Navigation Bar

Integrated Pest Management and Pesticide Safety

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This module was developed by Scott Baker, Extension Agent, Bedford County.

Welcome to Integrated Pest Management and Pesticide Safety

In this module you will learn the steps to minimize chemical pest control. You will learn to use the Pest Management Guide (in the associated lab) and how to advise homeowners on procedures for personal safety while using chemical pesticides.

- Read Chapter 7, in your Master Gardener Handbook before viewing these slides
- Browse the Suggested Readings at the end of these slides. They contain online sources that will be helpful for your learning
- The Test Your Knowledge section is for fun and review

What I Will Learn in This Module

- The proper use of pesticides as pest management tools in the residential environment
- How to advise homeowners on the procedures for maintaining personal safety while using chemical pesticides
- Steps that can be taken to minimize the need for chemical pest control measures (See also the Plant Pathology module, Methods for Controlling Disease - Use of an Integrated Approach (IPM)

Terminology

Below are links to terminology related to pesticides. They are rather extensive.

Definition of Common Terms
Pesticide Glossary
Pesticide Glossary (epa)

What is a Pesticide?

Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant

- Synthetic chemicals
- Plant extracts
- Biological organisms
- Inorganic or organic compounds
- Etc.

Types and Functions of Pesticides

1. Insecticides: Used to control insects
   Broad Spectrum; narrow spectrum; chitin synthesis inhibitors; insect growth regulators; pheromones; short term vs. residual
2. Miticides: Used to control mites and ticks
3. Fungicides: Used to control fungi
   Protectant vs. eradicant
4. Herbicides: Used to control unwanted plants
   Selective; non-selective; Preplanting vs. preemergence vs. postemergence
5. Growth Regulators: Increase, decrease or change normal growth or reproduction in a plant
6. Rodenticide: Used to control rats, mice and other rodents
7. Nematicides: Used to control nematodes

Types of Pesticide Ingredients

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What is a Pest?

An organism is declared to be a pest under circumstances that make it deleterious to man or the environment, if it is

- Vertebrate (other than man)
- Any invertebrate organism (except internal parasites of man or living animals)
- Any plant growing where not wanted
- Any fungus, bacterium, prion, virus, or other microorganism (except if on man or living animal, in cosmetics, drugs or in processed food or feed)
    - Includes control of microorganisms on surfaces (e.g., disinfectants, sanitizers) and other

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Pesticide Registration

- An EPA registration is required if there is a claim or an implication that the product can be used as a pesticide
  - Limited exception for specific minor risk products that meet all Federal requirements including labeling

    Product and uses must meet statutory standards
  - Certain products and uses are available for homeowner uses. Many others are limited only to trained and certified applicators for use in agriculture, around residences and in other areas.
- Products also must be registered at the individual state level if sold in that state

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The Pesticide Label

The Label is the Law

Do Not Apply Any Pesticide to a Site

Not Specifically Listed on the Label!

The Pesticide Label

- Product label is a binding legal agreement between
  - EPA
  - Product Registrant (Company making/selling the product)
  - Product User

- Labels provide instructions for proper pesticide use, storage, and disposal

- Users must read, understand and follow label

The Pesticide Label

- When to read it
  - Before, during and after each use
  - For storage
  - For Disposal

- Why read it?
  - Labels change!

- Labels are not advice or suggestions but

  LEGAL REQUIREMENTS

How to Read a Pesticide Label

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Required Label Components or Sections

Identifying information
- Brand name
- EPA registration #
- EPA establishment number
- Ingredient statement
  - Active ingredient (a.i.) and amount (wt/wt in container)
- Formulation type
- Name and address of manufacturer

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Required Label Components or Sections

Precautionary Statements

- Signal word and symbol
- Child Hazard Warning
- First aid (Statement of Practical Treatment)
- Emergency contacts
- Personal protective equipment (PPE) requirements
- Hazards to humans and domestic animals
- Environmental hazards
- Physical or chemical hazards (not always required)

Personal Protective Equipment

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Required Label Components or Sections

