# Labels Formulations & Hazards

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# Pesticide Labeling

# Pesticide Classification

- Unclassified/General use
- Restricted Use (RUP)
  - Can cause harm to humans or the environment unless applied safely and correctly by licensed applicators
- Environmental Protection Agency (EPA) approves all legal pesticide labeling

# The Label

- Is the information printed on or attached to the container
- It also includes all other information (like SDS – safety data sheets) received from the supplier when you buy it


You must read the label !

# Parts of the Label
## Example

| | | |
|---|---|---|
| • **Brand name** | Conserve SC | 3336 $^{G}$ |
| • **Common name/a.i.** | spinosad | Thiophanate-methyl |
| • **EPA Reg. Number** | 62719-291 | 1001-70 |
| • **Manufacturer** | Dow AgroSciences | Cleary |
| • **Net contents** | gallon | quart |
| • **Pesticide Type** | insecticide | fungicide |
| • **Formulation** | SC | F |

# Parts of the Label

| | Conserve SC | 3336 F |
|---|---|---|
| • Restricted use designation | N0 | No |
| • Precautionary statements/ Signal Word | Caution | Caution |
| • Statement of practical treatment (If: Swallowed, In Eyes, Inhaled, or On Skin or Clothing) | Wash hands before eating…. | Wash… |

# Other Parts of the Label

- Personal Protective Equipment/PPE (Applicators and other handlers, Enclosed areas, Outdoors, Cleaners and repairers of application equipment, and Early entry)
- Environmental hazards/ Water, Leaching, Polinators
- Directions for use (requirements NOT advice)
- General information and Crop information

# Precautionary Statements: Signal Words

- Caution
  - Slightly toxic; slight potential to cause acute illness
- Warning
  - Moderately toxic; moderate potential to cause acute illness
- Danger
  - Highly toxic; likely to cause acute illness

# DANGER = POISON

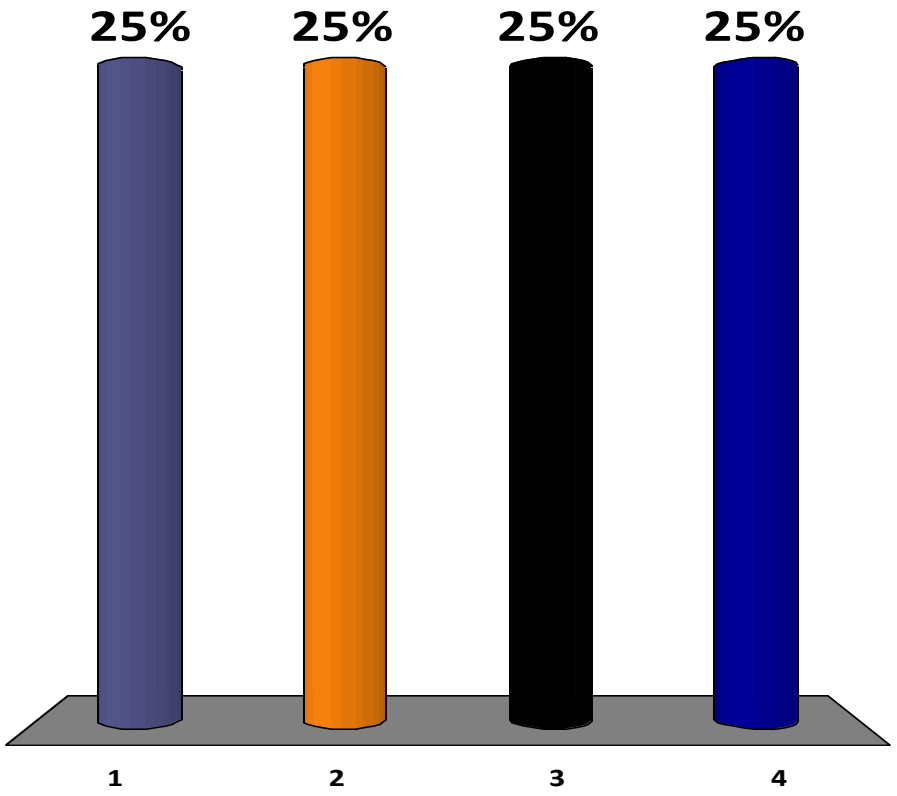
- Very dangerous pesticides contain the skull and crossbones symbol
- This symbol means it is extremely likely to cause acute illness through oral, dermal or inhalation exposure

