Worker Protection Standards for Pesticide Handlers

Environmental Health, Safety, and Risk Management

Stephen F. Austin State University

Applicator's License

* All employees handling and applying restricted-use and regulated pesticides on SFA property must hold a current Pesticide Applicator License issued by the Texas Department of Agriculture (TDA).

* Provide a copy of the applicator's license to the Environmental Health, Safety, and Risk Management Department (EHSRM) when issued or renewed at P.O. Box 6113,

  or Fax to: 468-7312.

Worker Protection Standard (WPS)

- WPS is a regulation issued by the US EPA.
- It covers pesticides used in the production of agricultural plants on farms, forests, nurseries, and greenhouses.
- Requires SFA to take steps to reduce the risk of pesticide related illness or injury by:
  - Providing training, Personal Protective Equipment (PPE), and Proper Storage Facilities.

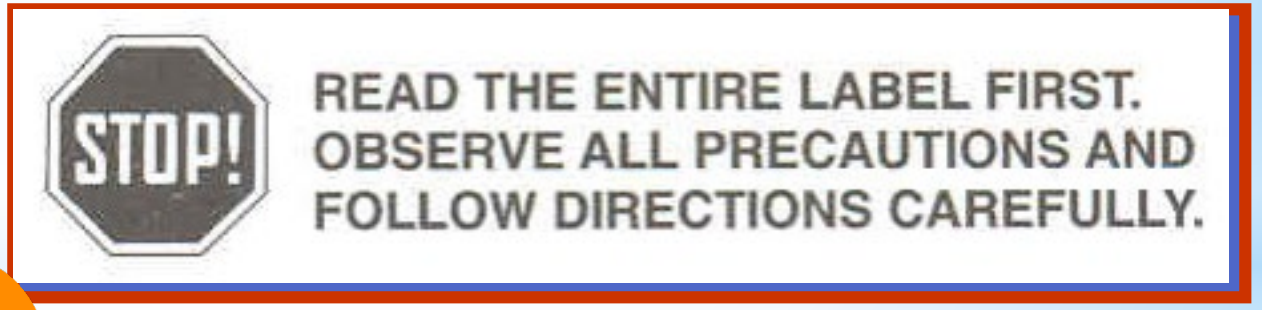
Labeling

By law, pesticide labels must contain the following information:

- Active ingredients
- Warnings
- Storage
- Disposal
- Hazards (Physical, Chemical, Environmental)
- Directions for use

Pesticide Labels

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



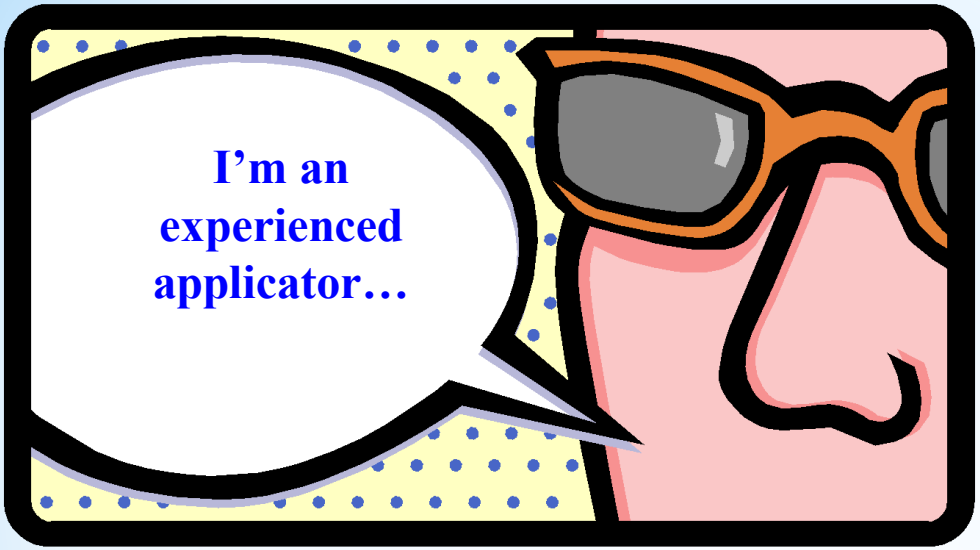
Labeling

Pesticide applicators have the legal responsibility to read, understand and follow the label directions.

Quite often, pesticide applicators fail to take the time to read or follow the specified safety precautions that the label provides.

Why should I really care?

- Because the label is a legal document.
- Applying a pesticide in a manner inconsistent with the label is illegal.
- "I didn't know it said that" is not a good defense if you misuse a pesticide.



Common excuses for not reading the label

I've used this product for years…

I'm too busy…

Problems that can be (and have been) caused by not reading and following the label.

- Crop loss
- Fish kills
- Near fatal exposures
- Fatal exposures
- Fire and explosion

Trade, Brand, or Product Names

- Companies register trade names as a trademark.
- The same active ingredient may be sold under different trade names.

Trade or Brand Names

Be careful, some products with different brand names may have the same active ingredients

For example: Azoxystrobin is the active ingredient in:

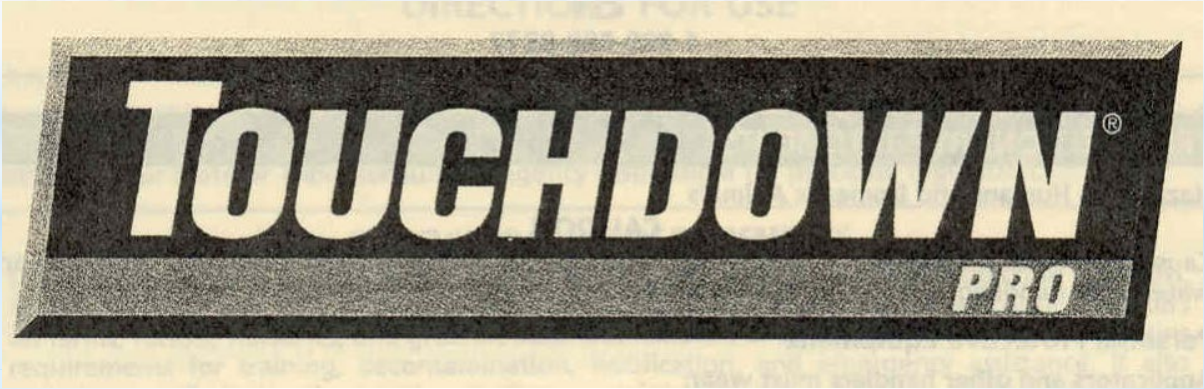
Heritage

Abound

Quadris

Can I substitute these products for each other to control aquatic weeds ?

