a violation of federal law to use this product in a manner inconsistent with its labeling. _____ _____ | KEEP OUT OF THE REACH OF CHILDREN DANGER |
| PRECAUTIONARY STATEMENTS HAZARD TO HUMANS (AND DOMESTIC ANIMALS) DANGER _____ _____ | |
| ENVIRONMENTAL HAZARDS _____ _____ | |
| PHYSICAL OR CHEMICAL HAZARDS _____ _____ | FIRST AID (STATEMENT OF PRACTICAL TREATMENT) IF SWALLOWED _____ IF INHALED _____ IF IN EYES _____ IF ON SKIN _____ |
| STORAGE AND DISPOSAL STORAGE _____ _____ DISPOSAL _____ _____ | ACTIVE INGREDIENTS: _____ % OTHER (INERT) INGREDIENTS: _____ % TOTAL: _____ 100.00% |
| | THIS PRODUCT _____ WARRANTY STATEMENT CONTAINS XX LBS. _____ OF XXXX PER GALLON _____ |
| | MANUFACTURER'S ADDRESS _____ _____ |
| | NET WT. / NET CONTENTS STATEMENT: _____ |
| | EPA Registration No. / EPA Reg. No: _____ |
| | EPA Establishment No. / EPA Est. No: _____ |

Storage and Disposal Instructions

PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
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with its labeling.

PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
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DANGER

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL
HAZARDS

STORAGE AND
DISPOSAL

STORAGE

DISPOSAL

KEEP OUT OF THE
REACH OF CHILDREN
DANGER

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____
100.00%

THIS PRODUCT ... **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

MANUFACTURER'S _____
ADDRESS _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

- How best to store the product
- What to do with unused product
- What to do with the empty container



Signal Word



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
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with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

**PHYSICAL OR CHEMICAL
HAZARDS**

**STORAGE AND
DISPOSAL**

STORAGE _____

DISPOSAL _____

**KEEP OUT OF THE
REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____
100.00%

THIS PRODUCT _____ **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

**MANUFACTURER'S
ADDRESS** _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

One of three danger words:

- (1) Caution
- (2) Warning
- (3) Danger or Danger Poison

These words represent the product's potential hazards to humans.

Caution is least hazardous.
Danger Poison is the most hazardous.

Statement of First Aid



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
this product in a manner inconsistent
with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

**PHYSICAL OR CHEMICAL
HAZARDS**

**STORAGE AND
DISPOSAL**

STORAGE

DISPOSAL

**KEEP OUT OF THE
REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED

IF INHALED

IF IN EYES

IF ON SKIN

ACTIVE INGREDIENTS:

 %

OTHER (INERT) INGREDIENTS:

 %

TOTAL:

 100.00%

THIS PRODUCT **WARRANTY STATEMENT**
CONTAINS XX LBS.

OF XXXX PER GALLON

**MANUFACTURER'S
ADDRESS**

NET WT. / NET CONTENTS STATEMENT:

EPA Registration No. / EPA Reg. No:

EPA Establishment No. / EPA Est. No:

What to do if someone swallows, breathes or contacts the product, or gets the product on their skin or in their eyes

A 'Note to Physicians', which provides Drs. with specific information, may also be included.

Ingredients Statement – Active Ingredients

PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use this product in a manner inconsistent with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL HAZARDS

STORAGE AND DISPOSAL

STORAGE

DISPOSAL

**KEEP OUT OF THE REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT ... **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

MANUFACTURER'S ADDRESS _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Identifies the 'active ingredient(s)', which is/are the ingredient(s) that control the pest.

Ingredients Statement - Inert Ingredients



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use this product in a manner inconsistent with its labeling.

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HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

PHYSICAL OR CHEMICAL HAZARDS

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STORAGE

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FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED
IF INHALED
IF IN EYES
IF ON SKIN

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT CONTAINS XX LBS. OF XXXX PER GALLON

WARRANTY STATEMENT

MANUFACTURER'S ADDRESS

NET WT. / NET CONTENTS STATEMENT:

EPA Registration No. / EPA Reg. No:

EPA Establishment No. / EPA Est. No:

Gives the % of other/inert ingredients
These ingredients do not control the pest, but serves another purpose. This purpose may be to dissolve the active ingredient(s) or to affect how the product works.