# Other Information That You May See on a label

- Keep out of reach of children
  - On the front of every label
- Chlorite
  - Indicates an oxidizer
- Carbamate
  - A class of pesticides

# What is the most common type of pesticide exposure?

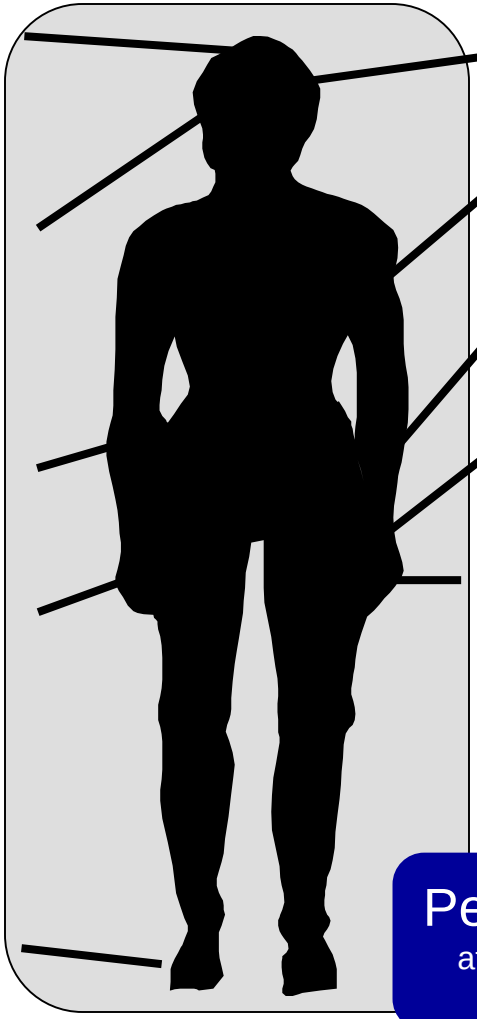
1. Oral
2. Ocular
3. Inhalation
4. Dermal



# Types of Exposure

- **Oral** – swallowing a pesticide
- **Ocular** – pesticide spraying into eyes
- **Inhalation** – breathing in a pesticide (common in greenhouses)
- **Dermal** – pesticides on your skin
  - Skin is the body part mostly likely to receive exposure Were?
  - Amount absorbed depends on:
    - Diluent used (i.e. oil soaks into the skin better than water)
    - Area of the body
    - Skin Condition – hot, sweaty, cuts

# How different parts of the body relatively absorb pesticides



Scalp 32%

Forehead 36%

Ear Canal 40%

Armpits 64%

Forearm 9%

Abdomen 18%

Palm of the Hand 12%

Area Behind Hands 21%

Genital Area 100%

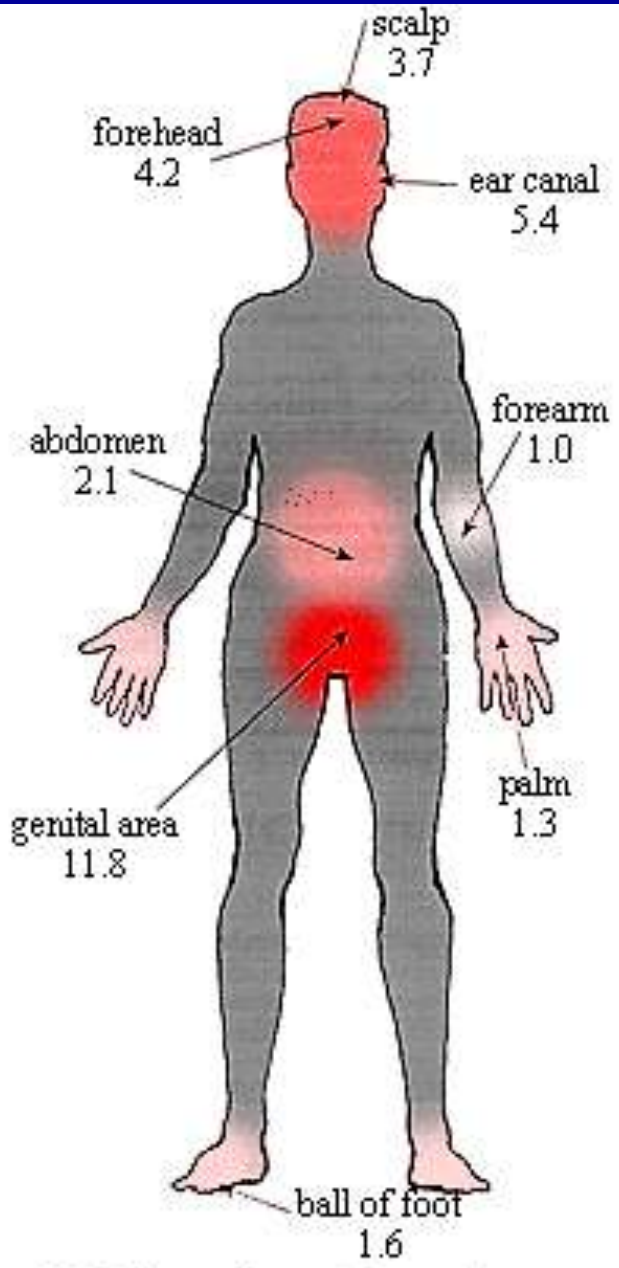
Foot Heel 13%

**Percentage of Parathion Absorbed**

after 24 hour exposure the percent of dose absorbed

Maibach 1974

# Another way to look at it




**Relative absorption rates, as compared to the forearm (1.0)**

# Types of Harmful Effects

- **Acute** – illnesses/injuries usually appear within 24 hours
- **Delayed** – illnesses/injuries that do not appear within 24 hours
- **Allergic** – May affect some people while not affecting others

# Immediate or Acute Health Effects

- Excessive sweating
- Headache
- Weakness
- Stomach ache, cramps
- Nausea, vomiting
- Dizziness
- Burning eyes, nose or skin
- Death

# Delayed Effect

**Effects for certain pesticides may not be felt immediately - symptoms may not be felt while working, with a delay until that evening or next day**

# Examples Long-Term or Chronic Health Effects of Some Pesticides

- Cancer
- Inability to become pregnant
- Miscarriage
- Birth defects
- Nervous system disorders
- Damage to organs, such as the lungs or liver
- Damage to the immune system

# Allergic Reaction - Sensitization

- **After repeated exposure some individuals may eventually become sensitized – effect becomes worse with each subsequent exposure**

# First Aid for Pesticide Exposure

1. Before using, look for First Aid (or statement of practical treatment) on the label
2. **Stop the source** of exposure quickly
3. **In the eye:** wash eye quickly, but gently for at least 15-20 minutes; after 5 minutes remove contact lenses and continue
4. **If inhaled**, get victim to fresh air or provide artificial respiration if needed
5. **If swallowed or in mouth**, only induce vomiting or provide water/milk if label says to do so AND only if victim is conscious
6. **If on skin**, remove contaminated clothing and wash with soap and water, put on clean clothes

The State of Florida and EPA says…

# THE LABEL IS THE LAW AND THE LAW IS THE LABEL

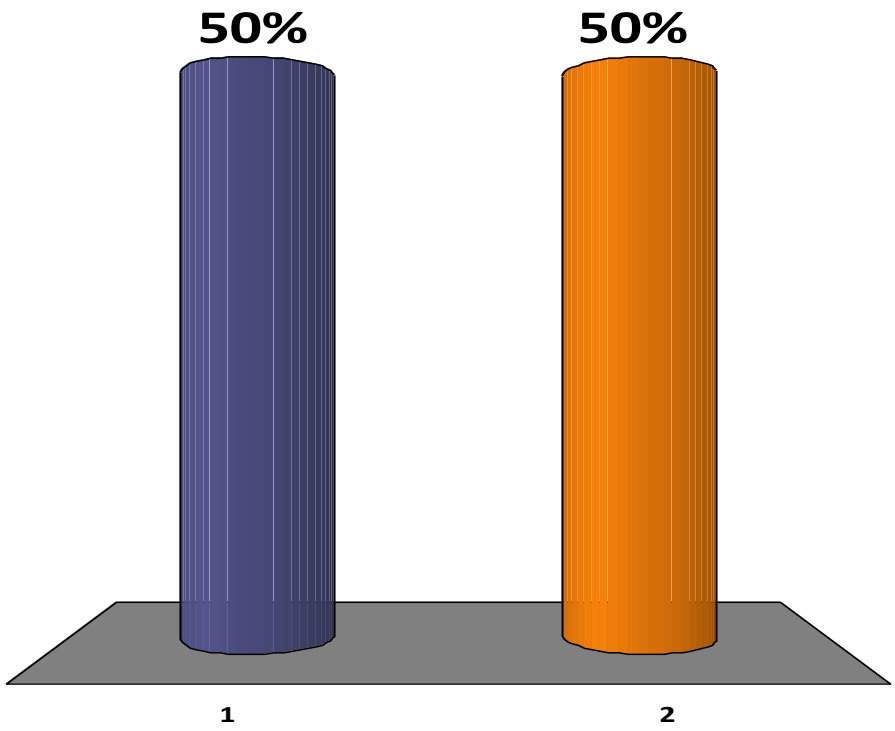
# What the label prohibits

- You may only use the pesticide for plants, animals or **sites** named in the directions of use
  - This means no…
    - Higher dosages
    - Higher concentrations
    - More applications than recommended
    - Use of prohibited equipment

    •Products with the same ingredients are not necessarily interchangeable as to sites

# Is it okay to treat a pest that is not listed on the label?

1. No
2. Yes



# What the label allows

- Treat a pest not listed on the label, if the site, or plant **is listed** on the label
- Apply at a dosage or concentration less than that listed on the label
- Use any method of application that is not prohibited on the label OR by law
- Mix with a fertilizer, if not prohibited by the label

# Formulations

# Formulations

- State the mixture of active and inert ingredients
- Some may be ready to use or must be diluted by:
  - Air
  - Water
  - Petroleum-based product
- An active ingredient is the chemical that controls the target pest

# Liquid Formulations

- EC = Emulsifiable concentrate (contain petroleum based products)
- S = Solutions (form a true solution)
- RTU = Ready to use (no mixing required)
- ULV = Ultra-low volume
- F or L = Flowables
- A = Aerosol