Same active ingredient: ?? Glyphosate



Same active ingredient: ?? Glyphosate

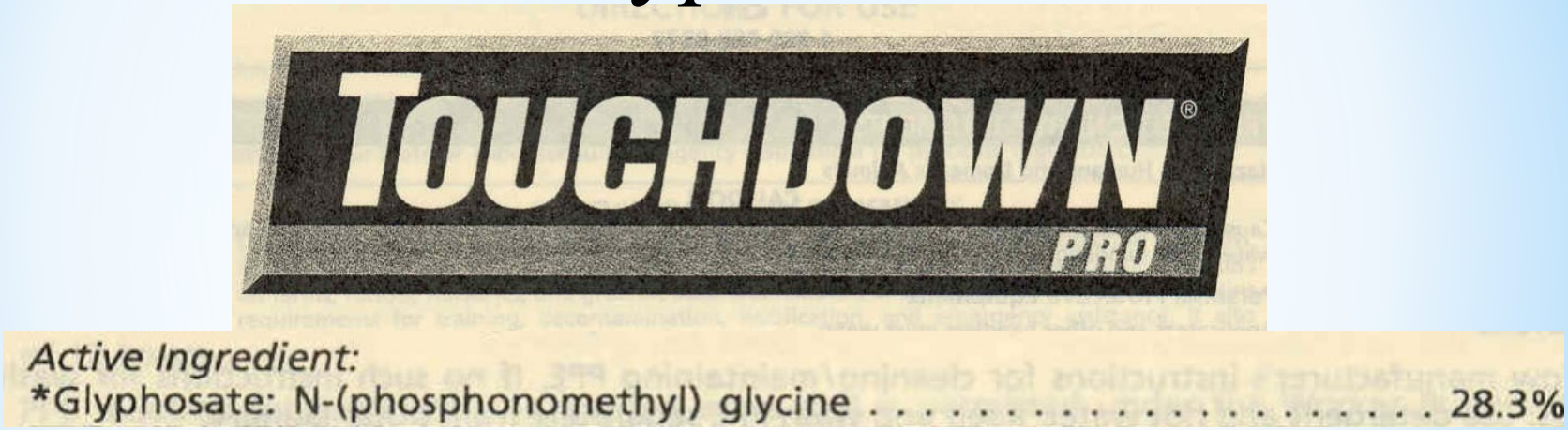
ACTIVE INGREDIENT:
Glyphosate (N-(phosphonomethyl)glycine)
in the form of its isopropylamine salt 41.0%

AQUATIC AND NONCROP SITES

AQUATIC SITES:

This product may be applied to emerged weeds in all bodies of fresh and brackish water which may be flowing, non-flowing, or transient. This includes lakes, rivers, streams, ponds, estuaries, irrigation and drainage ditches, canals, wildlife habitat restoration and management areas, and similar sites including the following:

Same active ingredient: ?? Glyphosate



Environmental Hazards:

Do not apply directly to water, or areas where surface water is present, or intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash water.

Read the Label

- First step for safe pesticide use
- Provides directions for correct application
- Pesticides can only be applied to a site identified on the label
- Provides safety guidelines and medical information

Follow the Label

- It is a violation of federal and state law to use a product in a manner inconsistent with its labeling
- Worker Protection
- Rates of application
- Mixing procedures
- Application
- Cautions

Follow the Label Directions

The following pesticide applications are considered off label and therefore are illegal:

- Applying above the highest dose rate
- Applying more frequently than the label allows
- Applying without using PPE
- Applying to a site that is not on the label

Reduce Pesticide Exposure

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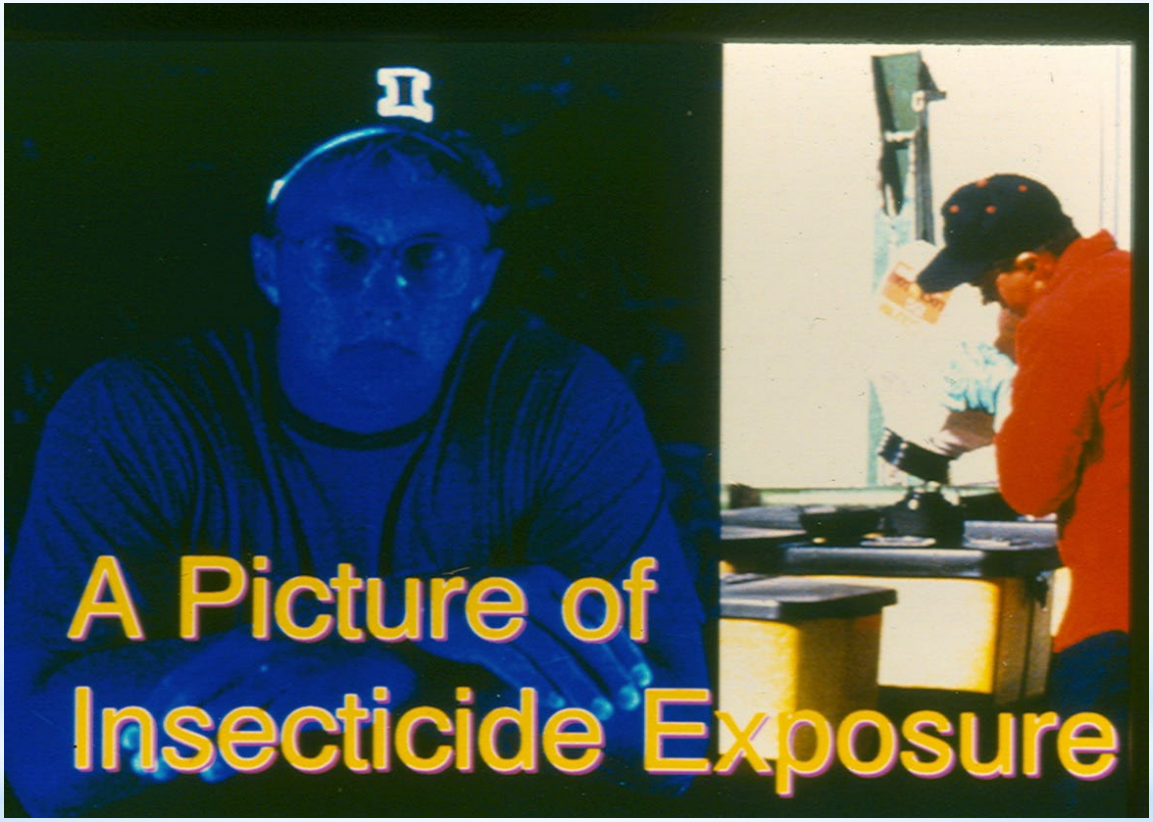
Insecticide Exposure