Directions for Use

- How and when to apply the product
- Application Directions
  - Legal sites, timing, rates
  - How often the product can be applied
  - Mixing directions
  - Handling requirements
  - Application equipment and methods
  - Pest control claims
  - Days to harvest if for use on an edible crop

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Required Label Components or Sections

Storage and Disposal Directions

- Specific information may be required for storage conditions
- Do not contaminate food or feed by storage
- Detailed information on proper disposal
  - If the container is empty
  - If the container is not yet empty

Proper storage and disposal is essential to help protect the environment and human health

An example of a label for a common product. Arrows indicate the required sections mentioned in the previous slides

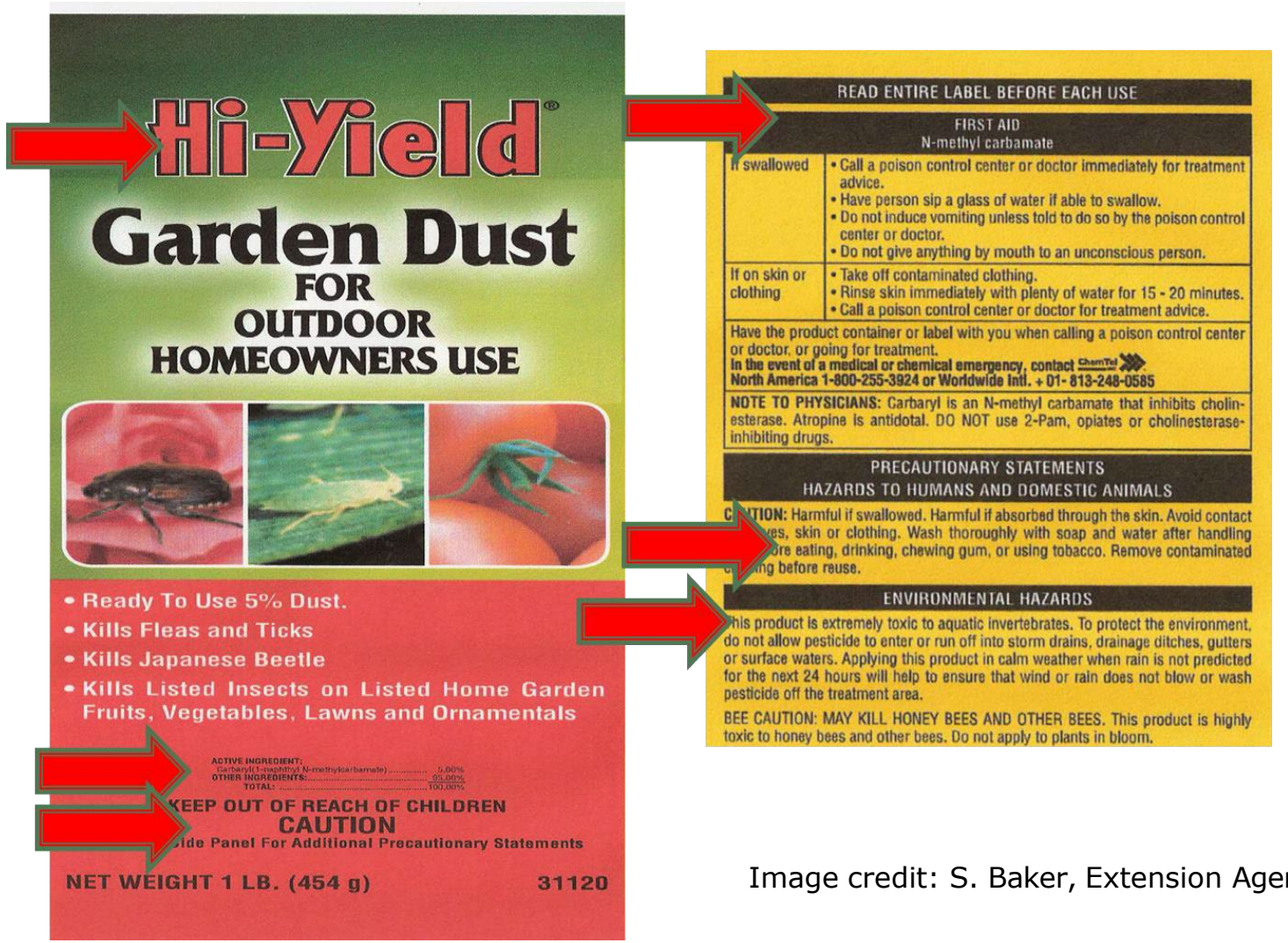

Image credit: S. Baker, Extension Agent

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DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. **USE STRICTLY IN ACCORDANCE WITH LABEL RESTRICTIONS AND DIRECTIONS.**

Restrictions

Do not apply this product in a way that will contact any person or pet, either directly or through drift. Keep people and pets out of the area during application. Do not allow people or pets to enter the treated area until dusts have settled.

Non-refillable container. Do not cut package to expose contents. Discard package when empty.

Precautions

Some phytotoxicity may occur on tender foliage in the presence of rain or high humidity of several days' duration following application.

Hi-Yield® Garden Dust is an insecticide formulation for kill of listed insects found in home gardens. Not for use on plants being grown for sale or other commercial use, or for commercial seed production, or for research purposes.

DIRECTIONS

For residential use on listed Ornamentals, Flowers, Shrubs, and Garden Vegetables. For outdoor use only.

ORNAMENTAL FLOWERS, ORNAMENTAL SHRUBS AND ORNAMENTAL TREES to kill: Elm Leaf, Rose and Apple Aphids, Rose Slugs, Birch Leaf, Boxwood and Oak Leaf Miners, Mealy Bugs, Leaf Rollers, Plant, Lace and Boxelder Bugs, Bagworms, Japanese Beetle, Tent Caterpillars, Gypsy Moth.

Do not use on Boston Ivy as damage may result.

WHEN & HOW TO APPLY:

- Begin applications when insect or damage is first observed and repeat as directed below.
- Wearing household latex or rubber gloves, use this ready-to-use shaker can to apply product. Dust lightly to cover upper leaf surfaces with a thin, even film of dust.
- Apply when air is calm.
- Start applying at the farthest corner of the treatment area and work backward. For plants above chest high, consider using a liquid carbaryl product.

The Pre-Harvest Interval (PHI) indicates the number of days between the last application and harvest. The PHI is listed in the ( ) immediately after each crop heading.

Do no repeat applications more often than every 7 days. The maximum number of applications per year allowed is listed in the next [ ].

GRAPES: (7) [5] To kill Grape Leaf Folder, Grape Leafhopper and Grape Leaf Skeletonizer, Grape Berry Moth, Japanese Beetle and Red Banded Leaf Roller.
STRAWBERRIES: (7) [5] To kill Meadow Spittlebug, Strawberry Leaf Roller, Strawberry Weevil, Japanese Beetles and Leafhoppers.
BLUEBERRIES: (7) [5] To kill Blueberry Maggot, Cherry and Cranberry Fruitworms and Japanese Beetle. Apply 3 weeks before harvest and repeat 10 days later if necessary.
CRANBERRIES: (7) [5] To kill Cutworms, Fireworms, Fruitworms, Japanese Beetle, and Leafhoppers.
CUCUMBER, MELONS, PUMPKIN AND SQUASH: (3) [6] To kill Pickleworms Melonworm, Cucumber Beetle, Flea Beetle, Leafhopper and Squash Bugs. May cause some leaf injury during high humidity. Do not use on watermelons in Florida.
TOMATO, EGGPLANT AND PEPPER: (3) [7] To kill Colorado Potato Beetle, Flea Beetle, Leafhopper, European Corn Borer, Fall Armyworm, Lace Bugs, Tomato Fruitworm, Tomato Hornworm, Tarnish Plant Bugs and Stink Bugs.
OKRA: (3) [4] To kill Stink Bugs. Repeat at 7 day intervals.
CARROTS: (7) [6] To kill Flea Beetles, Leafhoppers, Six-Spotted Leafhoppers (aster yellows vector), Armyworms, Harlequin Bug, Spittlebug and Stink Bugs.

ORNAMENTAL SHRUBS, TREES AND FLOWERS

For outdoor use only. To kill Bagworm, