



Pesticide Safety & Pesticide Categories

Janet Hurley, & Don Renchie

Texas A&M AgriLife Extension Service

School IPM



What is a pesticide

- 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)
- 

Pest control **devices** (i.e., mousetraps) are not pesticides, but subject to labeling requirements

There are many kinds of pesticides



Copyright@Pestmail.com

RESTRICTED USE PESTICIDE
USE TO TENDRY TO AQUATIC ENVIRONMENTS
FOR CONTROL OF AQUATIC INSECTS AND OTHER PESTS
FOR WHICH THERE IS NO OTHER AVAILABLE CONTROL
AND WHICH ARE NOT LIKELY TO BE CONTROLLED BY OTHER MEANS

top choice
Insecticide

Net Weight
50 lbs
SKU# 79982844
800000000 0911248

FOR USE ON TURFGRASS, LANDSCAPE BEDS AND OVERSEED TURFGRASS AREAS FOR CONTAMINATED ORNAMENTAL PLANTS

GENERAL PRECAUTIONS AND RESTRICTED USE STATEMENTS:

- This product is restricted to use by or under the direct supervision of a person who has completed a restricted use pesticide training course.
- This product is not to be used on lawns, golf courses, or other areas where the general public has access.
- This product is not to be used on lawns, golf courses, or other areas where the general public has access.

RESTRICTED USE STATEMENTS:

- This product is not to be used on lawns, golf courses, or other areas where the general public has access.
- This product is not to be used on lawns, golf courses, or other areas where the general public has access.

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

USE	PREPARED BY	APPROXIMATE PERCENTAGE OF TURFGRASS	APPROXIMATE PERCENTAGE OF TURFGRASS	APPROXIMATE PERCENTAGE OF TURFGRASS
Residential Lawns	100%	100%	100%	100%
Commercial Lawns	100%	100%	100%	100%
Golf Courses	100%	100%	100%	100%
Other	100%	100%	100%	100%

PREPARED BY: Bayer Environmental Science
APPROXIMATE PERCENTAGE OF TURFGRASS: 100%

RESTRICTED USE STATEMENTS:

- This product is not to be used on lawns, golf courses, or other areas where the general public has access.
- This product is not to be used on lawns, golf courses, or other areas where the general public has access.

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

NET WEIGHT 50 LBS (22.7 kg)



How insecticides work: Modes of action

- 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



Pesticide Poisoning Symptoms Can be Confused with Other Illnesses

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

The Type
and Severity
of Symptoms
Depend on:

The Pesticide

The Route of Exposure

The Length of Exposure

How Often you are Exposed

Age of the Person

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?



LD₅₀

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.

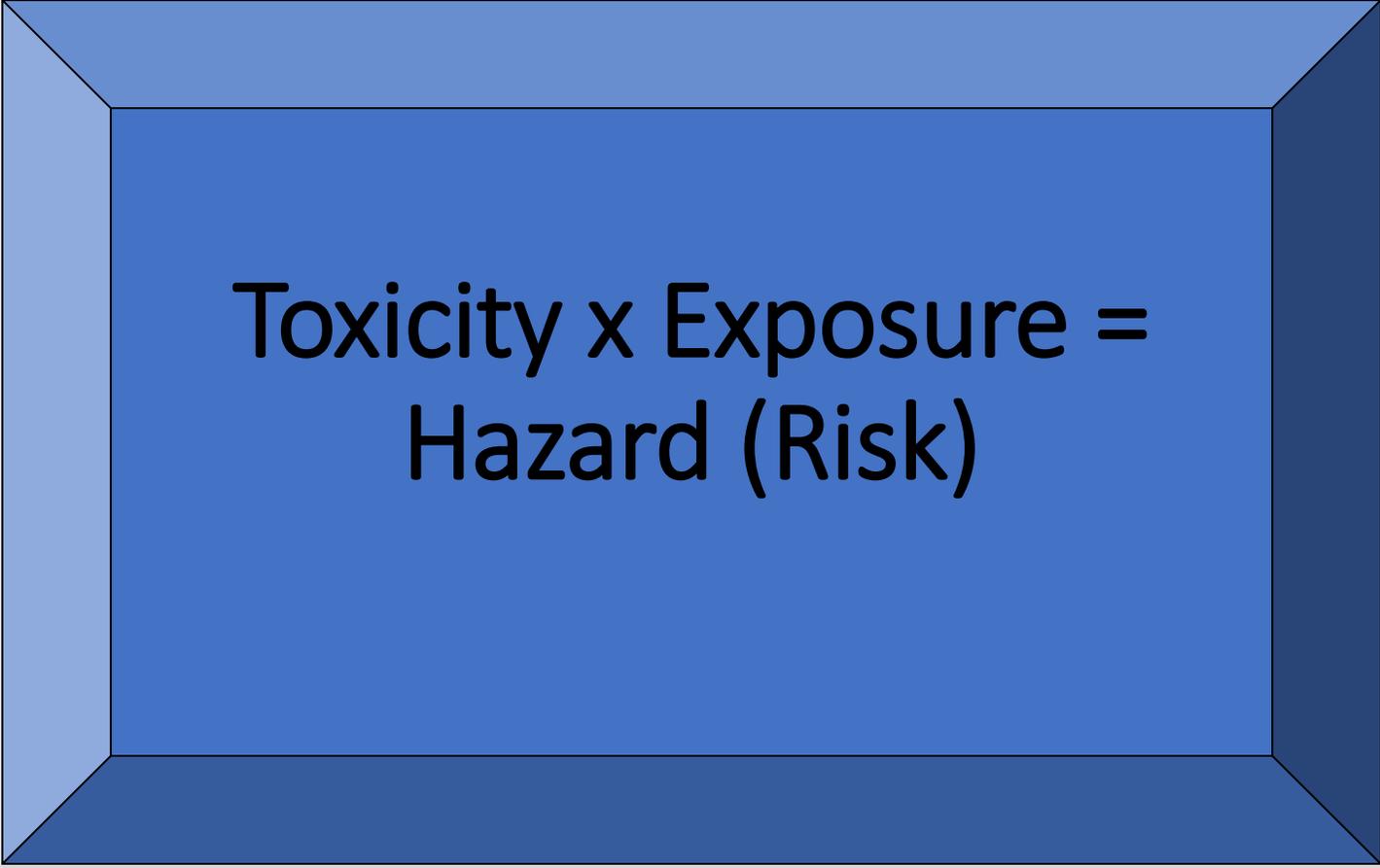
Amount of toxin (in milligrams)
per Kilogram of body weight of
the test subject (same as parts
per million)

Mg/Kg



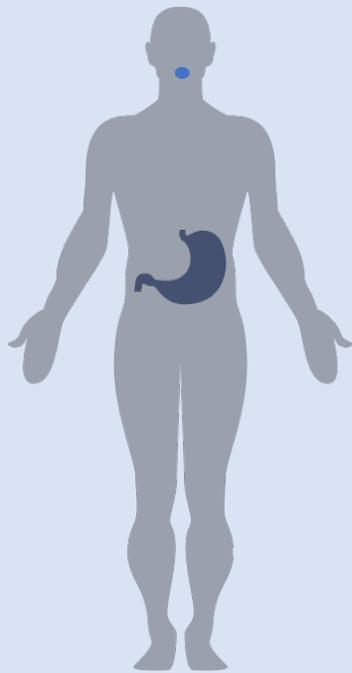
Hazard Indicators	Toxicity Categories			
	I Highly Toxic	II Moderately Toxic	III Slightly Toxic	IV Relatively Nontoxic
Oral LD ₅₀	0 to 50 mg./kg.	From 50.1 to 500 mg./kg.	From 500.1 to 5000 mg./kg.	Greater than 5000.1 mg./kg.
Inhalation LC ₅₀	0 to .2 mg./liter.	From .2 to 2 mg./liter	From 2.1 to 20 mg./liter	Greater than 20.1 mg./liter
Dermal LD ₅₀	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

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

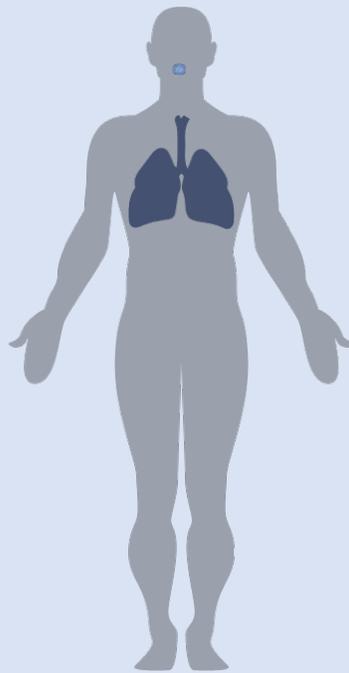

$$\text{Toxicity} \times \text{Exposure} = \text{Hazard (Risk)}$$

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

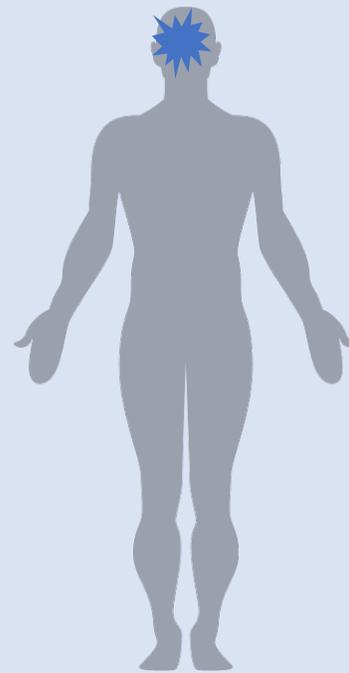
Routes through which pesticides can enter the body