Picture: Courtesy of TAMU, College Station, TX

Note the PPE in this picture

Picture: Courtesy of TAMU, College Station, TX

Exposure

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Note the PPE in this picture

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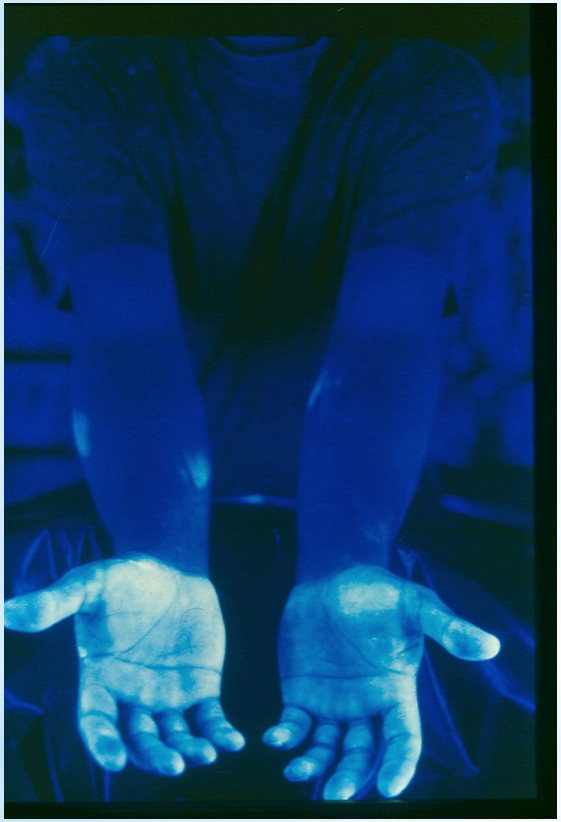
Exposure



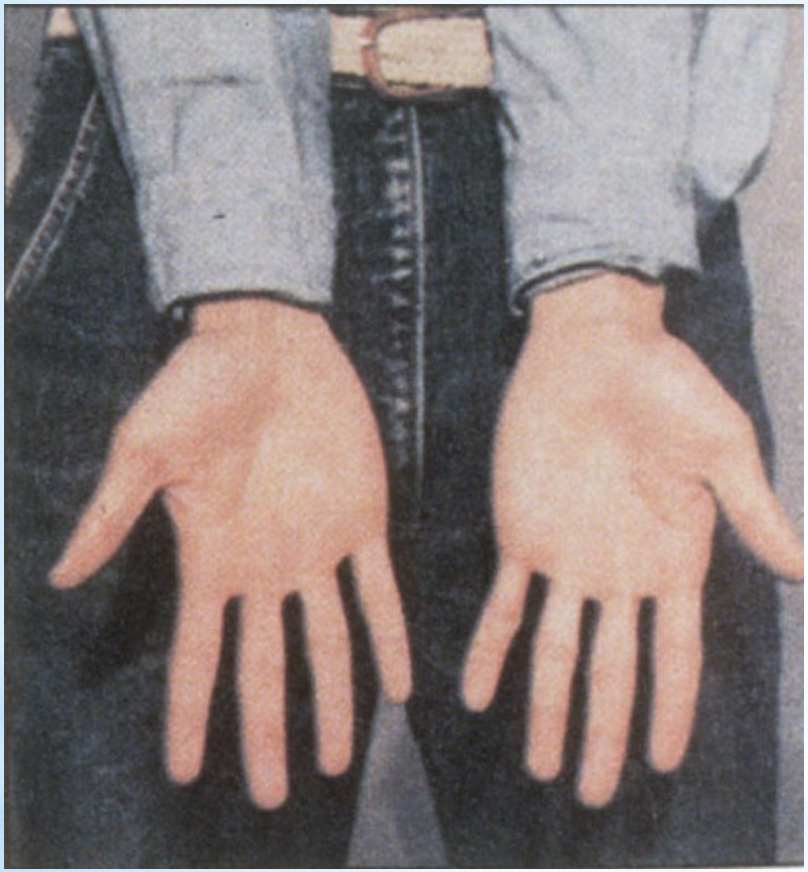
Pictures: Courtesy of TAMU, College Station, TX

PE i re

Exposure

Pictures: Courtesy of Mary Ketchersid, TAMU, College Station, TX

Exposure to Hands *Without* Gloves



Pictures: Courtesy of Mary Ketchersid, TAMU, College Station, TX

Exposure to Hands *With* Gloves

Pictures: Courtesy of TAMU, College Station, TX

Reduce Risk of Pesticide Use

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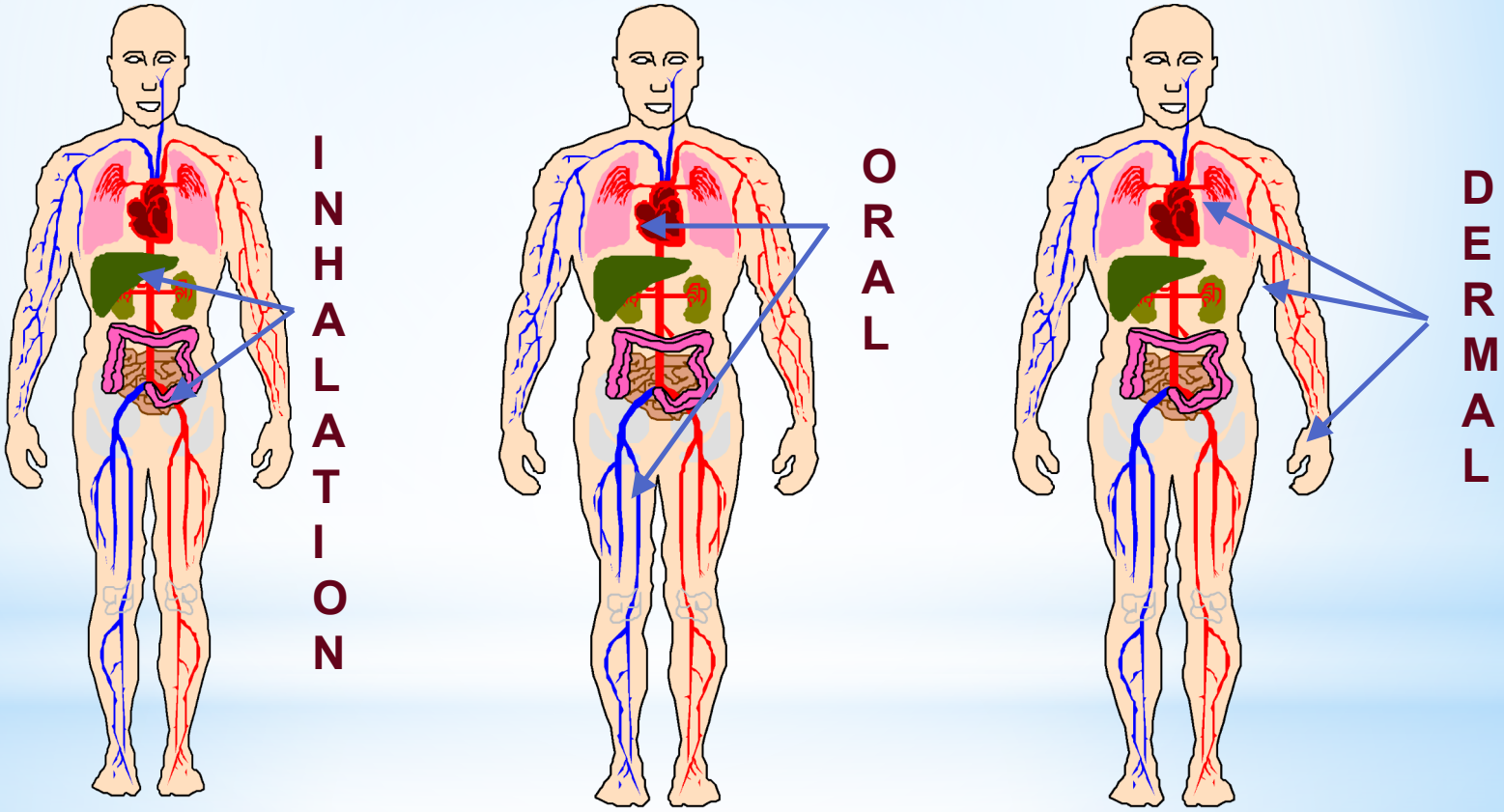
Risk Factors

- Toxicity
  - Nature of the chemical
  - Interaction with other chemicals
- Exposure
  - Dose
  - Route
  - Duration
  - Frequency

Factors That Increase Risk

- Toxicity
  - chemicals
  - physical conditions
  - human health factors
- Exposure (handler)
  - mixing/loading
  - application
  - cleanup
  - storage/transport
  - disposal
- Exposure (workers/public)
  - entering treated areas
  - movement off site
  - transport
  - mix/load/storage sites
  - disposal
  - spills
  - exposure to treated crops

Exposure Routes



Means of Exposure to Pesticides

- Oral
  - Unwashed Hands
    - eating
    - smoking
  - Unwashed Foods
- Inhalation
  - Dusts
  - Vapors
- Dermal (Skin &eyes)
  - Spills and splashes
  - Open cuts
  - Inadequate protective clothing

Chemical Absorption by Human Skin

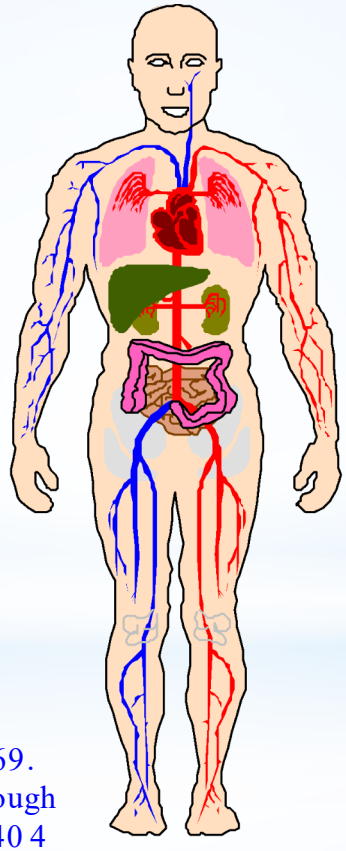
Foot arch 1

Palm 6 X

Forearm 8 X

Back 12 X

Scalp 25 X



Armpit 26 X

Forehead 43 X

Jaw 93 X

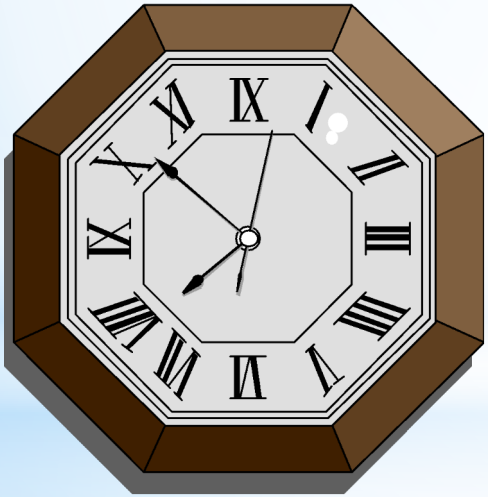
Scrotum 300X

Data from Feldman R.J. and H.I. Maibach. 1969. Absorption of some organic compounds through the skin in man. J. Invest.Dermatol., 54:339-40 4

Duration of Exposure Can Be:

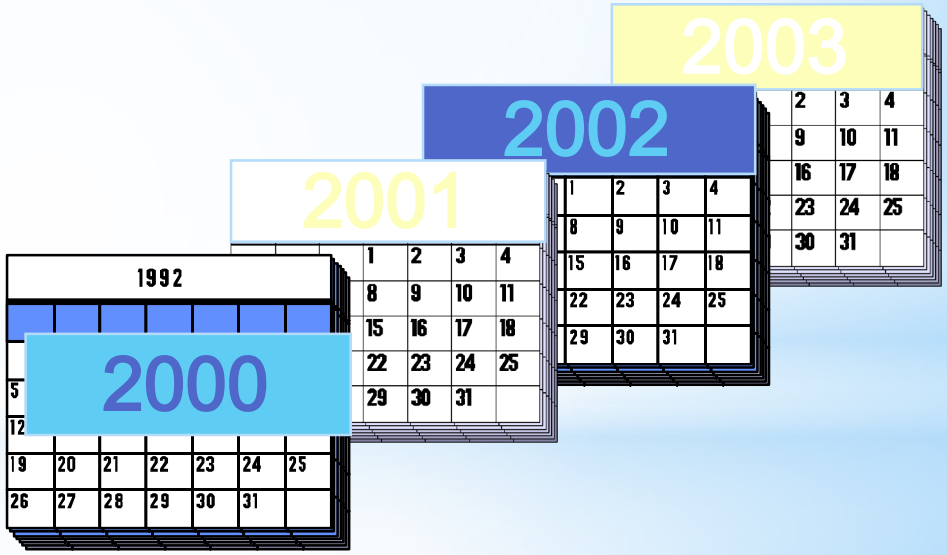
ACUTE

(minutes or hours)



CHRONIC

(weeks or years)



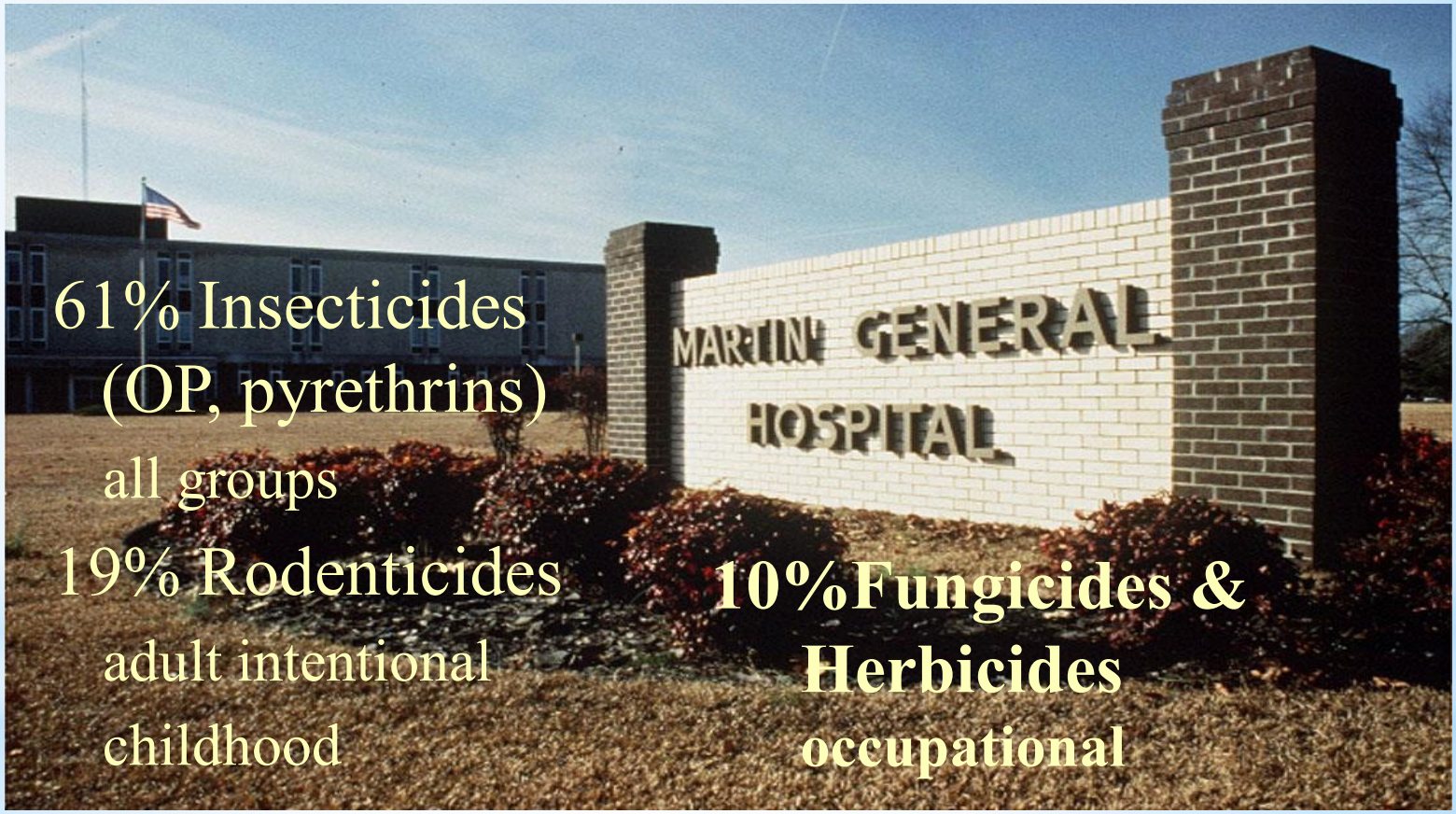
REMEMBER:

Repeated low-level exposure to chemicals that have potential to cause long-term effects can greatly increase the risk of chronic adverse effects.

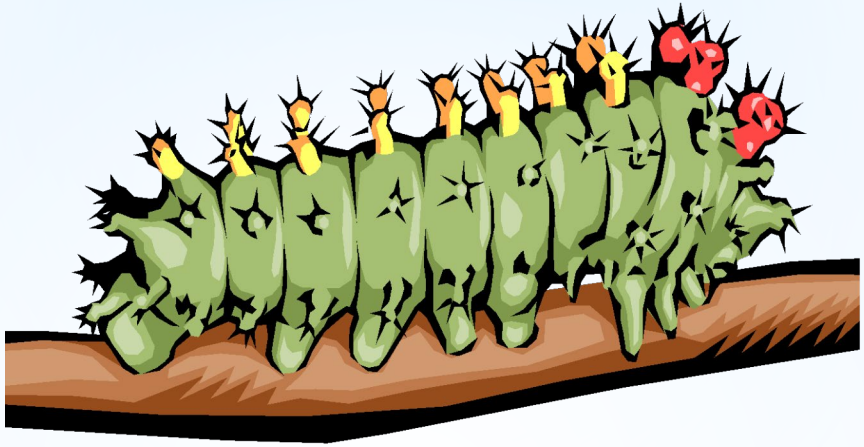
Chronic Health Effects Potentially Associated with Pesticide Exposure

- Cancer
- Reproductive Effects
- Birth Defects
- Nervous System Damage

Hospitalized Pesticide Poisoning in North Carolina, 1990-1993



Why are some pesticides a greater health risk?



The nervous system of insects and humans have common characteristics

Nervous System

- Nerves communicate by electrical signals
- Special proteins called “transmitters” carry the electrical signal across the gap between two nerves

Nervous System

- Other proteins called enzymes, clean out the gap so the nerve is ready for the next signal
- Insects and humans have some of the same transmitters and enzymes

Organophosphate (OP's) & Carbamate Insecticides

OP's	**Carbamates**
acephate, Orthene	carbaryl, Sevin
disulfoton, Di-Syston	aldicarb, Temik
chlorpyrifos, Lorsban	oxamyl, Vydate L
fonofos, Dyfonate	carbofuran, Furadan
malathion, Malathion	methomyl, Lannate
diazinon, Spectracide	

Common Symptoms of OP & Carbamate Exposure

- dizziness
- nausea
- vomiting
- diarrhea
- excessive urination
- excessive tears
- excessive sweating
- excessive salivation
- pinpoint pupils (eyes)

Organophosphates

- Mode of Action
  - Irreversible inhibition of acetylcholinesterase (AchE)
- Treatment
  - Atropine
  - 2-PAM (Pralidoxime)
  - Supportive therapy

Carbamates

- Mode of Action
  - Reversible inhibition of acetylcholinesterase (AchE)
- Treatment
  - Atropine
  - Supportive therapy

Monitoring OP/Carbamate Exposure

- Blood cholinesterase analysis
- Baseline determination is important
- Depression of 25% or more is indicative of serious overexposure

Conditions Confused With Pesticide Poisoning

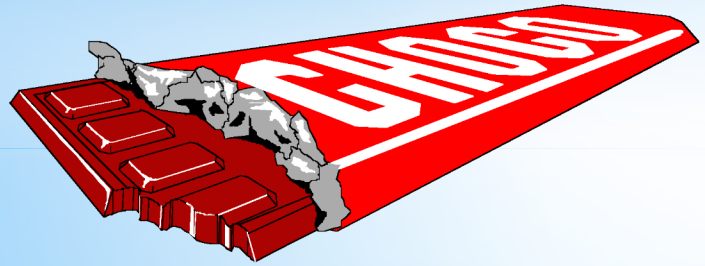
- Heat stress
  fatigue, dizziness, severe thirst, heavy sweating, altered behavior, headache, nausea, chills
- Green tobacco sickness
  stomach cramps, nausea, vomiting, difficulty breathing, dizziness

Emergency Response

- Remove the person from exposure
- Follow label or Safety Data Sheet (SDS) first aid instructions
- Call 911 or take them to ER or MD
- Give EMT's label, SDS & exposure information

Skin Conditions Associated with Pesticide Exposure

- Irritation
- Allergy



Allergies can

- Trigger an asthma attack
- Cause shock
- Cause rashes, blisters, contact dermatitis
- Cause itchy, watery eyes, sneezing

Pesticides Associated with Allergic Reactions

permethrin, Pounce, Ambush

rotenone, various

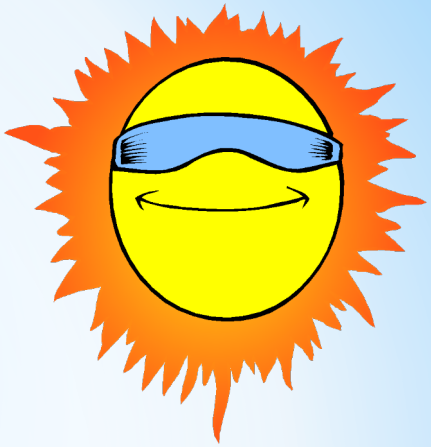
maneb, Maneb

dazomet, Basamid

Could be anything !

Importance of Allergic Reactions

- Permanent
- Worsen with recurrent exposures
- Can be fatal
- Allergy to similar substances



