



# Pesticide Safety & Pesticide Categories

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School IPM




# What is a pesticide

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- Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.
- Any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.
- Any nitrogen stabilizer.
- A product is likely to be a pesticide if the labeling or advertising:
  - Makes a claim to prevent, kill, destroy, mitigate, remove, repel or any other similar action against any pest.
  - Indirectly states or implies an action against a pest.
  - Draws a comparison to a pesticide.
  - Pictures a pest on the label.

# Not considered pesticides

**Drugs** used to control the diseases of humans or animals, which are regulated by the FDA



**Fertilizers** and soil nutrients



**Certain low-risk substances** such as cedar chips, garlic and mint oil are exempted from regulation by EPA (*requires license*)

- 25b classification requires no signal word (mostly food-safe compounds)
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Pest control **devices** (i.e., mousetraps) are not pesticides, but subject to labeling requirements

# There are many kinds of pesticides



**COMBAT ROACH KILLING GEL**

HOW COMBAT WORKS: Kills roaches on contact. Kills eggs and nymphs. Kills on contact and kills on return. Kills on contact and kills on return.

TARGETS THE NEST AND KILLS EGGS  
Ataca el nido y mata las huevas

CAUTION: KEEP OUT OF REACH OF CHILDREN

**Altosid Pro-G Insect Growth Regulator**

PREVENTS ADULT MOSQUITO EMERGENCE INCLUDING THOSE WHICH MAY TRANSMIT WEST NILE VIRUS

PREVENTS MOSQUITOES FROM BECOMING BREEDING, BITING ADULTS

30 DAY PROTECTION

EASY TO APPLY GRANULES

TREATS UP TO 5,455 SQUARE FEET OR 20,183 GALLONS OF WATER

KEEP OUT OF REACH OF CHILDREN CAUTION

NET WEIGHT 2.5 LBS (1.14 KG)

**top choice Insecticide**

RESTRICTED USE PESTICIDE  
USE TO TENDRY TO AQUATIC ENVIRONMENTS AND CONTAMINATED ORNAMENTAL PLANTS

Net Weight 50 lbs  
SKU# 79982844

**KEEP OUT OF REACH OF CHILDREN CAUTION - PRECAUCION**

**PREVENTS MOSQUITO EMERGENCE**

SITE	PETS CONTROLLED	APPROXIMATE LENGTH OF CONTROL	APPROXIMATE RATE OF APPLICATION	
			PER ACRES	PER 1000 GALLONS
WATER	CONTROLLED	30 DAYS	1.0 LB	1.0 LB
LAND	CONTROLLED	30 DAYS	1.0 LB	1.0 LB
INDOOR	CONTROLLED	30 DAYS	1.0 LB	1.0 LB

Produced by Bayer Environmental Science  
Bayer CropScience Inc., P.O. Box 10000, St. Louis, MO 63108



# How insecticides work: Modes of action

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- Nervous system poisons
  - Acts on the nerve
- Metabolic inhibitors
  - Affect ability of target to process food
- Hormone mimics
  - Disrupt normal growth & reproduction
- Physical poisons
  - Physically damage insect
- Repellents & attractants

# Mode of Action Classification

GROUP 4A INSECTICIDE

- All products have been assigned to groups based on their mode of action:
  - i.e. pyrethroids are Group 3; Neonicotinoids are Group 4A, Spinosad is Group 5, Diamides are Group 28
- Product labels include the number corresponding to the mode of action group.
- The aim is to help product users make better decisions such as product rotations or tank mixing.

# Common Signs and Symptoms of Pesticide Poisoning

- Eye irritation
- Nose and throat pain
- Skin rash
- Dizziness
- Headache
- Muscle aches or cramps
- Exhaustion
- Nausea
- Diarrhea
- Chest pain
- Breathing difficulties
- Blurred vision
- Excessive salivation or drooling
- Very small, pinpoint pupils
- Lack of muscle control
- Convulsions or seizures
- Unconsciousness



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## Pesticide Poisoning Symptoms Can be Confused with Other Illnesses

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- Cold
- Flu
- Heat illness
- Food poisoning
- Hangover



The Type  
and Severity  
of Symptoms  
Depend on:

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The Pesticide

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The Route of Exposure

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The Length of Exposure

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How Often you are Exposed

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Age of the Person

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Health of the Person

Not all  
pesticides  
are equally  
toxic!

- First rule of toxicology: The dose makes the poison
  - All things are poison, and nothing is without poison; only the dose permits something not to be poisonous.

So how do we measure this?



# LD<sub>50</sub>

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A measurement of relative toxicity used by toxicologists today

Lethal Dose 50 - The amount of material needed to kill half of a test population. A statistically valuable estimate of average toxicity.



Most common unit used in LD50s.

Amount of toxin (in milligrams) per Kilogram of body weight of the test subject (same as parts per million)

**Mg/Kg**



Hazard Indicators	Toxicity Categories			
	I Highly Toxic	II Moderately Toxic	III Slightly Toxic	IV Relatively Nontoxic
Oral LD <sub>50</sub>	0 to 50 mg./kg.	From 50.1 to 500 mg./kg.	From 500.1 to 5000 mg./kg.	Greater than 5000.1 mg./kg.
Inhalation LC <sub>50</sub>	0 to .2 mg./liter.	From .2 to 2 mg./liter	From 2.1 to 20 mg./liter	Greater than 20.1 mg./liter
Dermal LD <sub>50</sub>	0 to 200 mg./kg.	From 201 to 2000	From 2,001 to 20,000	Greater than 20,001
Eye effects	Corrosive; corneal opacity not reversible within 7 days.	Corneal opacity reversible within 7 days; Irritation persisting for 7 days.	No corneal opacity; irritation reversible within 7 days.	No irritation
Skin effects	Corrosive	Severe irritation at 72 hours.	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours
Signal word required on label	DANGER (POISON! skull & crossbones)*	WARNING!	CAUTION!	CAUTION!
Approximate oral dose that can kill an average person	A few drops to 1 teaspoonful (or a few drops on the skin)	More than 1 teaspoonful to 3 teaspoonfuls	More than 1 ounce to 1 pint or 1 pound	More than 1 pint or 1 pound

# Safety Data Sheets (HCS 2012/GHS Format)

On March 26, 2012, OSHA published the final rule of its revised Hazard Communication Standard (HCS) 29 CFR §1910.1200 to align with the Globally Harmonized System for the Classification and Labeling of Chemicals (GHS).

One of many changes to the HCS is the move from a performance-oriented to a uniformity-oriented approach or standardized format for Safety Data Sheets (SDS), previously called Material Safety Data Sheets (MSDS). The goal is to enhance hazard communication and workplace safety through consistency.

## Retained Requirements

- Employers must have an SDS in the workplace for each hazardous chemical used.
- SDS must be readily available to employees in their work areas and during their shifts.
- SDS must be in English.

## New Provisions

- SDS must be in a uniform format that includes at least the required section numbers, headings and associated information.\*

## Compliance Dates

- By December 1, 2013, employers must train employees on new Safety Data Sheets.
- By June 1, 2015, all SDSs must be in the uniform format as prescribed in HCS 2012.

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## Identification



- (a) Product identifier used on the label;
- (b) Other means of identification;
- (c) Recommended use of the chemical and restrictions on use;
- (d) Name, address, and telephone number of the manufacturer, importer, or other responsible party;
- (e) Emergency phone number.

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## Hazard(s) Identification



- (a) Classification of the chemical;
- (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s);
- (c) Unclassified hazards.

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## Composition Information on Ingredients



### For Substances

- (a) Chemical name;
- (b) Common name and synonyms;
- (c) CAS number and other unique identifiers;
- (d) Impurities and stabilizing additives which are classified.

### For Mixtures (In addition to required substance information)

The chemical name and concentration or concentration ranges of all ingredients which are classified as health hazards.

*Note on Trade Secret Claims:* Statement must be provided if chemical identity and composition have been withheld.

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## First Aid Measures



- (a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion;
- (b) Most important symptoms/effects, acute and delayed;
- (c) Indication of immediate medical attention and special treatment needed, if necessary.

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## Fire Fighting Measures



- (a) Suitable (and unsuitable) extinguishing media;
- (b) Specific hazards arising from combustion.

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## Handling and Storage



- (a) Precautions for safe handling;
- (b) Conditions for safe storage, including any incompatibilities.