Warranty Statement



PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
this product in a manner inconsistent
with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

**PHYSICAL OR CHEMICAL
HAZARDS**

**STORAGE AND
DISPOSAL**

STORAGE _____

DISPOSAL _____

**KEEP OUT OF THE
REACH OF CHILDREN
DANGER**

FIRST AID
(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
IF IN EYES _____
IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____
100.00%

THIS PRODUCT ... **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

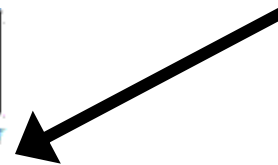
**MANUFACTURER'S
ADDRESS** _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Statement intended to limit a company's liability, or to act as a disclaimer, or to act as a product warranty.



Contact Information of Manufacturer or Distributor

PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use this product in a manner inconsistent with its labeling.

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HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
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 %
TOTAL:

 100.00%

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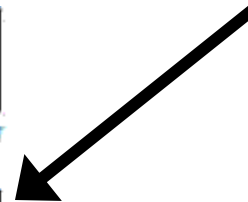
**MANUFACTURER'S
ADDRESS**

NET WT. / NET CONTENTS STATEMENT:

EPA Registration No. / EPA Reg. No:

EPA Establishment No. / EPA Est. No:

Name, address and sometimes phone number of the manufacturer or distributor.



Net Contents Statement

PRODUCT NAME

DIRECTIONS FOR USE
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this product in a manner inconsistent
with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
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OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT _____ **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

**MANUFACTURER'S
ADDRESS** _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

Identifies how much pesticide product is in the container.



EPA Registration Number

PRODUCT NAME

DIRECTIONS FOR USE
It is a violation of federal law to use
this product in a manner inconsistent
with its labeling.

**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS
(AND DOMESTIC ANIMALS)
DANGER**

ENVIRONMENTAL HAZARDS

**PHYSICAL OR CHEMICAL
HAZARDS**

**STORAGE AND
DISPOSAL**

STORAGE _____

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(STATEMENT OF PRACTICAL TREATMENT)

IF SWALLOWED _____
IF INHALED _____
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IF ON SKIN _____

ACTIVE INGREDIENTS: _____ %
OTHER (INERT) INGREDIENTS: _____ %
TOTAL: _____ 100.00%

THIS PRODUCT _____ **WARRANTY STATEMENT**
CONTAINS XX LBS. _____
OF XXXX PER GALLON _____

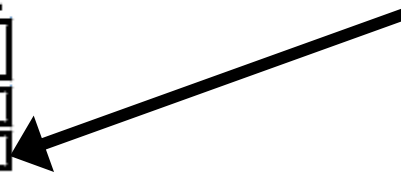
**MANUFACTURER'S
ADDRESS** _____

NET WT. / NET CONTENTS STATEMENT: _____

EPA Registration No. / EPA Reg. No: _____

EPA Establishment No. / EPA Est. No: _____

EPA Registration Number



EPA Establishment Number

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IF ON SKIN

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OTHER (INERT) INGREDIENTS:

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TOTAL:

 100.00%

THIS PRODUCT **WARRANTY STATEMENT**
CONTAINS XX LBS.

OF XXXX PER GALLON

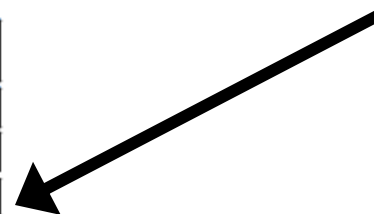
**MANUFACTURER'S
ADDRESS**

NET WT. / NET CONTENTS STATEMENT:

EPA Registration No. / EPA Reg. No:

EPA Establishment No. / EPA Est. No:

EPA Establishment Number



Common Label Violations



- If a little is good, more is better.
- If the label says it works great in the driveway, it should be dynamite in the garden!
- If it says to use it every 2 weeks, it should work even better every week!
- There's just a little bit left over...I'll pour it down the drain.
- Gloves are for sissies.