The signs and symptoms of a pesticide poisoning are similar to

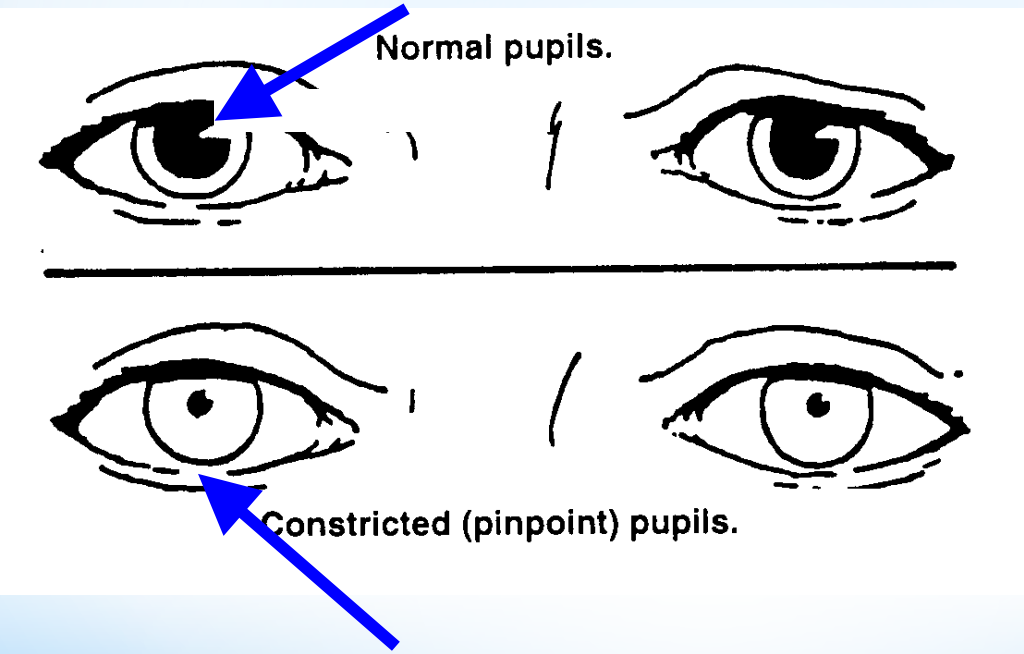
Heat Stress

Heat Stress Symptoms

- Exhaustion, headache, nausea, chills, dizzy
- Thirsty and dry mouth
- Clammy skin or hot, dry skin
- Heavy sweating or not sweating
- Confused, slurred speech, irrational
- Death

Heat Stress Symptoms

Pupils of a heat stress victim are normal



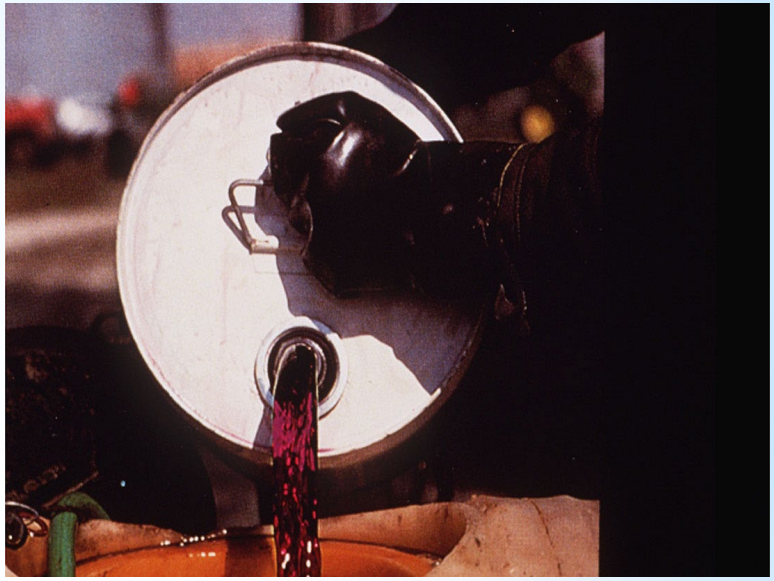
Pupils of an OP pesticide poisoning victim are pinpoint (constricted)

Heat Stress

- Move to shade
- Rapidly cool victim - splash or sponge cool water on skin
- Drink as much water as possible
- Stay calm and call for help

To Minimize Pesticide Exposure:

- Know the chemical and associated hazards
- Read and follow the label instructions



First Aid for Pesticide Poisoning

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Spill on Skin

- Remove pesticide and contaminated clothing immediately.

- Use liquid soap and don't forget hair and fingernails.

Breathing a Pesticide

- Get to fresh air immediately.
- Get medical help.

Swallowing a Pesticide

- Rinse mouth repeatedly with water.
- Get medical help - don't induce vomiting without first checking the label.

Eye Exposure

- Rinse with clean water for at least 15 minutes.
- Get medical help.

Decontamination Kit

- Clean water
- Soap or detergent
- Single use towels (disposable)
- Emergency phone numbers

Safety Precautions

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Washing and Bathing

- Shower or bathe daily after using pesticides.
- Wash hands before touching anything that goes into mouth.
- Do not touch face or genitals before washing hands.

Personal Protective Equipment (PPE)-Read the Label!

- Chemical resistant or waterproof gloves
- Chemical resistant or waterproof boots
- Goggles or face shield
- Coveralls (chemical resistant or other)
- Respirator (Dust/Mist or Organic Vapor)
- Chemical resistant hat

Personal Protective Equipment (PPE)

- The label is very specific about the PPE required for mixing/loading, application, and early entry.
- The label sometimes refers to the EPA Chemical Resistance Category Selection Chart for more information (next slide).

EPA Chemical Resistance Category Selection Chart

Category Type on Label	Barrier Laminate	Butyl Rubber ≥ 14 mils	Nitrile Rubber ≥ 14 mils	Neoprene Rubber ≥ 14 mils	Natural Rubber ≥ 14 mils	Polyethylene	PVC ≥ 14 mils	Viton ≥ 14 mils
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

High: Highly chemical resistant. Clean or replace PPE at end of each day's work. Rinse off 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 min. of contact.

None: No chemical resistance. Don't use this type of material as PPE when contact is possible

Personal Protective Equipment (PPE): Gloves

Waterproof or chemical resistant gloves (read the label to determine the correct type) Never wear leather!

Natural Rubber

PPE: Gloves

- If the label says “waterproof”, you may choose gloves made of rubber or synthetic materials.
- If the label says “chemical resistant”, use the selection chart or use barrier laminate, butyl, nitrile, neoprene, or Viton ($$$).

Nitrile Rubber

Neoprene

Viton

PPE: Boots

Choose knee-high rubber or synthetic boots without holes.
Wear cuff on outside of boot.
Never wear leather.

PPE: Coveralls

"Coveralls" can be reusable types (cotton or blends) or disposable types such as Tyvek or Kleenguard.

The label will specify if "chemical resistant coveralls" (coated/waterproof material) are needed.

PPE: Eye Protection

Goggles or face shields are required if label call for eye protection. Face shield offers more protection when mixing and loading. A chemical resistant hat is sometimes specified on the label.

PPE: Respirators

- Must be made for the pesticide - see the label.
- Make sure it fits correctly - no air gaps
- Change cartridge frequently
- Wash with soap and water after use
- Store in plastic bag after washing

PPE: Respirators

- Chemical cartridge - Most common. NIOSH or MSHA approved. Organic vapor cartridges TC-23C or TC-14G.

PPE: Respirators

- Dust/Mist (MSHA/NIOSH TC-21C)
- Reduces exposure to various dusts and mists.
- Label will specify type of respirator.

Picture: Courtesy of TAMU, College Station, TX

Cleaning Contaminated PPE

Pictures: Courtesy of TAMU, College Station, TX

Cleaning Contaminated Clothing

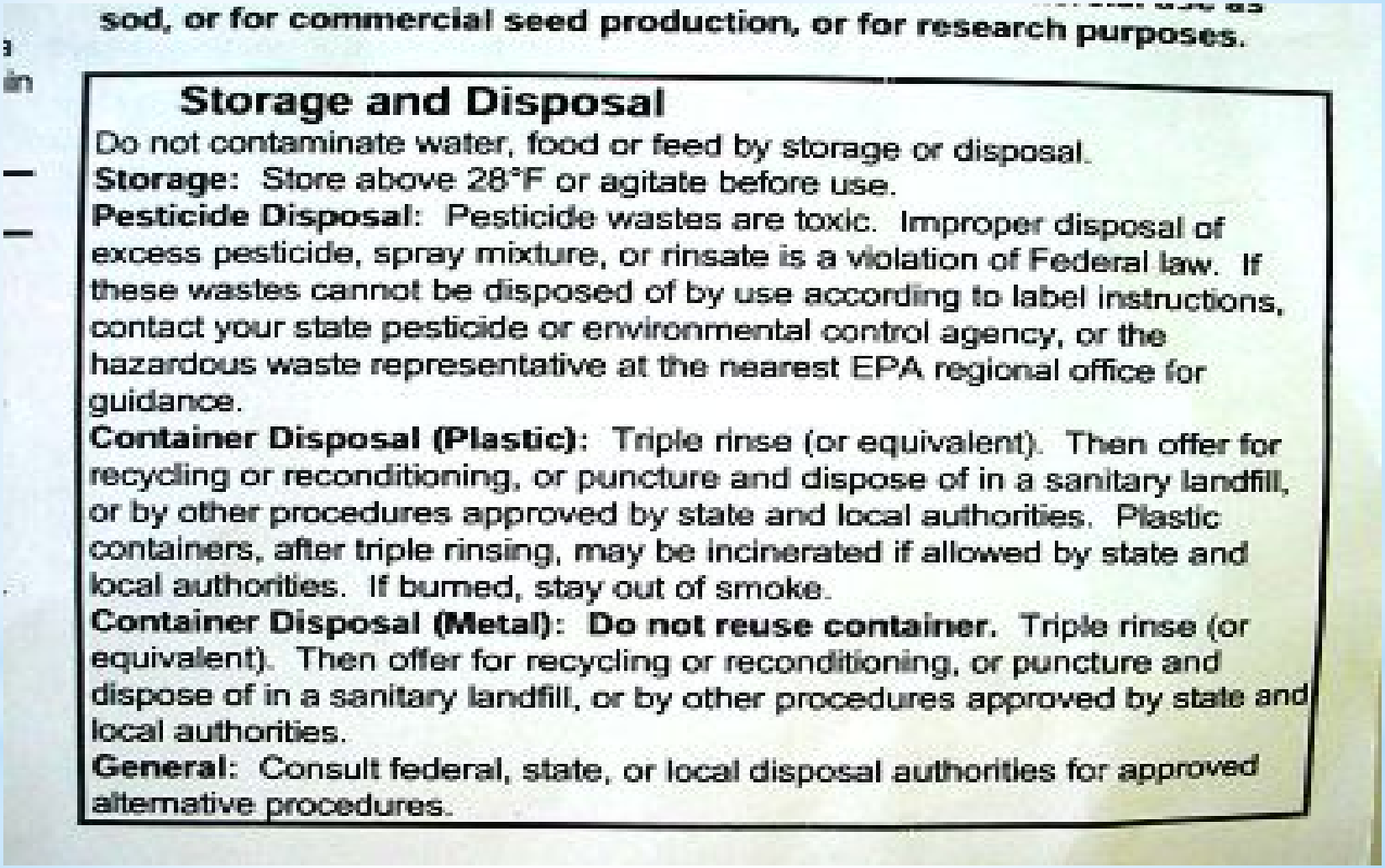
- Wash contaminated clothing daily.
- Do not attempt to clean clothing contaminated with undiluted pesticide - throw away.
- Pre-rinse, don't crowd washer, use hot water
- Use long cycle & heavy duty liquid detergent
- Keep separate from other clothing

Disposal of Excess Pesticides

- Buy only what you need for one season
- Calculate dilutions carefully
- Use all mixed pesticide as labeled
- Apply excess on site
  - Can't exceed rate and frequency
  - comply with application directions

NEVER pour excess pesticides down drains or into surface water!

Container Disposal



sod, or for commercial seed production, or for research purposes.

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.

Storage: Store above 28°F or agitate before use.

Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or environmental control agency, or the hazardous waste representative at the nearest EPA regional office for guidance.

Container Disposal (Plastic): Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. Plastic containers, after triple rinsing, may be incinerated if allowed by state and local authorities. If burned, stay out of smoke.

Container Disposal (Metal): Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

Improper Container Disposal

Improper Container Disposal

Steps for Proper Triple Rinsing

1. **Let Container Drain or Drip Into Spray Tank For At Least 30 Seconds**
2. **Fill Container 1/3 Full of Water**
3. **Replace Cap On Container and Rotate or Shake to Rinse ALL Sides**
4. **Drain Rinse Mixture From Container Into Spray Tank**
5. **Repeat Steps 2 - 4 Twice More Before Disposal of Pesticide Container**

Disposal Methods

- Storage
- Reuse
- Remediation
- Recycling
- Burial (Solid Waste)
- Incineration - NEVER in TEXAS – individual burning is not allowed

Application Equipment

- Make sure application equipment is inspected and repaired and that persons repairing, cleaning, or adjusting equipment are protected and informed.

The Dose Makes the Poison

"All substances are poisons, the right dose differentiates a *poison* from a *remedy*."

Paracelsus (1493 - 1541)

Thank You

Questions???