# Dry Formulations

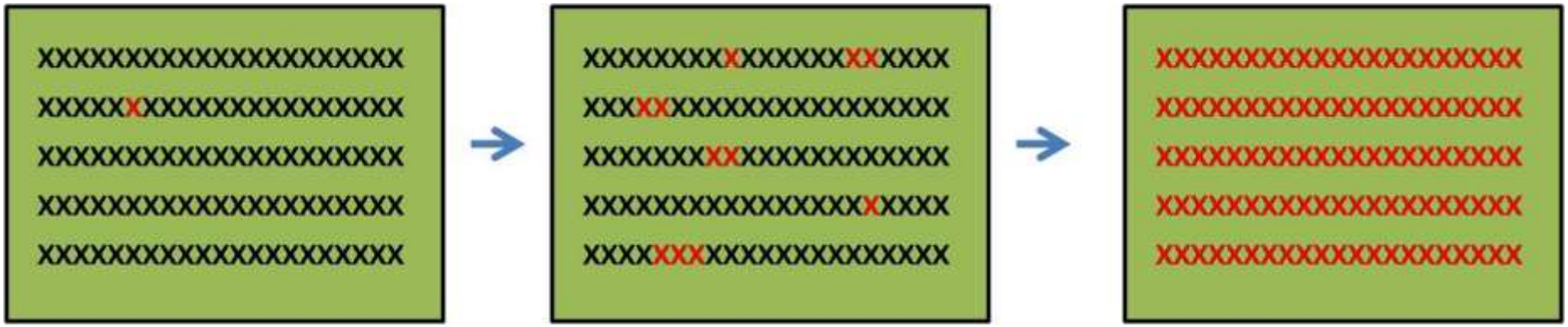
- D = Dust (ready to use, low A.I.)
- B = Baits (contain an attractant)
- G = Granules ( 1 -15% A.I.)
- P or PS = Pellets (Granules which are all the same size)
- **WP** = Wettable powders (Greater than 50% A.I.)
- SP or WSP = Soluble powders (> 50% A.I.)
- M = Microencapsulated (Slow release, can be bad for bees)
- **DF** or WDF = Water Dispersable Granules, Dry Flowables
- 18 others listed in manual

# Bees


http://www.xerces.org/wp-content/uploads/2013/06/DSCN1930-1024x768.jpg

- **Pesticide resistance:**

*the ability of a pest to tolerate a pesticide that once controlled it*



# How do you delay or prevent resistance?

- Rotate the **mode of action** of the chemicals that you use
  - Not the brand name
  - Not the chemical name

  - Discuss HRAC handout

# Other Terms You May See

- Fumigant
  - Form poisonous gases when applied
- Adjuvant
  - A chemical added to a pesticide formulation to increase its effectiveness or safety
    - Stickers
    - Spreaders
    - Penetrants
    - Buffers
- Horticultural oils

# Applying the Correct Amount

- Use the least amount required to achieve the desired control
- Application rate
    - Gallons per acre
    - Pounds per acre
    - Ounces per thousand square feet

# Applying the Correct Amount

- Make sure you are applying the correct amount by calibrating your equipment
- The speed at which the equipment moves through the target site determines the amount applied in any given area
- Measure accurately
- Calibrate often
- Check yourself AND recheck periodically

# Mixing

- Follow label directions
- Prevent water contaminations by having an air gap
  - At least 2 times the diameter of the hose

# Posting

- Any person who is licensed or certified under this chapter, including any person who is a limited certificate holder shall post a notice in a conspicuous location at the time of application of a pesticide to a lawn or to exterior foliage.
- 4 x 5 inches
- Rigid, durable, waterproof
- Business name or applicator's name
- Post at time of application for 24 hours

# Posting Sign

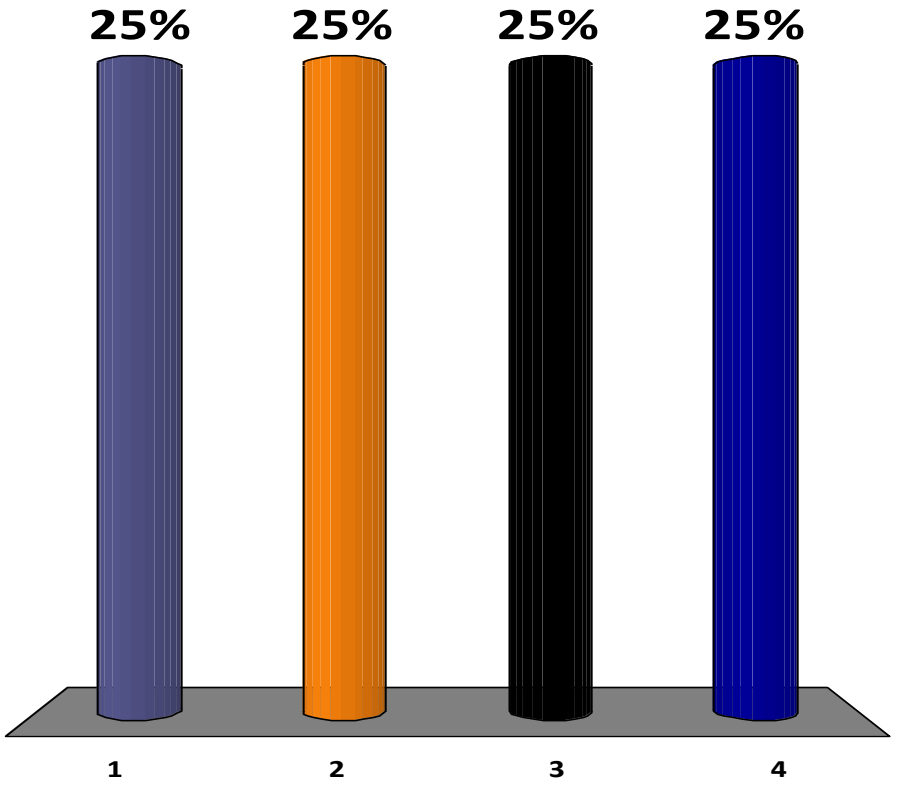

Source: https://precisionsignsonline.com/products/outdoor-signs/notification-signs

Size

Location

# What is the main cause of drift?

1. Wind speed
2. Droplet size
3. Inversions
4. Operator error



# Pesticide Movement

- Two types of movement
  - Air
    - Movement from the release site in the air is called drift
  - Water
    - Can enter bodies of water through:
      - Drift
      - Leaching
      - Runoff
      - Spills, Leaks

# Pesticide Movement

- Drift
- Runoff
- Leaching


# Sources of Contamination

**Point source**

- Point of contamination can be found easily
  - Ex: Leaks, spills, waste water

**Non-point source**

- Point of contamination not easily determined
  - Can come from a wide area
  - Ex:  Pesticide getting washed into a stream

# Pesticide Residue

- Some pesticides do not breakdown soon after application and can be found in the environment for years to come – i.e. persistence
- The rate of pesticide breakdown depends mostly on the chemical structure of the active ingredient

  -- I.E. The more multiple bonds a structure has, the longer it will take to disappear from the environment

# Sensitive Areas

- Water bodies
- Ground Water
- Natural areas
- Endangered Species Habitat
- Schools and homes
- Homes of those on Registry of Persons Requiring Prior Notification

- These need to be protected

# Pesticide Factors Influencing Ground Water Contamination

- Solubility – how easily pesticides dissolve in water and move into the water system
- Adsorption – how tightly pesticides are attached to soil particles and, thus, are less likely to move into water
- Persistence – measure of how long a pesticide remains in the environment

# Soil Factors Influencing Ground Water Contamination

- Soil texture – deal with proportions of sand, silt or clay; Coarse, sandy soils allow faster movement of water
- Soil permeability – measure of how fast water can move downward
- Soil organic matter – influences how much water the soil can hold and, thus, the ability to stop movement of pesticide particles

# Natural Control Methods

- Climate
- Natural enemies
- Geographic barriers
- Availability of shelter, food source and water

# Applied Control Methods


# Applied Control Methods



# Applied Control Methods

Physical/Environmental Modification


Regulatory

# Pest Management Methods

**Integrated Pest Management (IPM)**

- **Biological control**
- **Mechanical control**
- **Cultural control**
- **Physical/environmental modification**
- **Host resistance (genetic control)**
- **Chemical control**
- **Regulatory methods**

# Pest Control Goals

- Prevention – keep a pest from becoming a problem
- Suppression – reducing pest numbers to an acceptable level
- Eradication – destroying an entire pest population

# Why Spray?

- Aesthetic-injury Level
  - How it looks

  'Beauty is in the eye of the beholder'

- Economic-Injury Level
  - All about the money

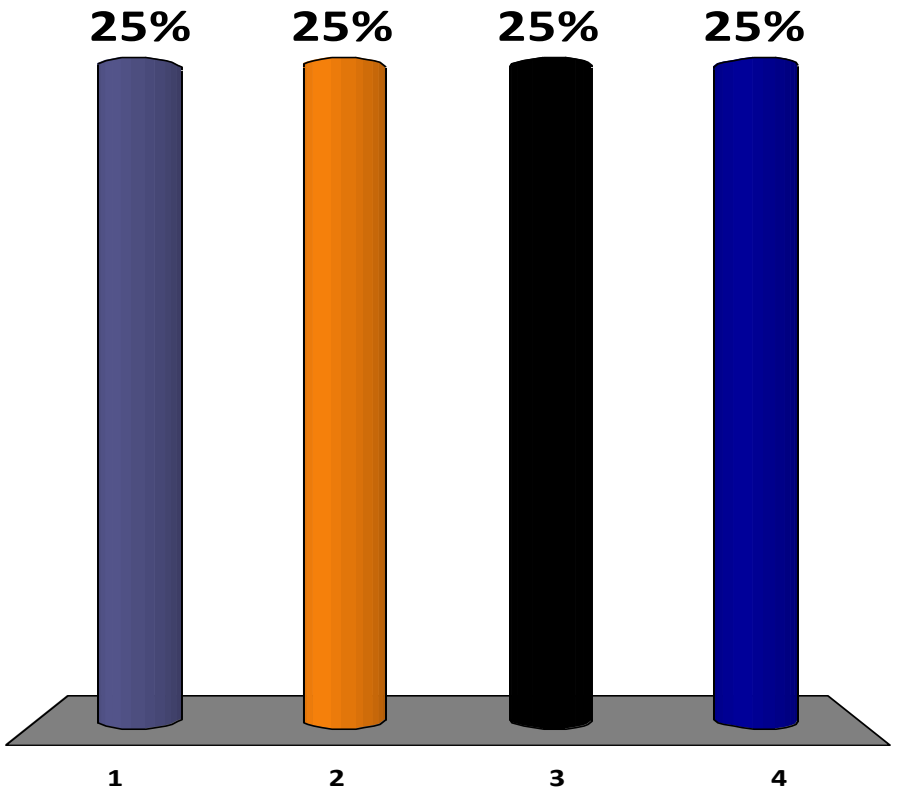
    $ $ $ $ $ $ $

# When a Pesticide Doesn't Work

- Improper pest identification (incorrect pesticide selection)
- Incorrect pesticide dosage
- Improper application timing
- Pesticide does not reach target pest
- Unfavorable environmental conditions
- Poor pesticide condition due to unsuitable storage conditions
- Pesticide resistance

# What is the most common type of pesticide exposure?

1. Inhalation
2. Dermal
3. Ocular
4. Oral



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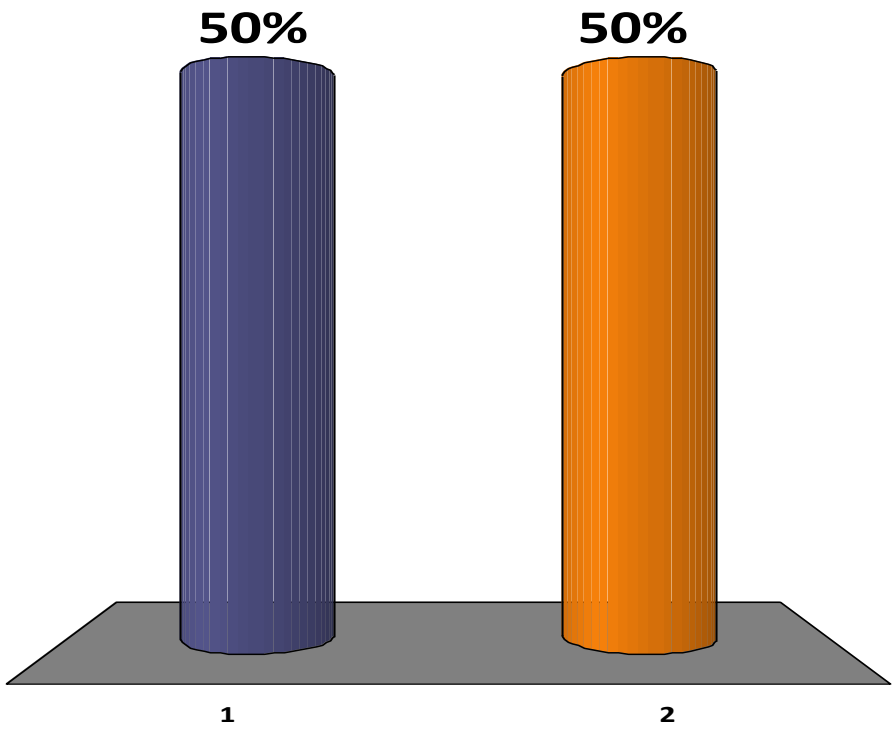

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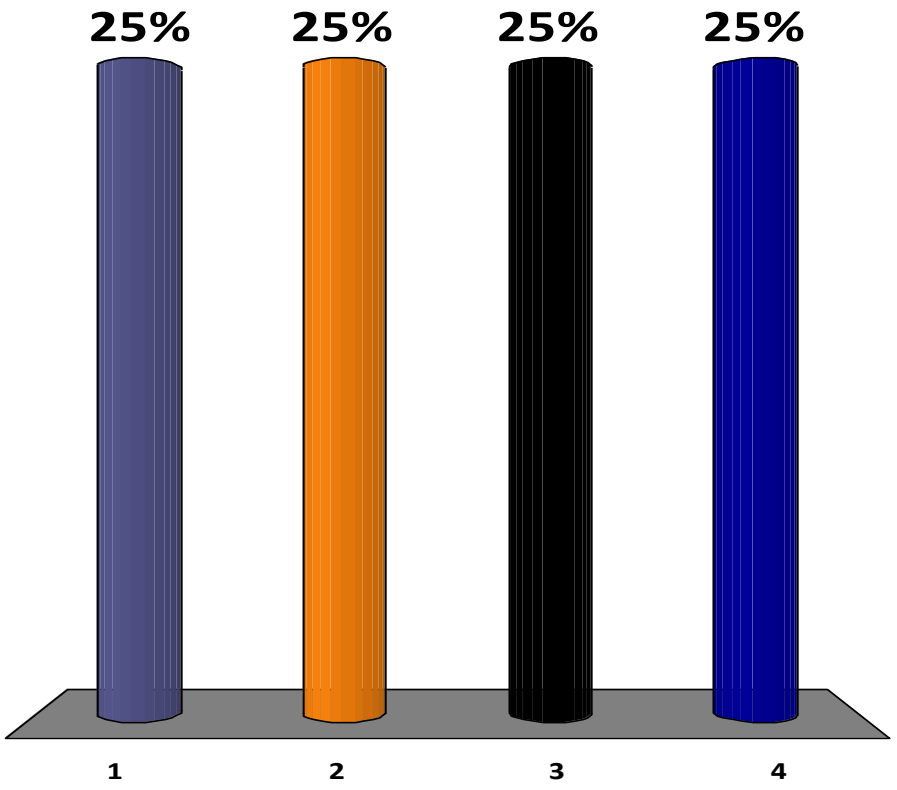

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