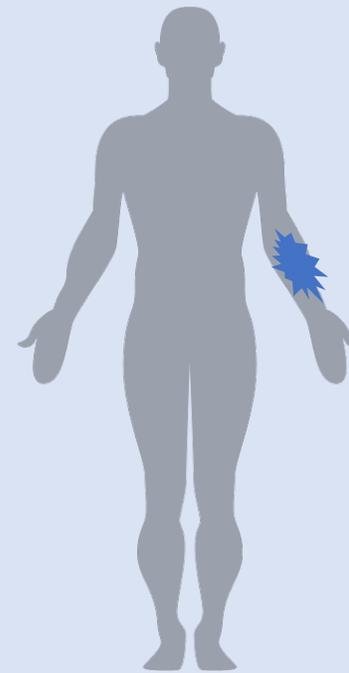
Oral



Inhalation



Ocular

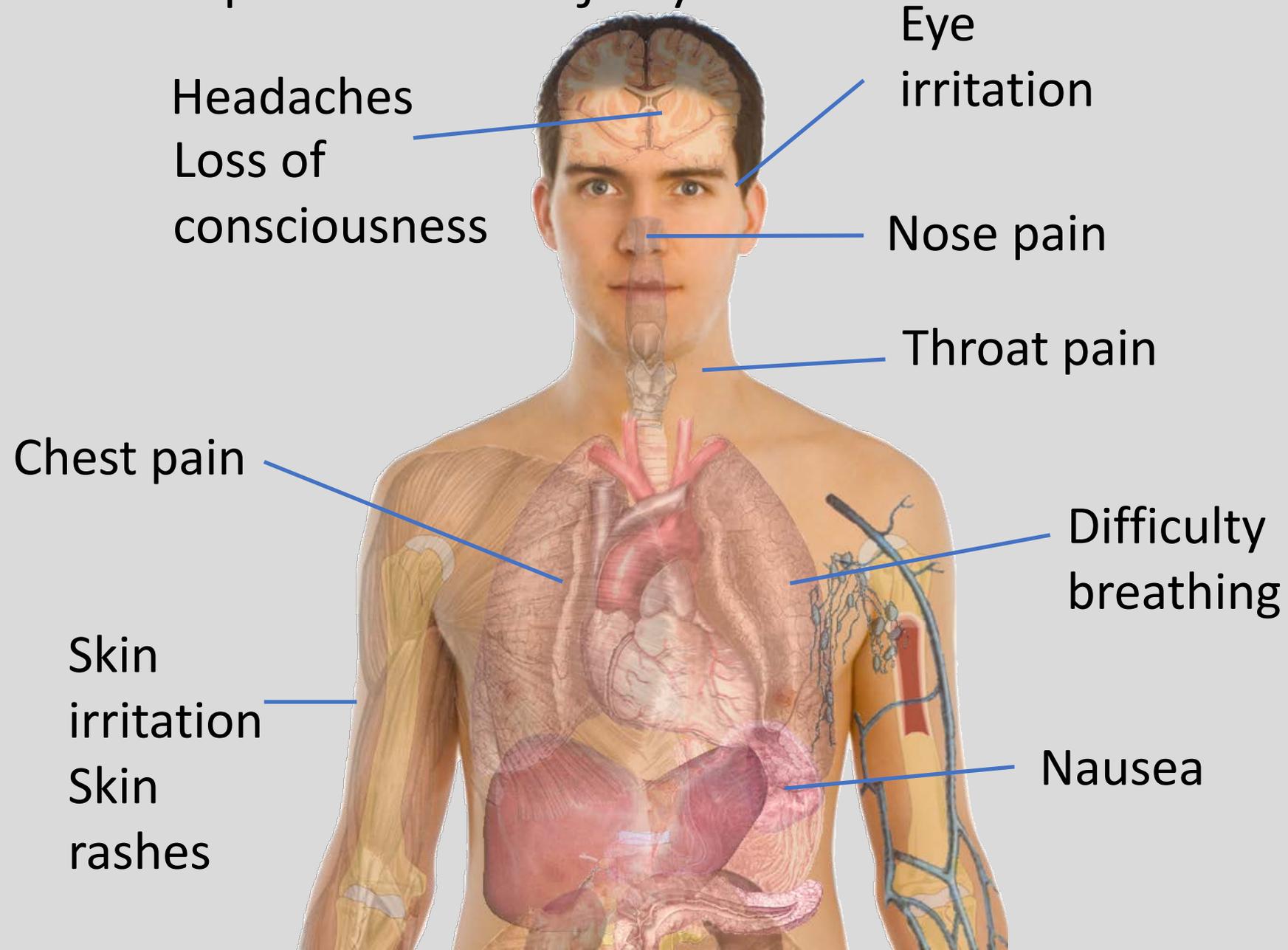


Dermal

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

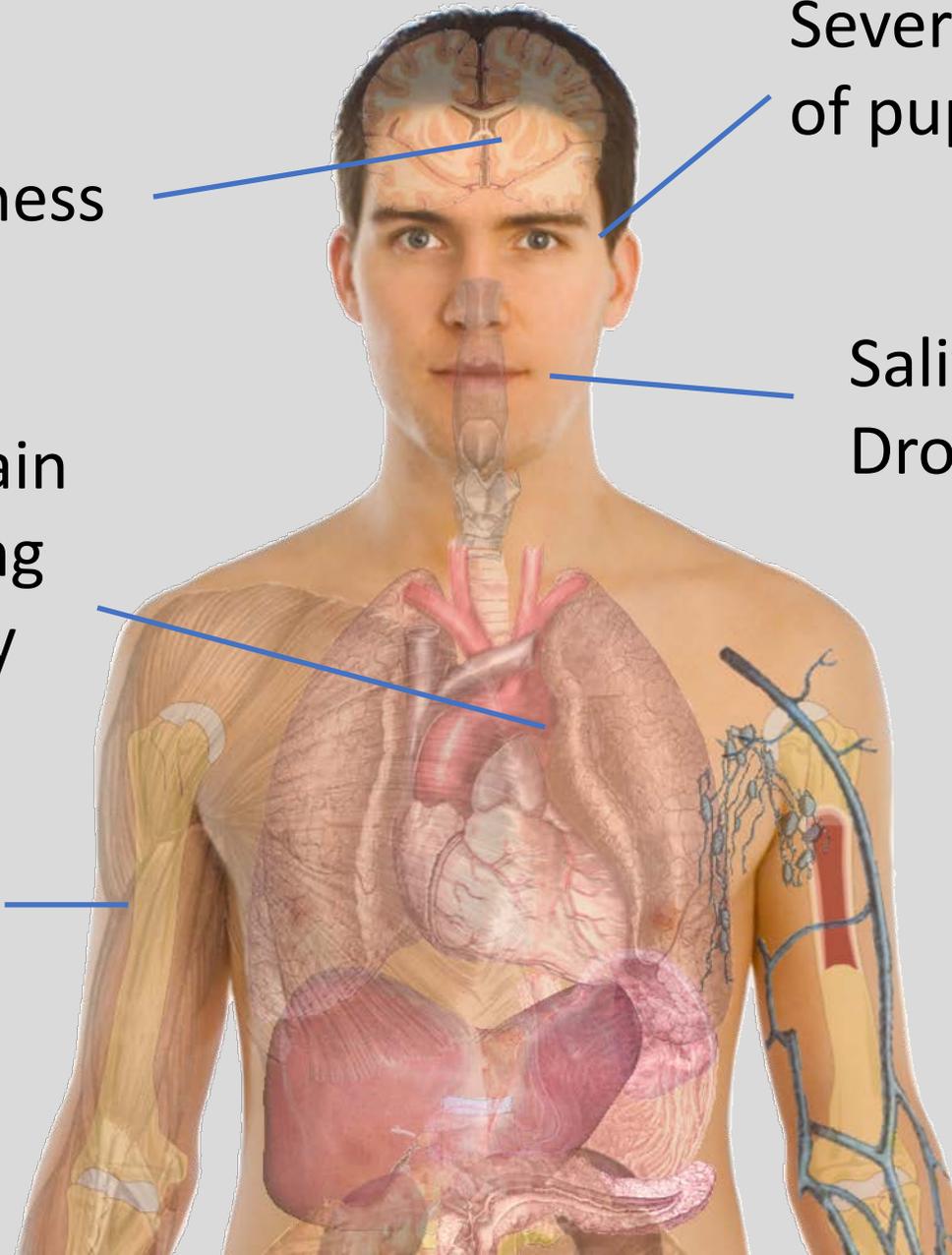
Unconsciousness

Severe constriction
of pupils

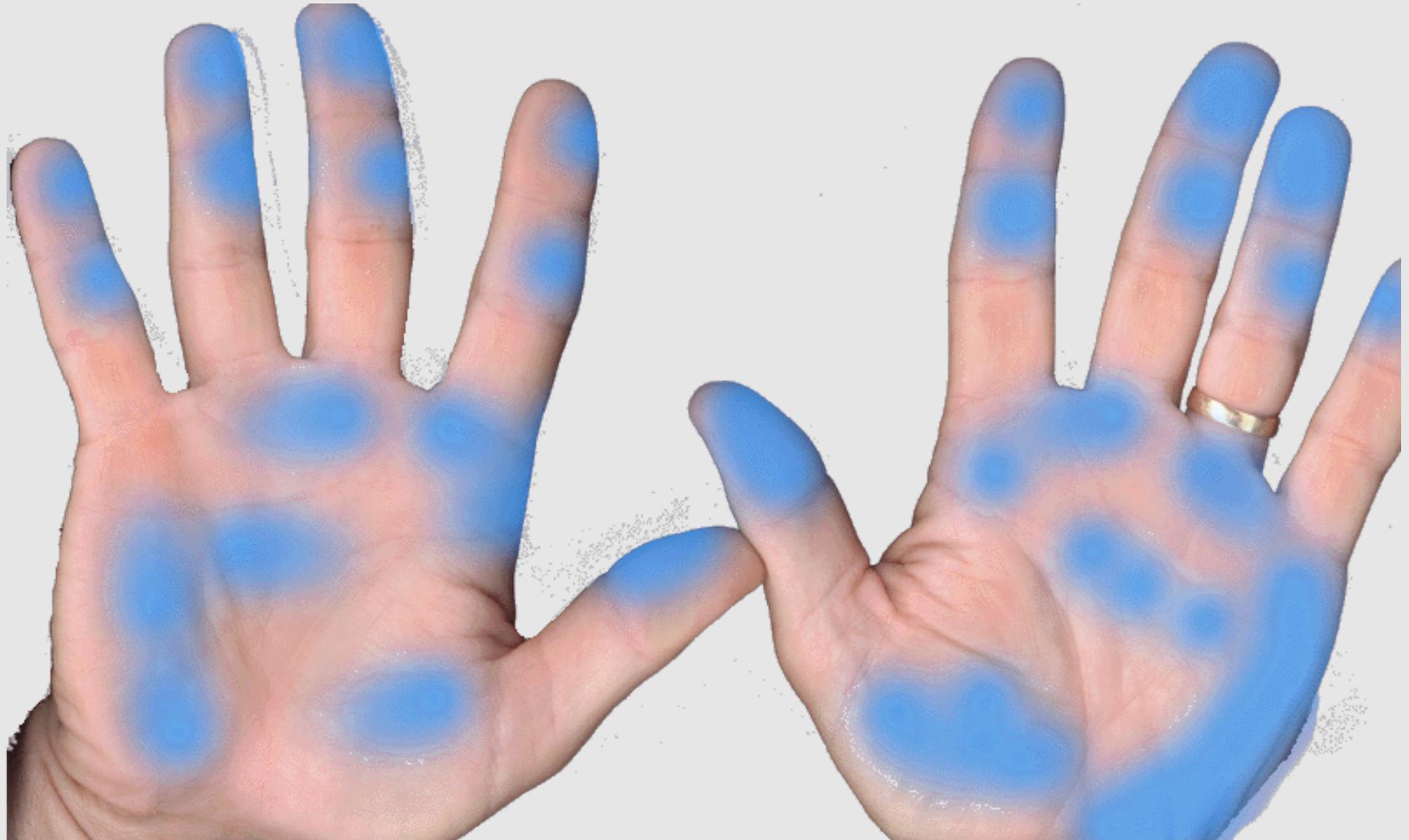
Chest pain
Breathing
difficulty

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

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

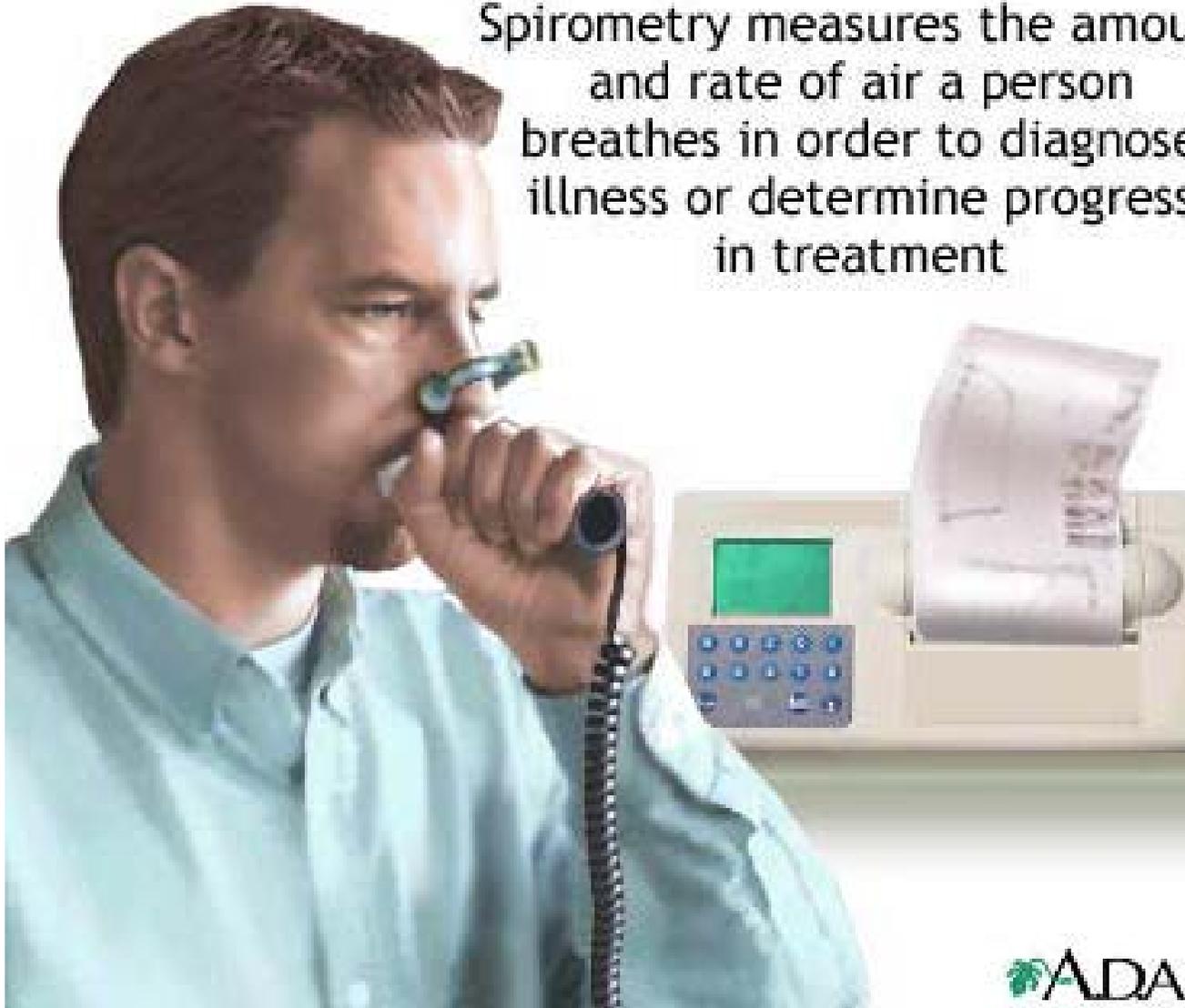


Respirators

- 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



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

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



Pesticide Storage Guidelines

- 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!



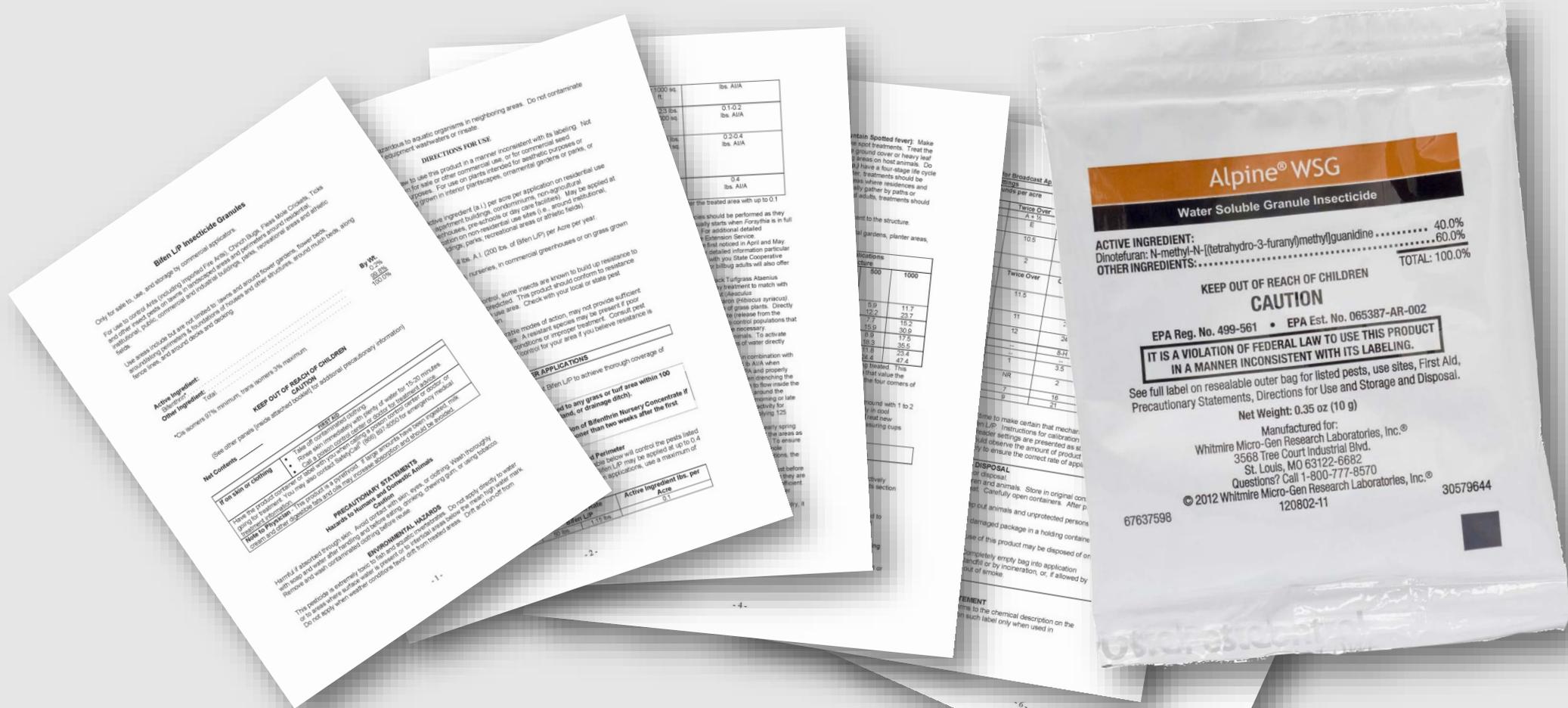
Read the label

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
fruit trees, ornamental
plants, or lawns.
Do not use on
crops or plants
intended for
human consumption.
Do not use on
crops or plants
intended for
animal consumption.
Do not use on
crops or plants
intended for
export.

AGE REQUIRE

For children 12 years
and under, use
only on lawns,
patios, and
walkways. Do
not use on
crops or plants
intended for
human consumption.
Do not use on
crops or plants
intended for
animal consumption.
Do not use on
crops or plants
intended for
export.

Do not use on
crops or plants
intended for
human consumption.
Do not use on
crops or plants
intended for
animal consumption.
Do not use on
crops or plants
intended for
export.

Do not use on
crops or plants
intended for
human consumption.
Do not use on
crops or plants
intended for
animal consumption.
Do not use on
crops or plants
intended for
export.

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



10 STATEMENT OF PRACTICAL TREATMENT
IF SWALLOWED: Induce vomiting by giving a representative of salt in a glass of
warm water. Rinse with warm 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 vapors.
Avoid contact
with or ingestion of
the Mixing Enclosure
material and the portion
containing Safety &
Instruction. If breathing
000-000-0000
TO PHYSICIAN: Call
physician and
provide such as EPA
2mg, intravenously or
by other route and dose.

11 ENVIRONMENT
This product is toxic
to other aquatic life.
Do not use in
streams, rivers, or
other bodies of water.
Do not use in
areas where it may
be carried by wind
to other areas.
Do not use in
areas where it may
be carried by wind
to other areas.
Do not use in
areas where it may
be carried by wind
to other areas.

PHYSICAL OR
HAZARD
Flammable. Keep
open flame.

DIRECTIONS

Use a minimum of 100
gallons per acre in a
manner of
spraying.

12 RE-ENTRY
Do not enter area until
application.

CATEGORY OF

For use only by
agreed
applicators.

13 STORAGE AND

STORAGE: Store in
a cool, dry place.
Do not store near
food, feed, or
other articles
intended for
human or animal
consumption.
Do not store
near
open flames.
Do not store
near
open flames.
Do not store
near
open flames.

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

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.

* This poster describes the minimum information that an SDS must include to comply with the HCS 2012. "Non-Mandatory" sections fall outside of OSHA's jurisdiction and will not be enforced. However, they are included to show what a fully GHS-compliant SDS would require— in addition to the OSHA-mandated ones.

1 Identification



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

2 Hazard(s) Identification



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

3 Composition/Information on Ingredients



For Substances

- Chemical name;
 - Common name and synonyms;
 - CAS number and other unique identifiers;
 - 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.

4 First Aid Measures



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

5 Fire Fighting Measures



- Suitable (and unsuitable) extinguishing media;
- Specific hazard arising from the chemical (e.g., nature of any hazardous combustion products);
- Special protective equipment and precautions for fire-fighters.

6 Accidental Release Measures



- Personal precautions, protective equipment, and emergency procedures;
- Methods and materials for containment and cleaning up;

7 Handling and Storage



- Precautions for safe handling;
- Conditions for safe storage, including any incompatibilities.

8 Exposure Controls/Personal Protection



- 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;
- Appropriate engineering controls;
- Individual protection measures, such as personal protective equipment.

9 Physical and Chemical Properties



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

10 Stability and Reactivity



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

11 Toxicological Information



- Description of various toxicological (health) effects and available data:
- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);
 - Symptoms related to the physical, chemical and toxicological characteristics;
 - Delayed and immediate effects and also chronic effects from short and long term exposure;
 - Short-term measures of toxicity (such as acute toxicity parameters);

12 Ecological Information (Non-Mandatory)



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

13 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.

14 Transport Information (Non-Mandatory)



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

15 Regulatory Information (Non-Mandatory)



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

16 Other Information



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

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

- **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

Revised Hazard Communication Standard: 29 CFR 1910.1200

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

CHEMICAL LABELS

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

- Pictogram:** A visual warning that identifies the hazards of a specific chemical.
- Signal Word:** A single word to indicate the severity of a hazard. Danger = severe. Warning = less severe.
- Hazard Statement:** Describes the hazard(s) of a chemical dependent on its hazard class and category.
- Precautionary Statements:** 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.

- 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.
- Hazard identification:** includes all hazards regarding the chemical required label elements.
- Composition/information on ingredients:** includes information on the chemical's ingredients, such as their ratios.
- First-aid measures:** includes acute and delayed symptoms, required treatment.
- Fire fighting measures:** lists suitable extinguishing equipment, chemical hazards from fire.
- Accidental release measures:** lists emergency procedures, protective equipment, proper methods of containment and cleanup.
- Handling and storage:** lists precautions for safe handling and storage, including incompatibilities.
- Exposure controls/personal protection:** lists OSHA's Permissible Exposure Limits (PELs), Threshold Limit Values (TLVs), workplace engineering controls, personal protective equipment (PPE).
- Physical and chemical properties**
- Stability and reactivity**
- Toxicological information**
- Ecological information***
- Disposal considerations***
- Transport information***
- Regulatory information***
- Other information**
*not required on SDS

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**

English version [shown here](#)

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*



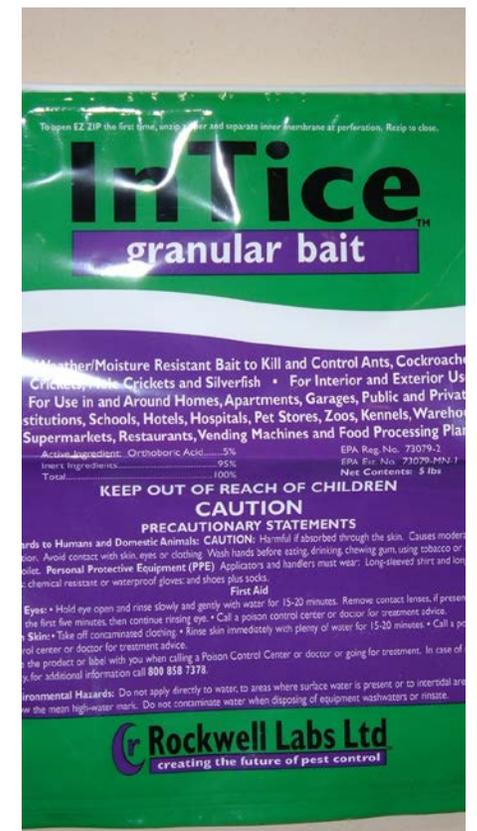
A quick list of Green Category Pesticides

- 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)

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



Insect growth regulators

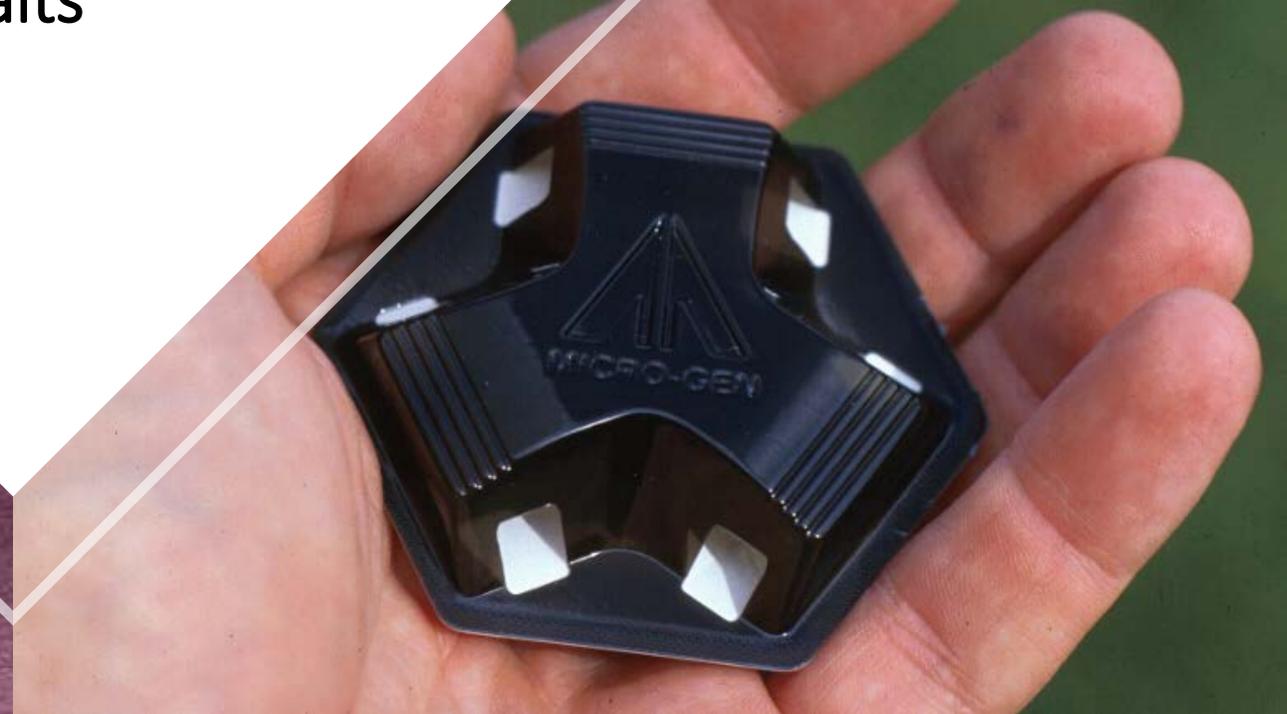
Inaccessible baits

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





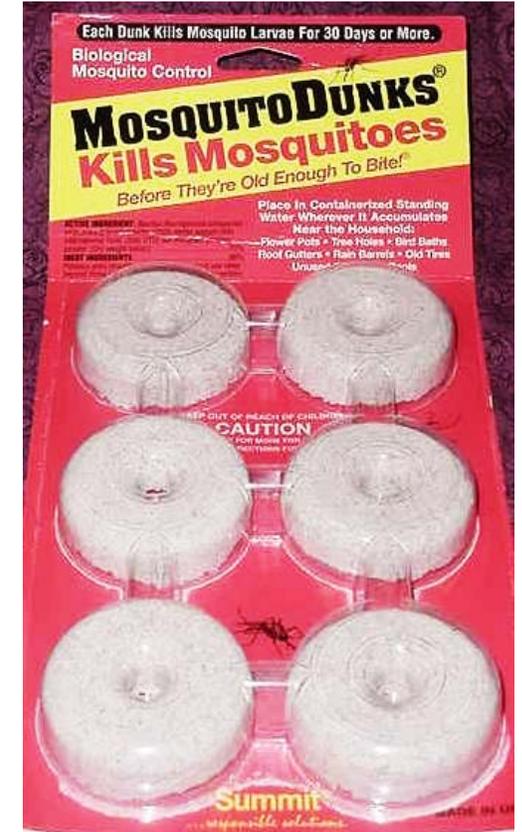
Baits



Microbe-based pesticides

- 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

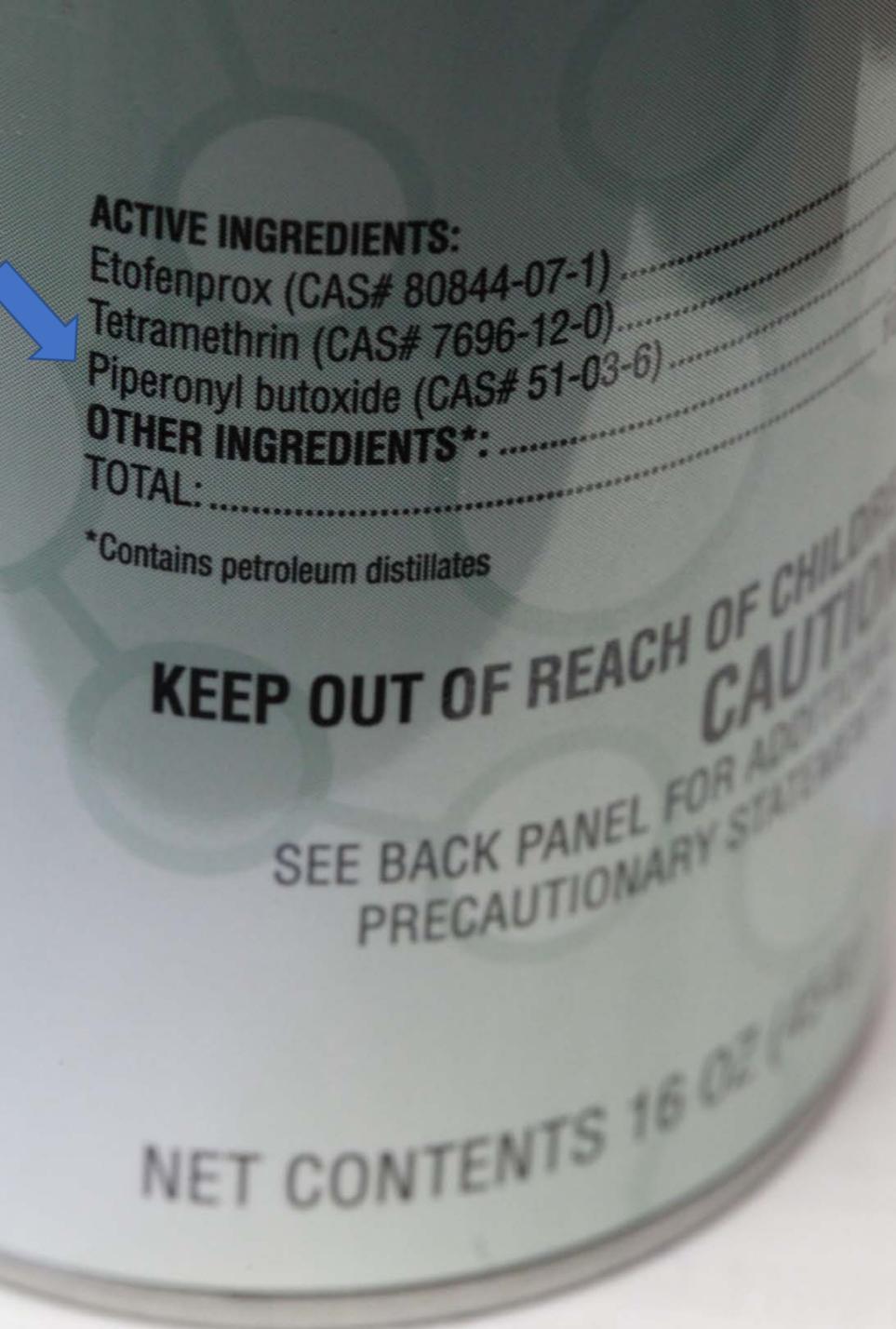




Chrysanthemum cinerariifolium

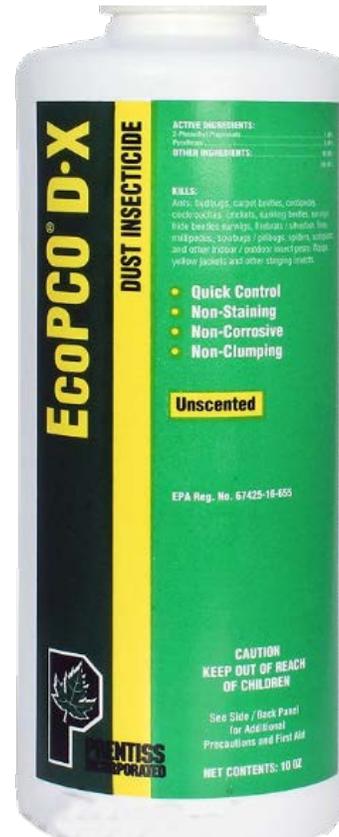
Pyrethrins

- 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

- 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

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

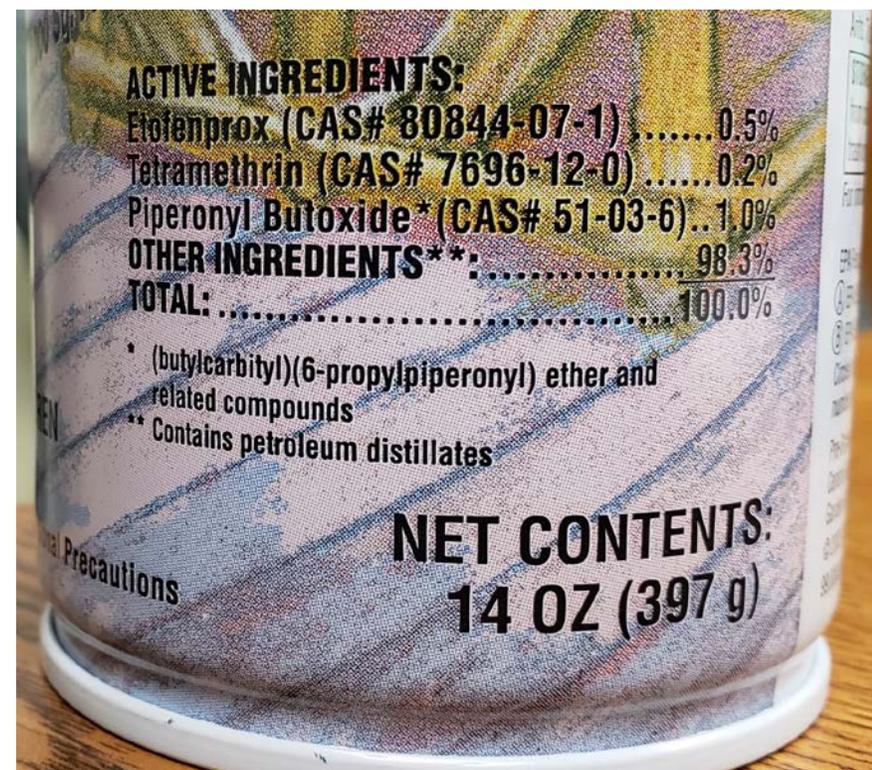




Pyrethroids

Most will be Yellow Category

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



Yellow Products Examples



Example 1 Yellow Category

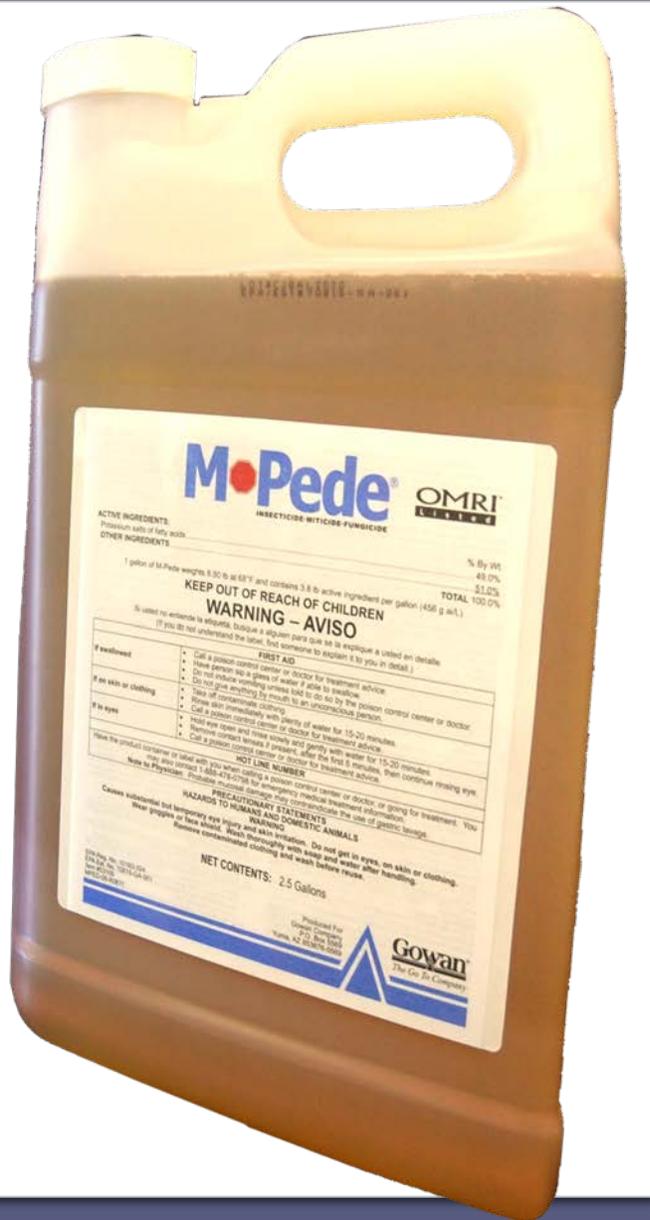
There are multiple fire ant mounds that appeared after a spring or fall rain on an athletic field or playground. The IPM coordinator contacts the pesticide applicator and requests a treatment ASAP.

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

- 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?