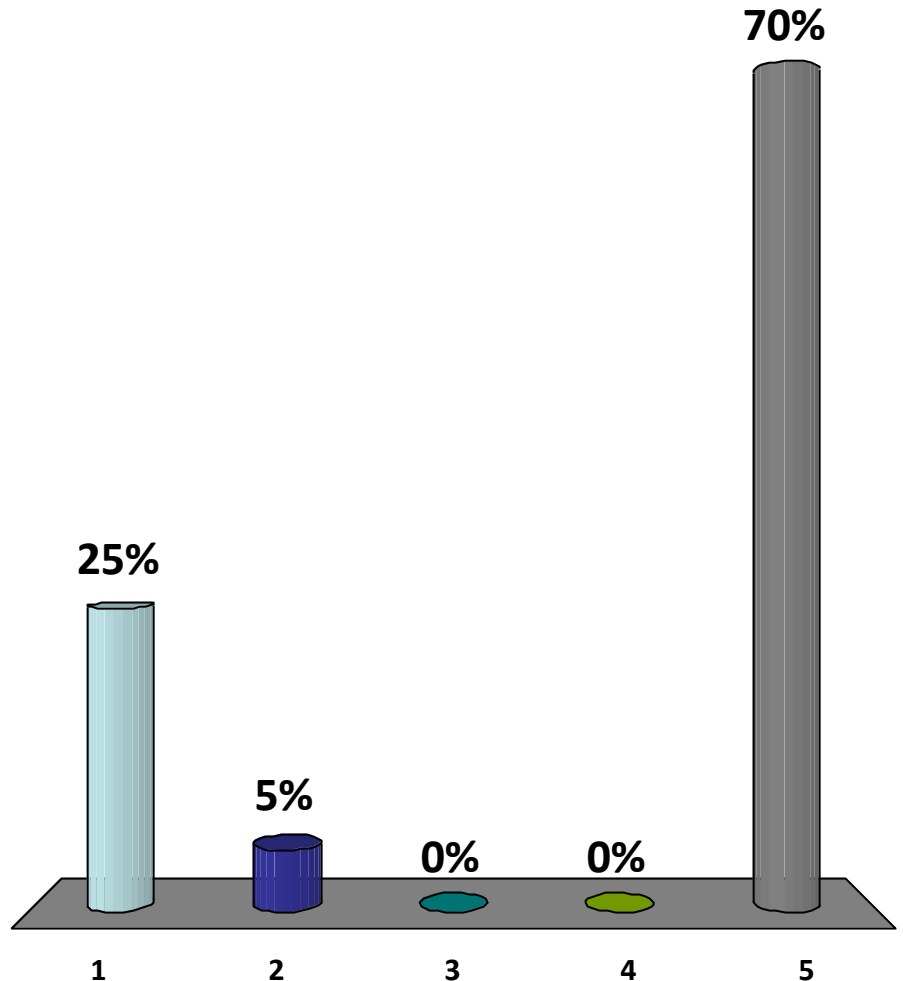
What you can do...



- Apply at a dose, concentration or frequency less than that listed on the label, but never more!
- Use any appropriate equipment not specifically prohibited by the label.
- Apply a pesticide for a pest not listed on the label if the plant or other target is listed.
- Mix with pesticide(s) and/or fertilizer(s) not specifically prohibited.
 - Always test for compatibility!

When should you read the label?

1. Before purchase
2. Before using product
3. Before storing product
4. Before disposing of product
5. All of the above



The Pesticide Label



- Read the label...
 - Before purchasing the product.
 - Before using the product.
 - Before storing the product.
 - Before disposing of the product or empty container.



Understanding Pesticides

Part 4

Equipment – PPE and Applicators

Personal Protective Equipment (PPE)



- Apparel and devices worn to protect the body from contact with pesticides.
- PPE includes:
 - Coveralls
 - Chemical-resistant suits, gloves, footwear
 - Protective eyewear
 - Respirators
- You are legally required to follow all PPE instructions on the label.
 - Label will commonly require “long-sleeved shirt and long pants” (not defined as PPE).

Personal Protective Equipment



Types of Clothing

- **Chemical resistant**
 - Rubber, neoprene
 - Plastic
 - Non-woven fabric (coated with plastic)
- **Non-chemical resistant**
 - Cotton
 - Leather
 - Canvas

Pesticide labeling will instruct you on the personal protective equipment that you need to wear when mixing, handling and applying



**The use of chemical-resistant gloves can
reduce dermal exposure by as much as
99%**



For most pesticides, plastic disposable gloves will provide adequate protection.



**Boots come in a variety of materials and styles.
Consider using chemical-resistant materials
when there is a chance that pesticides,
especially concentrates, will get on your feet.**



**PVC boots
provide best
protection**

Remember: clothing articles made of canvas, denim and leather absorb pesticides. You can do yourself more harm than good when wearing these and applying pesticides.



When the label calls for protective eyewear, choose safety glasses, goggles or a face shield. Regular **eyeglasses are *not* protective eyewear!**



Always wash pesticide-tainted work clothes separately from the family laundry.



If possible, line-dry clothing that is used in pesticide applications. Sunlight helps to break down any pesticide residues that may remain in clothing.





PPE Demonstration

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

| | |
|--------------------------------|---|
| ENGINEERING CONTROLS: | When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets with requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40CFR 170.240 (d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS. |
| RESPIRATORY PROTECTION: | Not normally required, if mists/vapors exceed acceptable levels, wear a NIOSH approved pesticide respirator for organic vapor and dust/mist. |
| EYE PROTECTION: | Chemical goggles or shielded safety glasses. |
| SKIN PROTECTION: | Wear protective clothing: long-sleeved shirts and pants, hat, shoes plus socks. Wear rubber or chemical-resistant gloves. |

| | OSHA PEL 8 hr TWA | ACGIH TLV-TWA |
|-------------|--------------------------|----------------------|
| For product | none established | none established |

Personal Protective Equipment (PPE): Applicators and other handlers must wear: long sleeved shirt and long pants, shoes plus socks, and protective eyewear. Discard clothing and other absorbent material that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. 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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some of the materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for Category A on an EPA chemical-resistance category selection chart.

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants.
- Chemical-resistant **gloves** (Category A) made of materials such as butyl rubber ≥ 14 mils, natural rubber ≥ 14 mils, neoprene rubber ≥ 14 mils, or nitrile rubber ≥ 14 mils
- Shoes plus socks.

EPA Chemical Resistance Category Selection Chart

For use when PPE section on pesticide label lists a chemical resistance category

| Selection Category Listed on Pesticide Label | Type of Personal Protective Material | | | | | | | |
|--|--------------------------------------|--------------------------------|----------------------------------|-----------------------------------|-----------------------------------|--------------|--|-------------------------|
| | Barrier Laminate | Butyl Rubber > or = 14 mils | Nitrile Rubber > or = 14 mils | Neoprene Rubber > or = 14 mils | Natural Rubber* > or = 14 mils | Polyethylene | Polyvinyl chloride (PVC) > or = 14 mils | Viton > or = 14 mils |
| A (dry and water-based formulations) | high | high | high | high | high | high | high | high |
| B | high | high | slight | slight | none | slight | slight | slight |
| C | high | high | high | high | moderate | moderate | high | high |
| D | high | high | moderate | moderate | none | none | none | slight |
| E | high | slight | high | high | slight | none | moderate | high |
| F | high | high | high | moderate | slight | none | slight | high |
| G | high | slight | slight | slight | none | none | none | high |
| H | high | slight | slight | slight | none | none | none | high |

* includes natural rubber blends and laminates

HIGH: Highly chemical-resistant. Clean or replace PPE at end of each day's work period. Rinse off pesticides at rest breaks.

MODERATE: Moderately chemical-resistant. Clean or replace PPE within an hour or two of contact.

SLIGHT: Slightly chemical-resistant. Clean or replace PPE within 10 minutes of contact.

NONE: No chemical-resistance. Do not wear this type of material as PPE when contact is possible.



Some pesticides are pre-mixed or packaged in containers that double as applicators.

Hose End and Compression Sprayers



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Hose-end Sprayers



- Hose-end sprayers are proportioners that mix a concentrated pesticide with water and emit a spray of diluted pesticide.



When using a hose-end sprayer:

- Place anti-siphon device between sprayer and water source to prevent back siphoning of pesticides into your water system.



Compression Sprayers



- Pressurized sprayers with a hand-operated pump.
- Best for spot applications.
- Require regular pumping for effective spray application.



Hand-held
Compression Sprayer

Mixing & Loading



- Requires extra precautions due to:
 - Breezes
 - Splashing
 - Pesticides in concentrated forms
- When using pesticides, **NEVER** eat, drink or smoke.
- Doublecheck label directions each time you mix pesticides. Labels change and memories fail!

Keep in mind that after you have handled pesticides, you can still transfer their residues to:

***people**

***animals**

***the telephone**

***furniture and carpeting**

***tools**

***any object**



Vehicle Safety Nevers...




- **Carry pesticides in the passenger section**
- **Allow children, pets or other passengers to ride with pesticides**
- **Transport pesticides with food, clothing or other things meant to be eaten by or in contact with people or animals**
- **Leave your vehicle unattended when pesticides are unlocked in the vehicle**



Burning of Any Pesticide Containers is Not Legal



Calibration & Calculating Amounts



- Necessary to ensure proper application rates.
- Two approaches:
 1. Apply to wet the plant or foliage.
 2. Apply to cover a surface of known area.
- Spray plain water until plants/area covered (count time)
- Spray plain water in bucket for the time counted.
 - How much water do you have?
- Calculate pesticide to be added to that amount of water.

<http://extension.oregonstate.edu/catalog/html/pnw/pnw320/>



Understanding Pesticides

Part 5 Storage/Disposal/ Environmental Fate

Pesticide Storage



- Keep pesticides to a minimum, to reduce storage needs.
- Follow label instructions.
- Keep pesticides in original containers!
- Store in leak-proof containers.
- Store out of reach of children and pets.
- Never store near food, feed or medicines.
- Avoid temperature extremes and moisture.

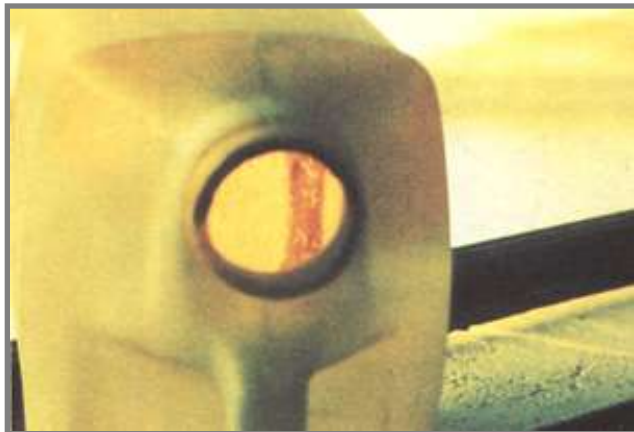


Never put pesticides in containers that might cause children and other people to mistake them for food or drink.



Disposal of Pesticide Containers

- Empty containers (not banned):
 - Cardboard containers in trash (not burned).
 - Triple rinse glass/plastic; apply rinse water.
 - Dispose of empty container in trash, or recycle if possible.
 - Poke holes in plastic/cardboard containers and wrap in newspaper to discourage reuse.



Containers in which pesticides have been allowed to dry are difficult—if not impossible—to rinse properly

Triple Rinsing



- Empty the pesticide into the sprayer tank and let the container drain for 30 seconds.
- Fill the container 10% to 20% full of water or rinse solution.
- Swirl the container to rinse all inside surfaces.
- Remove cover from the container.
- Add the rinsate from the container to sprayer tank and let drain for 30 seconds or more.
- Repeat these steps **two more times**, before letting the pesticide container dry

Disposal of Pesticide Containers

- Leftover pesticide or banned products:
 - Oregon Department of Environmental Quality, Hazardous Household Waste Collection Events
 - <http://www.deq.state.or.us/lq/sw/hhw/events.htm>



Hazardous waste collection event in Portland, OR

Resources for Oregonians

- **National Pesticide Information Center:**
<http://npic.orst.edu/>
- Oregon Dept. of Environmental Quality
 - 1-800-452-4011
 - 1-503-229-5913
- For information about scheduled hazardous waste collection events across Oregon:
 - 1-800-732-9253

Pesticide Recommendations for Homeowners



- PRODUCT LABELS!
- Plant Disease Control:
 - PNW Disease Management Handbook
 - <http://plant-disease.ippc.orst.edu>
- Insect Pest Control:
 - PNW Insect Management Handbook
 - <http://insects.ippc.orst.edu/pnw/insects>
- Weed Control:
 - PNW Weed Management Handbook
 - <http://weeds.ippc.orst.edu/pnw/weeds>