8

## Exposure Controls/Personal Protection



- (a) OSHA permissible exposure limit (PEL) and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet;
- (b) Appropriate engineering controls;
- (c) Individual protection measures, such as personal protective equipment.

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## Physical and Chemical Properties



- (a) Appearance (physical state, color, etc.);
- (b) Odor;
- (c) Odor threshold;
- (d) pH;
- (e) Melting point/freezing point;
- (f) Initial boiling point and boiling range;
- (g) Flash point;
- (h) Evaporation rate;
- (i) Flammability (solid, gas);
- (j) Upper/lower flammability or explosive limits;
- (k) Vapor pressure;
- (l) Vapor density;
- (m) Relative density;
- (n) Solubility(ies);
- (o) Partition coefficient: n-octanol/water;
- (p) Auto-ignition temperature;
- (q) Decomposition temperature;
- (r) Viscosity.

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## Stability and Reactivity



- (a) Reactivity;
- (b) Chemical stability;
- (c) Possibility of hazardous reactions;
- (d) Conditions to avoid (e.g., static discharge, shock, or vibration);
- (e) Incompatible materials;
- (f) Hazardous decomposition products.

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## Ecological Information (Non-Mandatory)



- (a) Ecotoxicity (aquatic and terrestrial, where available);
- (b) Persistence and degradability;
- (c) Bioaccumulative potential;
- (d) Mobility in soil;
- (e) Other adverse effects (such as hazardous to the ozone layer).

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## Disposal Considerations (Non-Mandatory)



Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.

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## Transport Information (Non-Mandatory)



- (a) UN number;
- (b) UN proper shipping name;
- (c) Transport hazard class(es);
- (d) Packing group, if applicable;
- (e) Environmental hazards (e.g., Marine pollutant (Yes/No));
- (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code);
- (g) Special precautions.

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## Regulatory Information (Non-Mandatory)



Safety, health and environmental regulations specific for the product in question.

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## Other Information



The date of preparation of the SDS or the last change to it.

\* This poster describes the uniform format for an SDS...

# Hazard Communication Safety Data Sheets

- **Section 1, Identification** includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
- **Section 2, Hazard(s) identification** includes all hazards regarding the chemical; required label elements.
- **Section 3, Composition/information on ingredients** includes information on chemical ingredients; trade secret claims.
- **Section 4, First-aid measures** includes important symptoms/effects, acute, delayed; required treatment.
- **Section 5, Fire-fighting measures** lists suitable extinguishing techniques, equipment; chemical hazards from fire.
- **Section 6, Accidental release measures** lists emergency procedures; protective equipment; proper methods of containment and cleanup.

# Hazard Communication Safety Data Sheets

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- **Section 7, Handling and storage** lists precautions for safe handling and storage, including incompatibilities.
- **Section 8, Exposure controls/personal protection** lists OSHA's Permissible Exposure Limits (PELs); ACGIH Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).
- **Section 9, Physical and chemical properties** lists the chemical's characteristics.
- **Section 10, Stability and reactivity** lists chemical stability and possibility of hazardous reactions.
- **Section 11, Toxicological information** includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity



# Other Info

- Section 12, Ecological information\*
- Section 13, Disposal considerations\*
- Section 14, Transport information\*
- Section 15, Regulatory information\*
- **Section 16, Other information**, includes the date of preparation or last revision.
- Employers must ensure that SDSs are readily accessible to employees.

**GHS BASICS**  
Globally Harmonized System of Classification and Labeling of Chemicals


Standard: 29 CFR 1910.1200

GHS = new labels + safety data sheets (formerly MSDS) + new pictograms

### CHEMICAL LABELS

The GHS requires that label preparers designate the appropriate hazard warnings using four key elements on each label:


- 1 Pictogram:** A visual warning that identifies the hazard of a specific chemical.
- 2 Signal Word:** A single word to indicate the severity of a hazard. Danger = severe. Warning = less severe.
- 3 Hazard Statement:** Describes the hazard(s) of a chemical dependent on its hazard class and category.
- 4 Precautionary Statement(s):** Describes the measures to be taken to minimize or prevent adverse effects resulting from exposure, improper storage or improper handling of a hazardous chemical.



### SAFETY DATA SHEETS (SDSs)

The SDS provides users with 16 standardized categories of information pertaining to a chemical's hazards. This facilitates safe handling of the chemical and allows for safe procedures in the event of an emergency.

- 1. Identification:** Includes the product identifier (the manufacturer's or distributor's name, address, phone number and emergency phone number), recommended use and restrictions on use.
- 2. Hazard identification:** Includes all hazards regarding the chemical required label elements.
- 3. Composition/information on ingredients:** Includes information on the chemical's ingredients, trade secret status.
- 4. First-aid measures:** Includes acute and delayed symptoms, required treatment.
- 5. Fire fighting measures:** Lists suitable extinguishing techniques, equipment, chemical hazards from fire.
- 6. Accidental release measures:** Lists emergency procedures, protective equipment, proper methods of containment and cleanup.
- 7. Handling and storage:** Lists precautions for safe handling and storage, including incompatibilities.
- 8. Exposure controls/personal protection:** Lists (OSHA) Permissible Exposure Limits (PEL), Threshold Limit Value (TLV), appropriate engineering controls, personal protective equipment (PPE).
- 9. Physical and chemical properties:**
- 10. Stability and reactivity:**
- 11. Toxicological information:**
- 12. Ecological information\***
- 13. Disposal considerations\***
- 14. Transport information\***
- 15. Regulatory information\***
- 16. Other information**



### PICTOGRAMS

Nine pictograms represent health, physical and environmental hazards.

- EXPLOSIVES**  
Self-Reactives  
Organic Peroxides
- FLAMMABLES**  
Pyrophorics  
Self-Heating  
Self-Reactives
- OXIDIZERS**
- CORROSIVES**  
Skin Corrosion/Burns  
Eye Damage  
Corrosive to Metals
- GASES UNDER PRESSURE**
- ACUTE TOXICITY (Severe)**
- ACUTE TOXICITY (Harmful)**  
Irritant  
Skin Sensitizer  
Respiratory Tract Irritant
- CARCINOGEN**  
Reproductive Toxicity  
Target Organ Toxicity  
Aspiration Toxicity
- ENVIRONMENTAL TOXICITY**

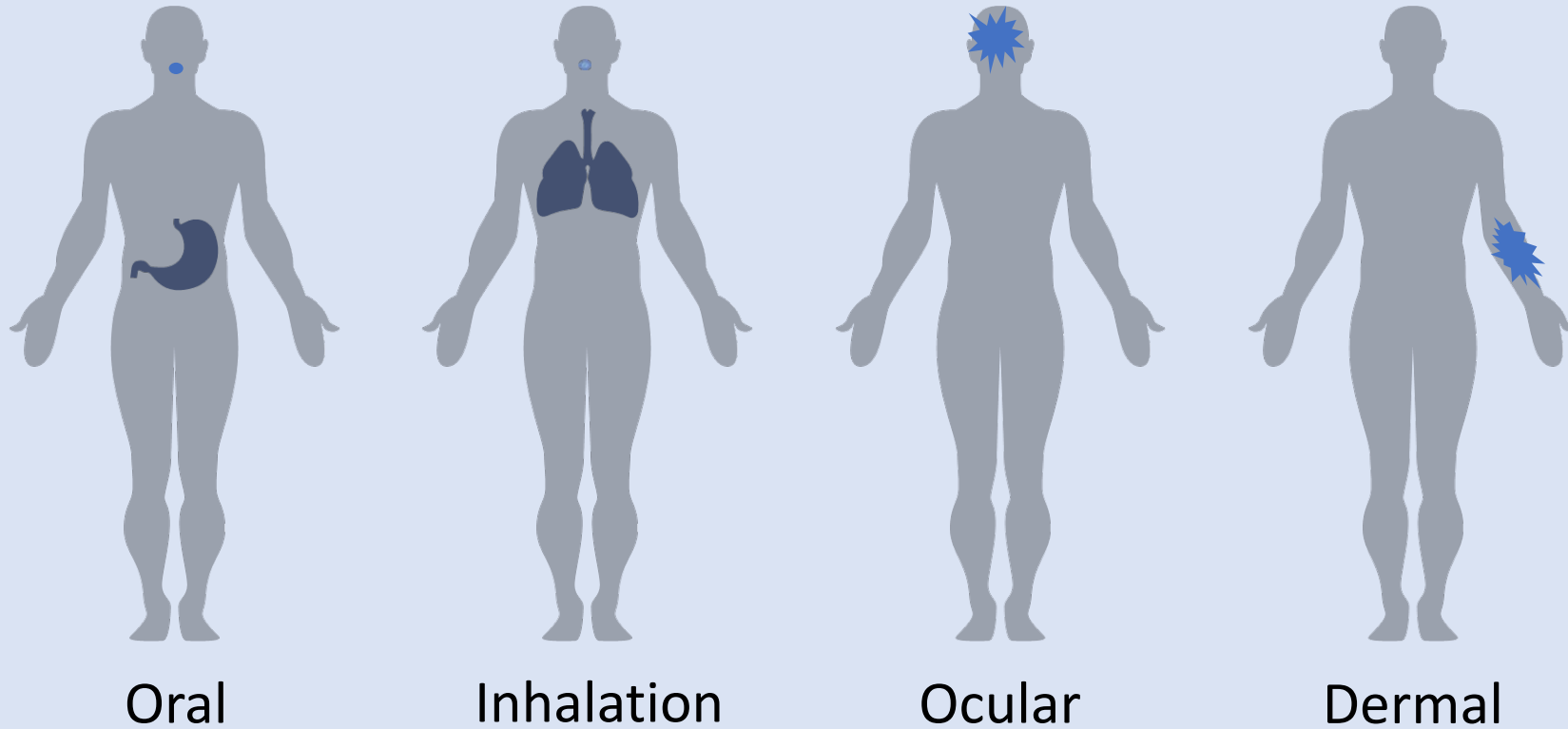
**CLARIANT**

Choosing a low-toxicity product is not the only way to reduce risk


$$\text{Toxicity} \times \text{Exposure} = \text{Hazard}$$

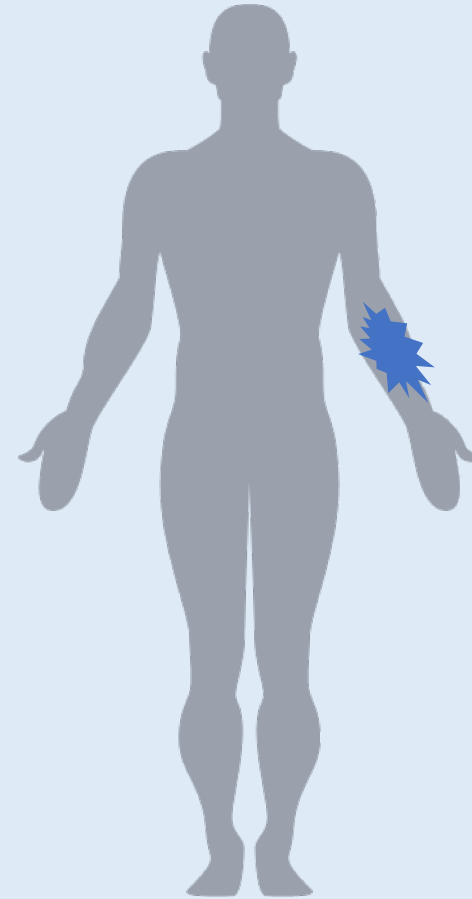
Reduce risk by reducing your exposure...Read the label!

# Routes through which pesticides can enter the body



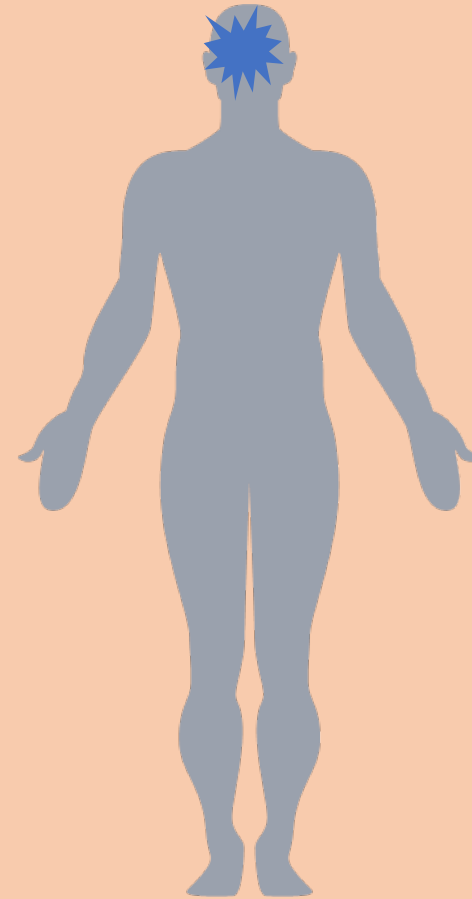
# Skin exposure

- Skin comes in direct contact with pesticides or pesticide residues
- Rash, blisters, skin irritations



# Eye exposure

- Pesticide drift
- Rubbing eyes with unwashed hands



# Respiratory exposure

- Vapor or dust from pesticide drift
- Entering treated areas



# Oral exposure

- Drink, smoke, eat, or chew gum with unwashed hands
- Unwashed produce
- Drinking from pesticide containers
- Drinking irrigation water

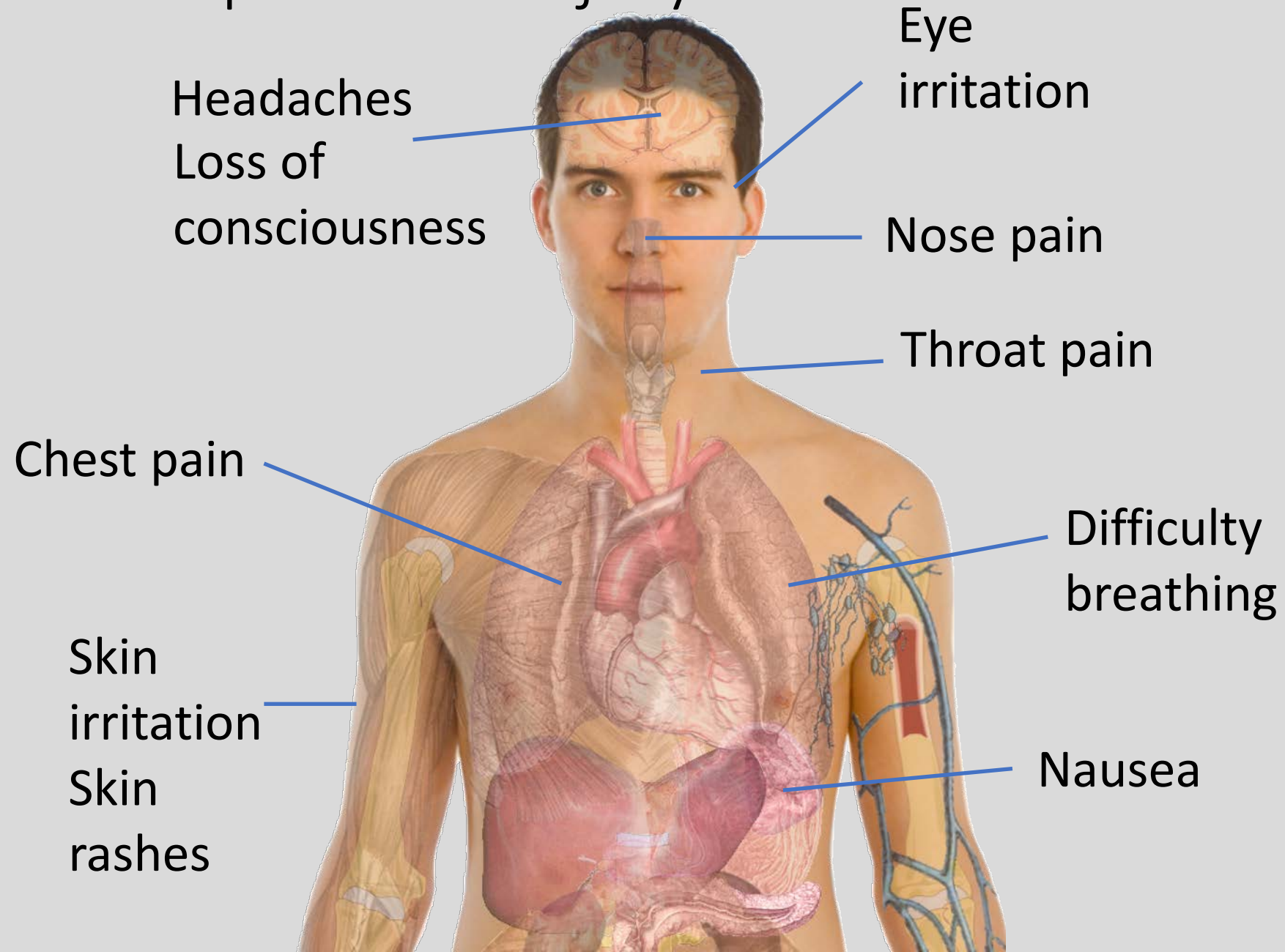


# Potential pesticide hazards

- Acute effects happen quickly during or after exposure
- Delayed effects may take time to develop after an exposure
- Chronic effects are the result of exposures over a long period of time
- Sensitization is the gradual development of an allergic reaction to pesticides



# Acute pesticide injury



# Severe acute poisoning

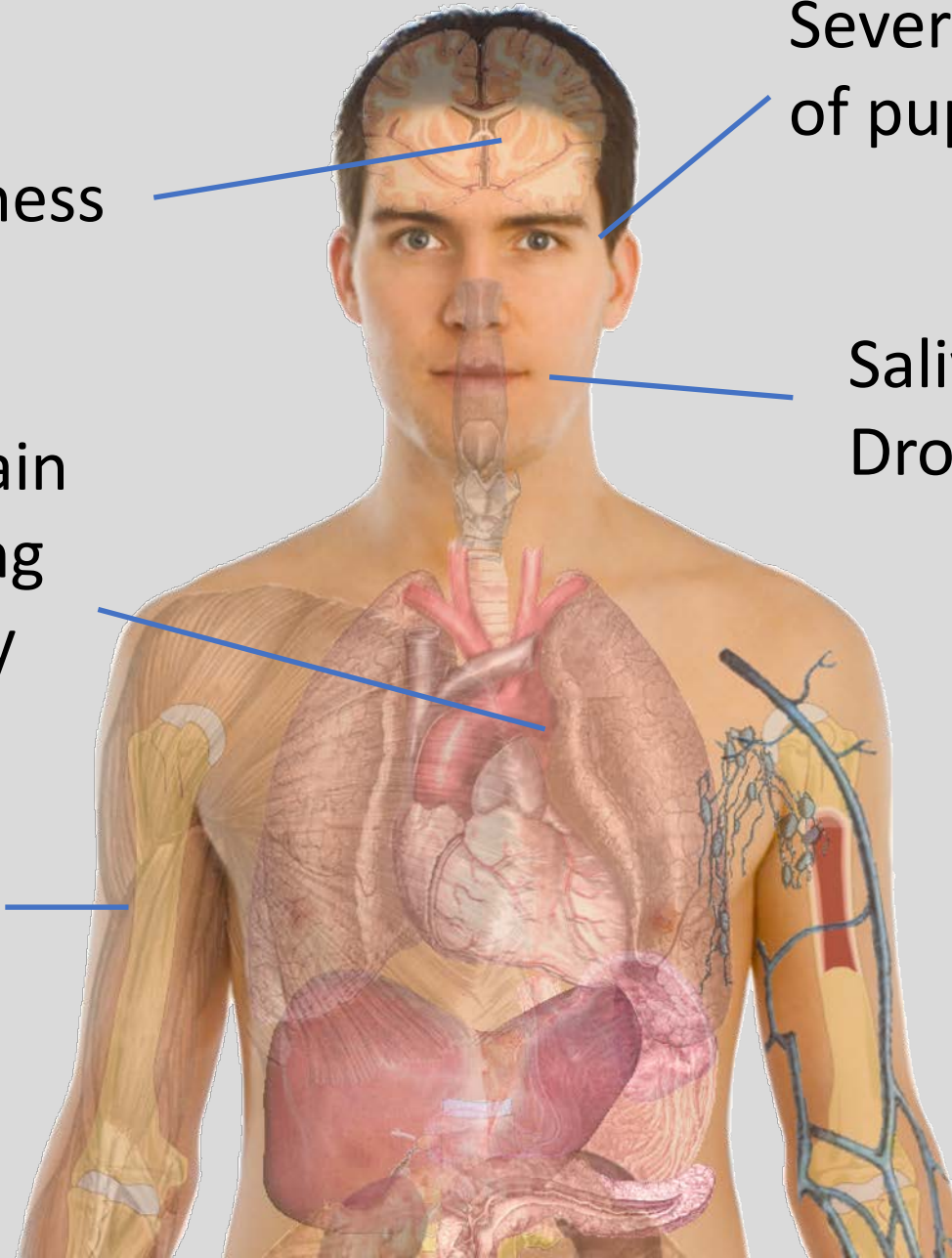
Unconsciousness

Severe constriction  
of pupils

Chest pain  
Breathing  
difficulty

Salivation  
Drooling

Lack of  
muscle  
control



# Most common site of exposure



# PPE & Decontamination

- Make sure everyone has access to Personal Protective Equipment
- Make sure there is enough materials for spill clean up
- Decontamination Supplies
- Remember heat stress is a factor in Texas!



# Personal Protective Equipment



## Appropriate clothing

Long pants

Chemical resistant shoes

Long-sleeved shirt



## Protective gear

Chemical resistant gloves

Goggles

Pesticide-rated respirator

**Table 1. Minimum personal protective equipment (PPE) and work clothing for handling activities.**

Route of exposure	Toxicity category of end- use product			
	I	II	III	IV
Dermal toxicity or skin irritation potential	Coveralls worn over long-sleeved shirt and long pants	Coveralls worn over long-sleeved shirt and long pants	Long-sleeved shirt and long pants	Long-sleeved shirt and long pants
	Socks	Socks	Socks	Socks
	Chemical-resistant footwear	Chemical-resistant footwear	Shoes	Shoes
	Chemical-resistant gloves	Chemical-resistant gloves	Chemical-resistant gloves	No minimum
Inhalation toxicity	Respiratory protection device	Respiratory protection device	No minimum	No minimum
Eye irritation potential	Protective eyewear	Protective eyewear	No minimum	No minimum



# Gloves should be

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- Resistant to organic solvents
- Unlined
- Long enough to protect wrists, arms
- Best:
  - Natural rubber
  - Butyl
  - Nitrile



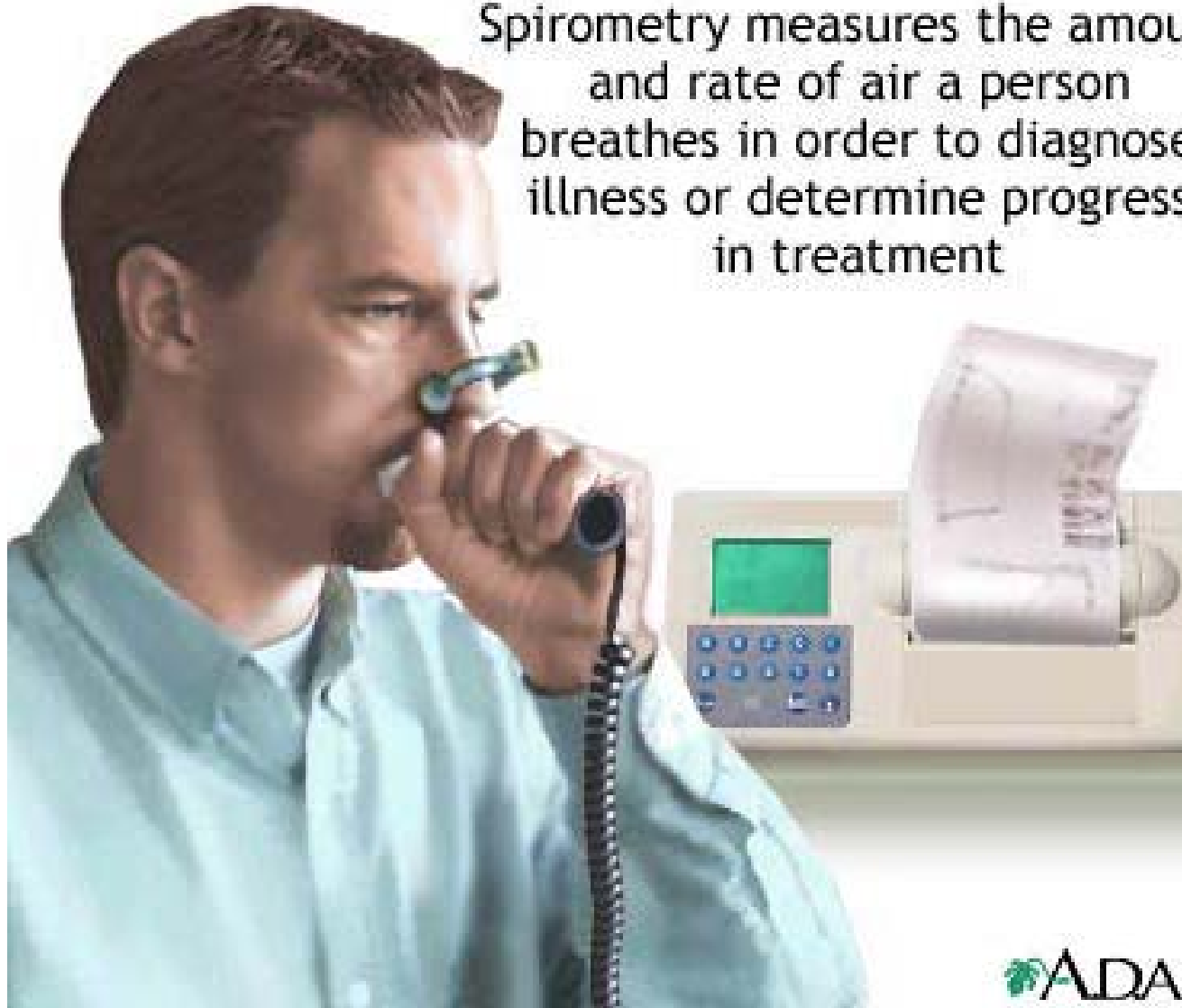
# Respirators

- For toxic dusts, sprays
- NIOSH approval number
- Rated for pesticides
- Look for tight seal
- Must have pre-filter and organic vapor cartridge
- For TDA or other health inspection purposes make sure respirator stored properly on truck.
- Must have a Fit Test medical evaluation





Spirometry measures the amount and rate of air a person breathes in order to diagnose illness or determine progress in treatment



ADA

## Respirators and Physical Fitness

- Medical evaluations are required for anyone wearing.
- Breathing through a respirator is work for the body.
- Respirators can be hazardous to people with heart or lung problems.

# Goggles



Not the same as safety glasses



Use when directed by label



Often used with respirator



# Coveralls

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- Recommended for most applications
- Remove and wash after use
- Tyvek<sup>®</sup> lightweight, relatively inexpensive and washable
- Wash pesticide contaminated clothes separately
  - Hot water
  - Two cycles



# Pesticide Storage Guidelines

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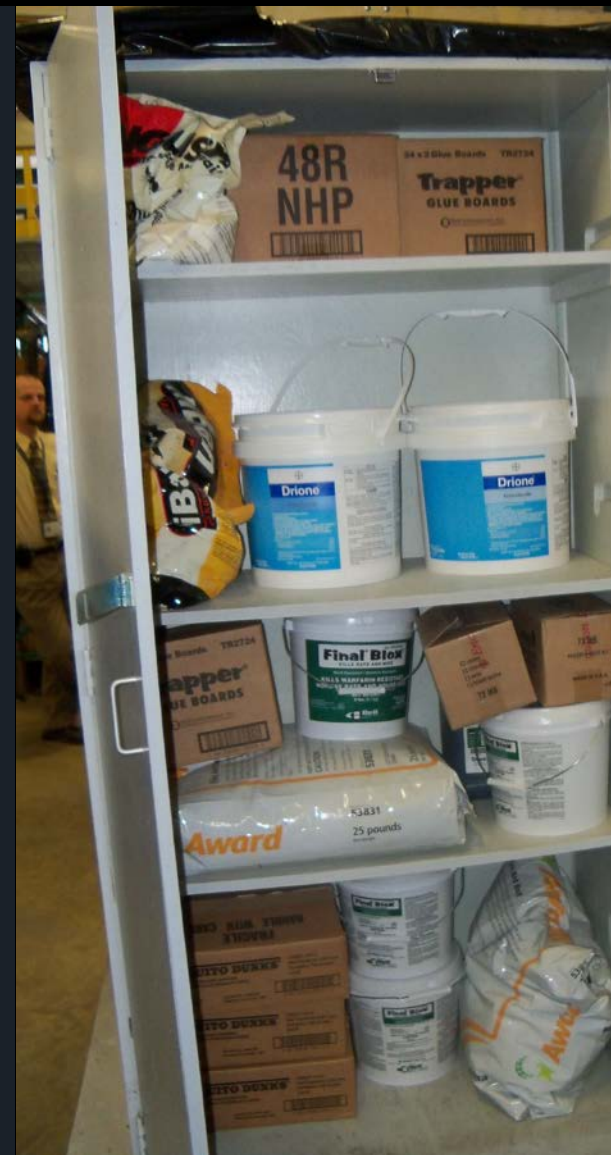
- Establish a suitable storage site
- Must be secure
- Temperature must be controlled
- Nonporous flooring
- Runoff protection
- Separate storage for pesticides, food, feed, seed, fertilizer and equipment





## Pesticide Storage Guidelines

- Use original containers only
  - Labels must be kept on containers--intact and legible
- Watch for container damage
  - (tears, leaks, rust)
  - Keep good inventory
- Consider pesticide shelf life



# Pesticide labeling



# Pesticide labeling

Most important source of information about a pesticide



The label is the law!



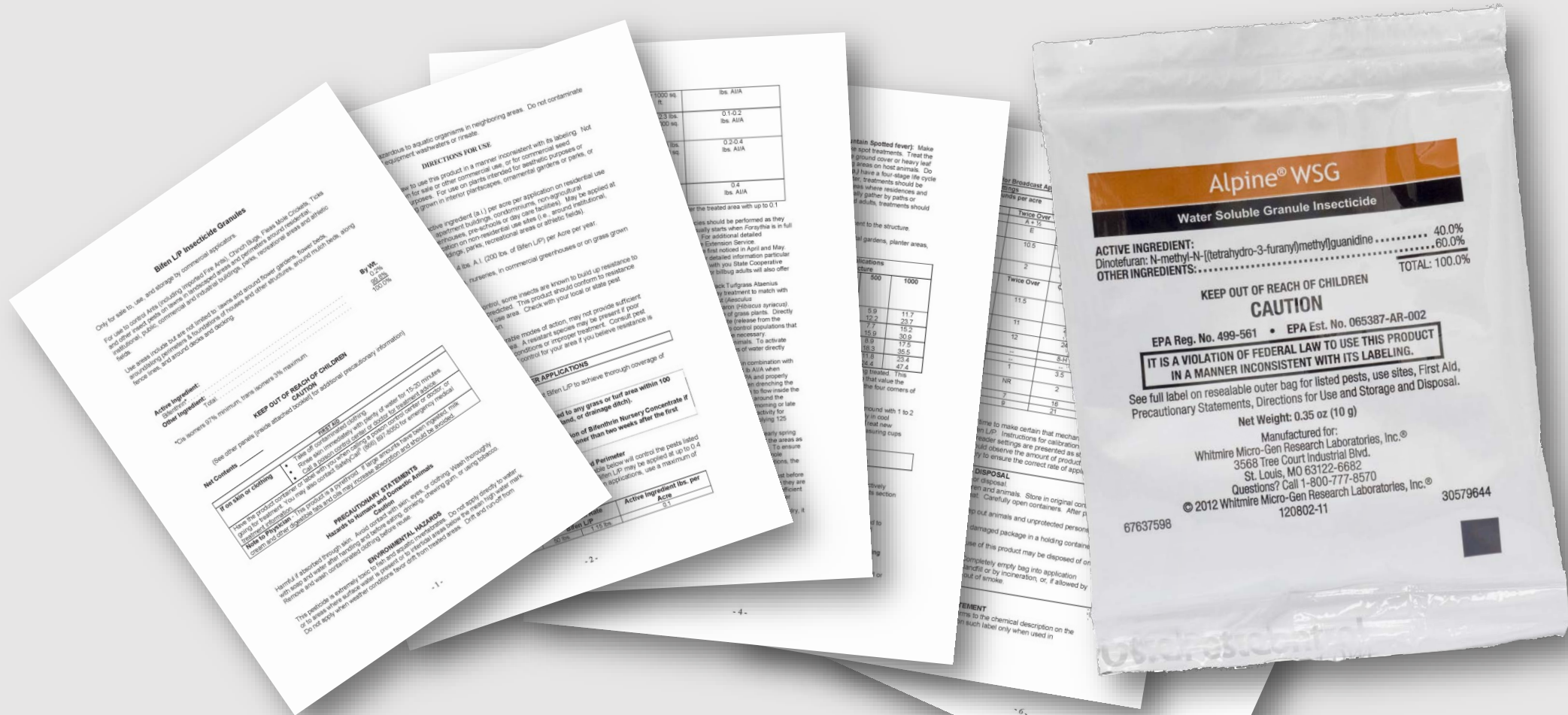
Read the label

before you buy/sell the product

before you use the product

before you dispose of the product

# Pesticide Labels may be extensive documents or text printed directly on the pesticide container





# Legal considerations

- Use of any pesticide inconsistent with its label is prohibited by federal and state law
- Deliberate violations of the label can result in heavy fines, imprisonment, or both



FOR USE  
JED

Wear Long  
Sleeved Shirt,  
Trousers, and  
Gloves. Avoid  
contact with  
skin. Avoid  
contact with  
eyes. Avoid  
contact with  
mouth. Avoid  
contact with  
open wounds.  
Do not eat, drink,  
or smoke while  
using this product.

Do Not Cut  
or Grate  
Within  
7 days  
14 days  
28 days

Do not use on  
vegetables, fruits,  
or ornamentals.  
Do not use on  
lawns, lawns,  
or lawns.

AGE REQUIRE

For use on  
vegetables, fruits,  
and ornamentals.  
Do not use on  
lawns, lawns,  
or lawns.

Do not use on  
vegetables, fruits,  
or ornamentals.  
Do not use on  
lawns, lawns,  
or lawns.

Do not use on  
vegetables, fruits,  
or ornamentals.  
Do not use on  
lawns, lawns,  
or lawns.


⑥ **RESTRICTED USE PESTICIDE**  
FOR RETAIL SALE TO AND APPLICATION ONLY BY  
CERTIFIED APPLICATORS OR PERSONS UNDER THEIR  
DIRECT SUPERVISION

① **DE PESTO**  
INSECTICIDE  
EMULSIFIABLE CONCENTRATE

② ACTIVE INGREDIENT: pestoff-tri-silylic acid 45.0%  
INERT INGREDIENTS: 55.0%  
TOTAL: 100.0%

THIS PRODUCT CONTAINS 4.0 LBS OF PESTOFF PER GALLON

**KEEP OUT OF REACH OF CHILDREN  
DANGER - POISON**



⑧

⑩ STATEMENT OF PRACTICAL TREATMENT

- IF SWALLOWED: Induce vomiting by giving a teaspoonful of salt in a glass of warm water. Rinse with water. Call a physician immediately.
- IF IRRITATED: Rinse with water. Call a physician immediately.
- IF IN EYES: Flush eyes with plenty of water for at least 15 minutes. Call a physician immediately.
- IF ON SKIN: In case of contact, remove contaminated clothing and immediately wash skin with soap and water.

SEE SIDE PANEL FOR ADDITIONAL  
PRECAUTIONARY STATEMENTS

③ MFG BY A Z CHEMICALS  
TOWN, STATE

④ EPA EST. NO. 00475

⑤ EPA REGISTRATION NO. 1357-42

NET CONTENTS, ONE GALLON

⑨ PRECAUTIONARY STATEMENT  
HAZARD TO  
(DANG)

Poisonous by ingestion.  
Do not breathe sprays.  
Avoid contact with  
eyes or inhalation of  
the mist. Avoid contact  
with the hot surface  
of the burner. Do not  
use near open flame.  
Do not use near  
open flame.

⑪ ENVIRONMENT

Physical or  
Hazard

DIRECTIONS

⑫ RE-ENTRY

CATEGORY OF

⑬ STORAGE AND

STORAGE: Store in  
original container.  
Do not use near  
open flame.  
Do not use near  
open flame.

# Stop here for label review

- Trade name
- Ingredients
- Manufacturer name and address
- EPA Establishment No
- EPA Registration No.
- Special consideration
- Directions for use
- Child Warning Statement
- Front panel precautionary statements
- Statement of Practical Treatment



# Pesticide Selection\*

- All pesticides classified as Red, Yellow or Green Category
- Sometimes confusing aspect of school IPM requirements
- Coordinator must have expertise in classifying pesticide products

*\*Texas (not national) regulations and definitions*



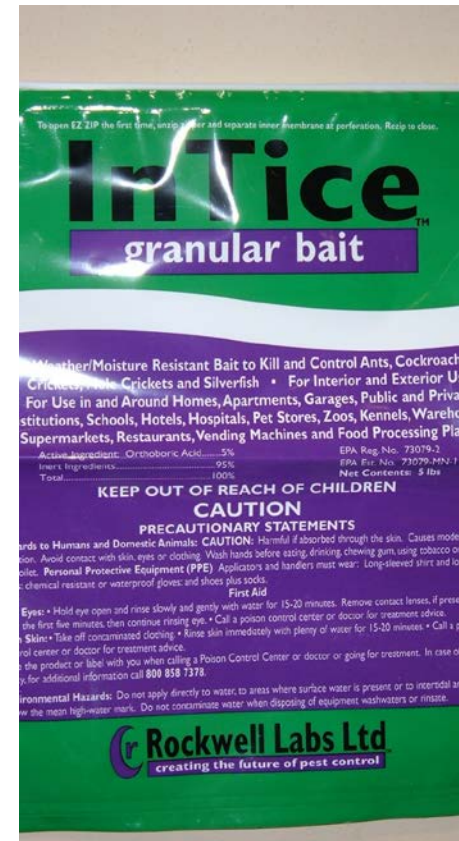
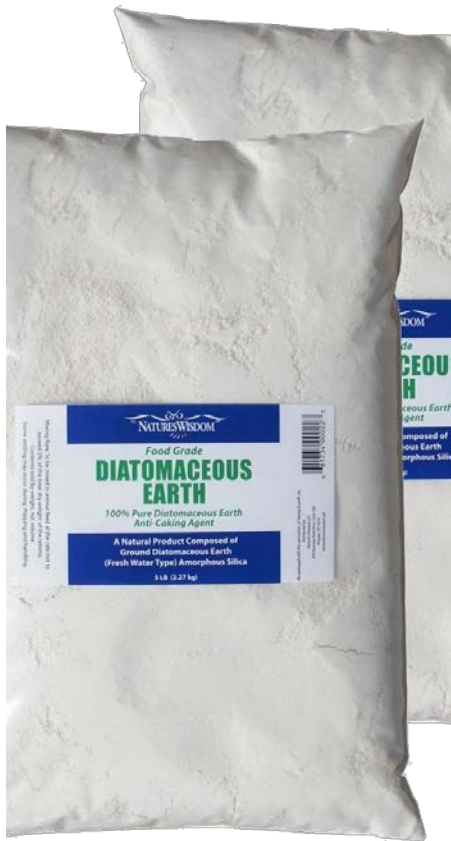
# A quick list of Green Category Pesticides

- Certain inorganic compounds
- Insect growth regulators
- Inaccessible baits
- Microbe-based insecticides
- Botanical insecticides
  - With no more than 5% synergist
- Biological (living) control agents
- Pesticidal soaps and horticultural oils

# Certain inorganic pesticides



- Boric acid
- Borax
- Disodium octoborate tetrahydrate
- Silica aerogel
- Diatomaceous earth



# Low-toxicity Inorganics



# Insect Growth Regulators (IGRs)

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- Halofenozide (turfgrass)
- Hydroprene (cockroach control)
- Methoprene (fire ant, mosquito, flea control)
- Pyriproxifen (fire ant, flea, cockroach control)
- Tebufenozide (caterpillar control)



# Insect growth regulators

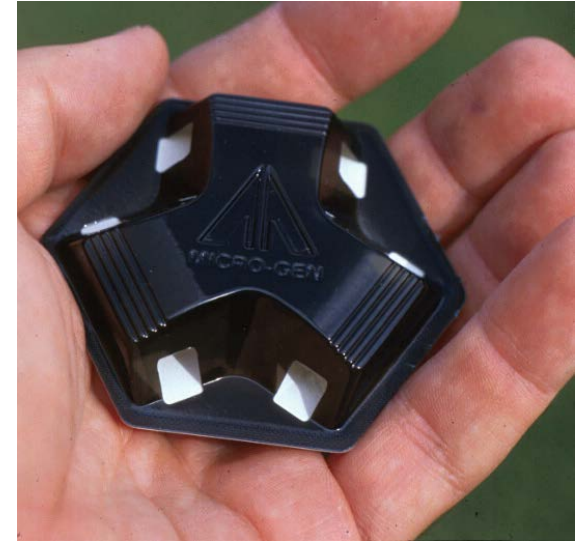


# Inaccessible baits

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- fire ant baits
- containerized cockroach baits
- granular ant, cockroach and cricket baits
- Rodent baits





# Baits

# Microbe-based pesticides

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- Active or killed microbes
  - *Bacillus thuringiensis*, *Beauveria bassiana*, etc.
- Microbial byproducts
  - Spinosad, avermectin





# Microbe-based insecticides

# Botanical pesticides derived from plants (with no more than 5% synergist)

- Pesticides derived from plants
  - pyrethrins
  - neem extracts & oils
  - rotenone
  - Mint oils
  - citrus oils
  - clove oil
  - 2-phenethyl proprionate
  - other essential oils



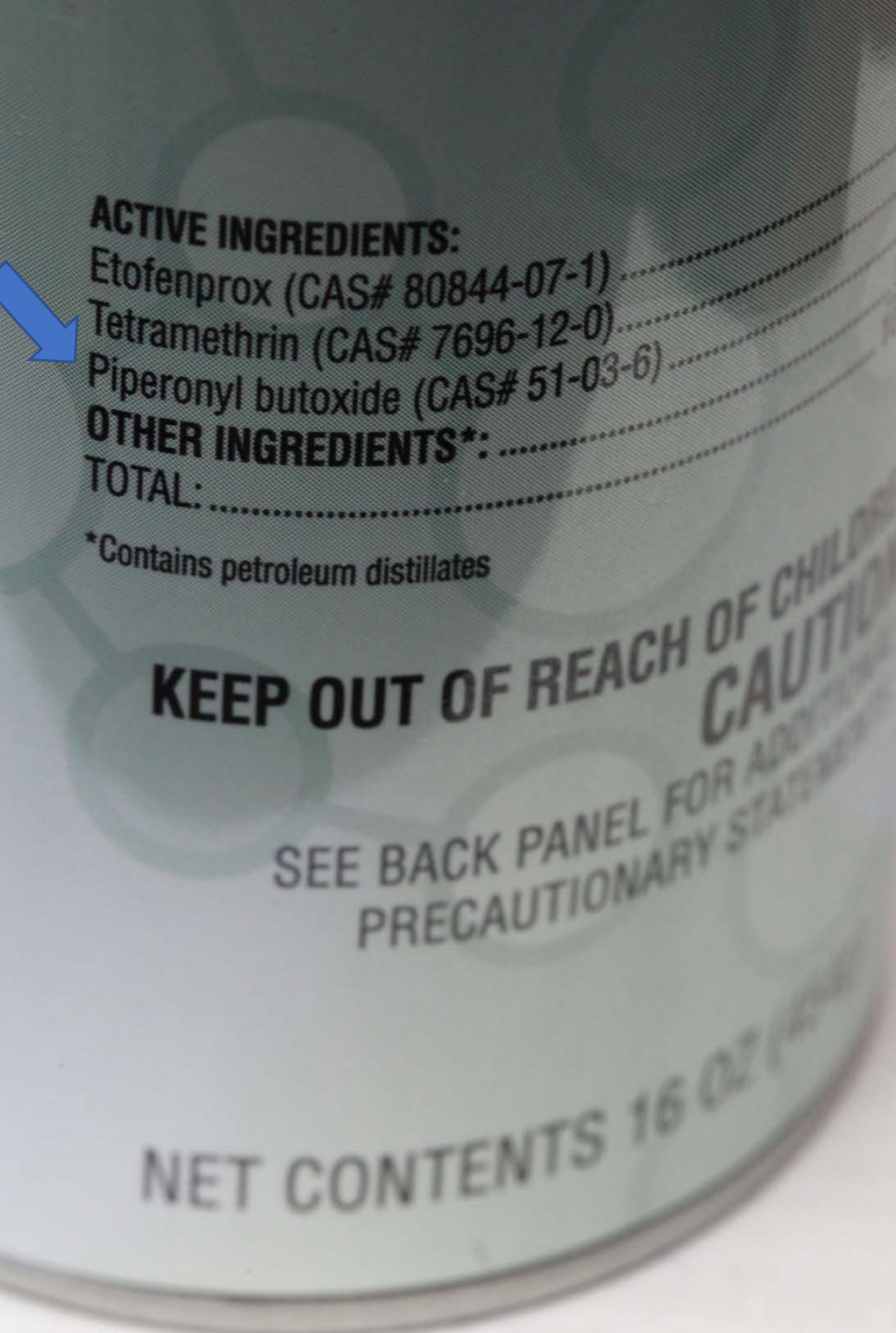


*Chrysanthemum cinerariifolium*

# Pyrethrins

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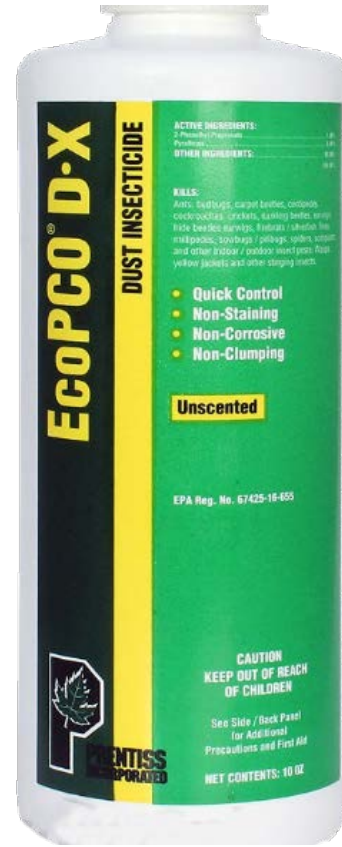
- From ground-up flowerheads of pyrethrum daisies
- A natural combination of six compounds: pyrethrins I and II, jasmolin I and II, and cinerin I and II
- More uses approved than any other insecticide
- Usually includes a “synergist” to keep insects from detoxifying it



# To qualify as Green

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- Botanicals may not contain more than 5% synergist
- A synergist is anything added to a substance for increasing the effectiveness of one or more of its properties. Most insecticide synergists block insect enzymes that detoxify some active ingredients.
- Examples of pesticide synergists
  - Piperonyl butoxide (PBO)
  - Sesamex
  - MGK-264, N-Octyl bicycloheptene dicarboximide



# Botanicals





# Biological control agents

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Living organisms used to control pests

# Low-toxicity contact insecticides

## Insecticidal soaps & oils



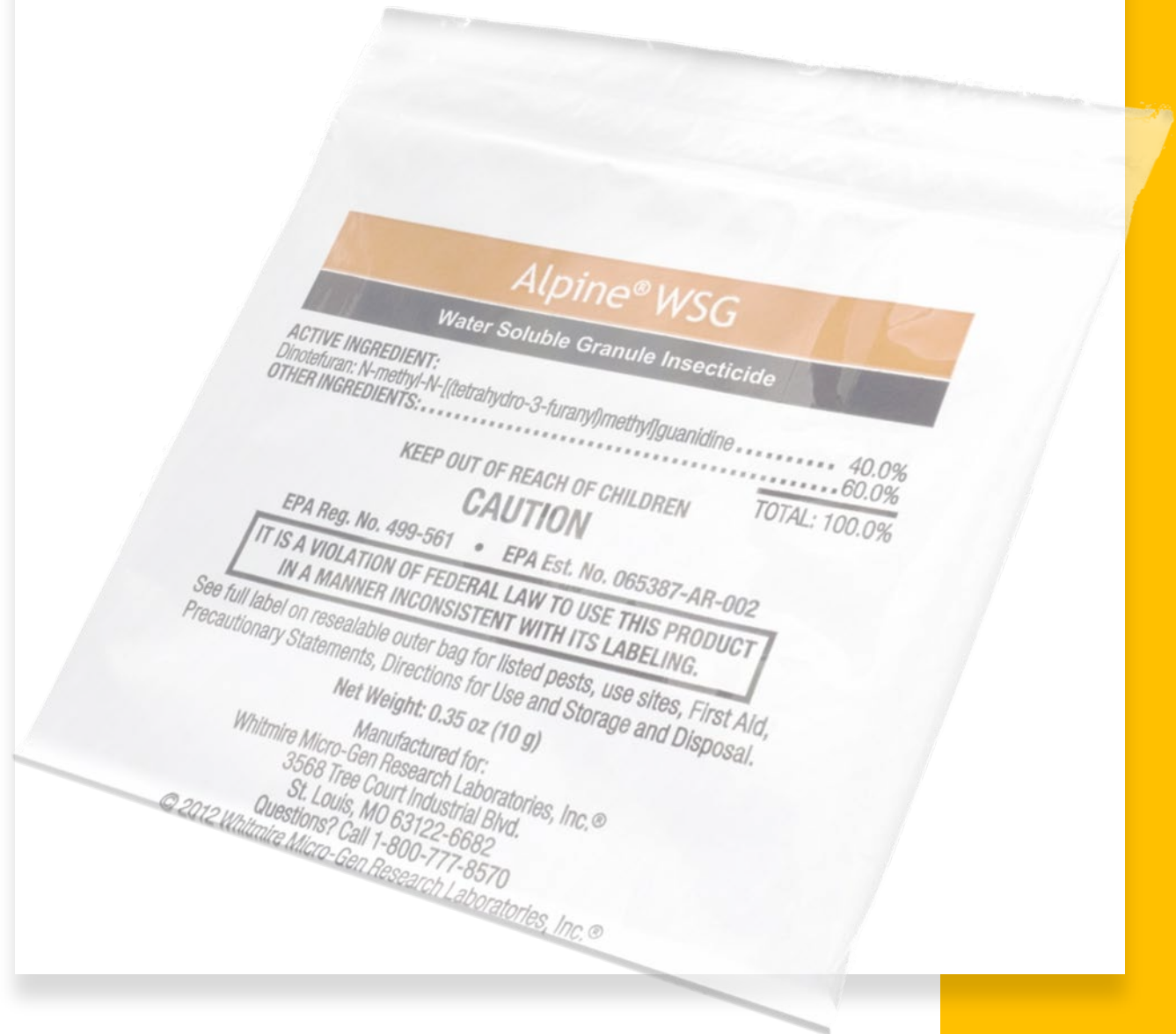
- Kill small and soft-bodied insects and mites. Must come in direct contact with pest to kill. Short residue.
- Safer's soap,
- Sunspray Ultrafine Spray Oil
- Various plant oils



Low-toxicity contact insecticides  
Insecticidal soaps & oils

# Yellow Category Pesticides

- Definition: A pesticide will be designated as a Yellow Category pesticide if:
  - it does not meet the criteria to be designated as a Green Category and...
  - It belongs to EPA toxicity categories III or IV and
  - Carries a CAUTION signal word on the label, unless no signal word is required to appear on the product label as determined by EPA
  - MUST have a Justification Form





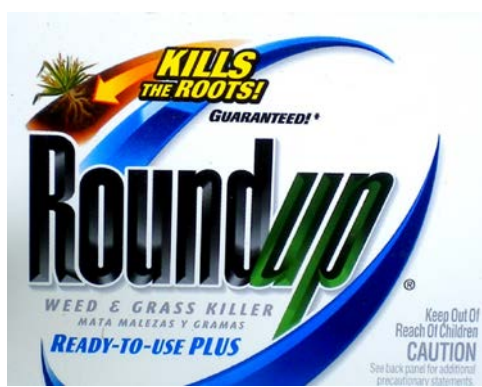
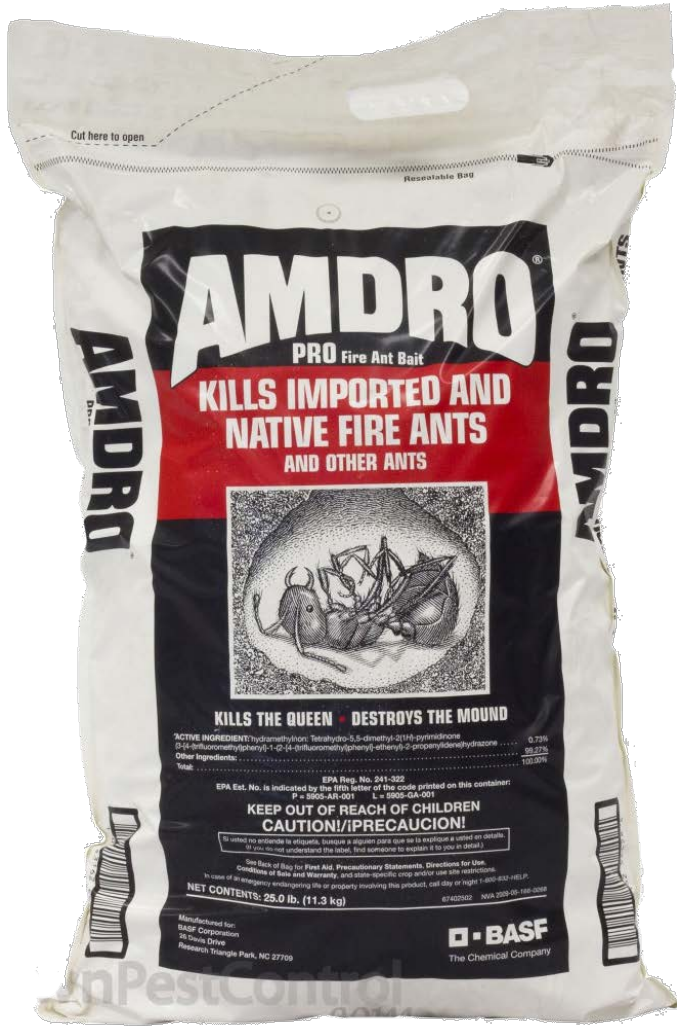
# Pyrethroids

## Most will be Yellow Category

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- Usually identified by –thrin suffix
  - permethrin
  - cyfluthrin
  - bifenthrin
  - allethrin
  - sumithrin
  - tetramethrin
  - *Esfenvalerate*
  - *Fluvalinate*
  - *Etofenprox*

Yellow Products Examples



# Example 1 Yellow Category

There are multiple fire ant mounds that appeared after a spring or fall rain on an athletic field or playground. The IPM coordinator contacts the pesticide applicator and requests a treatment ASAP.

The applicator responds that the product they can use is Advion and they can be out tomorrow to make the treatment, but the fire ants won't be eliminated for another 2 days. The coordinator agrees, then the applicator needs to complete the form. T

They will also need to post the outdoor area at the time of application with a sign, or secured using a locking device, a fence or other practical barrier such as commercially available barrier caution tape, or periodically monitored to keep students out of the treated area until the allowed reentry time of 4 hours after application is completed. Remember the time for reentry starts once the application is completed.

- Description of pest problem: Heavy rains and varying temperatures have caused fire ant mounds to appear on elementary playground. Fire ants can still children which can cause an adverse reaction.
- Justification for use: Advion is a fast-acting fire ant bait that can help reduce and control fire ants.

# Red Category Pesticides



- Definition: A pesticide will be designated as a Red Category Pesticide if:
  - all active ingredients belong to EPA toxicity category I or II;
  - it contains a WARNING or DANGER signal word on the product label; AND
  - it has been designated as a restricted use pesticide, a state-limited-use pesticide or a regulated herbicide...
- A conversation between applicator and coordinator with a completed justification form



# Red Product Examples



# Example 2 Red Category

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- Your school district has built or renovated a school campus and during construction the turf area was not maintained. It's early March and the area is covered in henbit, chickweed, and dandelions. Your grounds manager comes to you and requests to use Trimec Classic Broadleaf Herbicide so that he can "kill" everything so we can sod for turf this spring. This product has a Danger Signal word making it Red Category.
- Description of pest problem: Broadleaf weeds are covering a large turf area that needs to be eliminated prior to installing replacement turf.
- Justification for use: Trimec Classic is a fast-acting herbicide that control a variety of broadleaf weeds. This product will also allow us to re-establish a turf area within three weeks.
- Things to remember:
  - Post a sign or restrict entry to students for 8 hours after the application
  - Contact campus to remind staff to remain off the area



## Hands On Exercise

- Tell US
  - Trade Name
  - Active Ingredient
  - Signal Word
  - Is it Green, Yellow or Red?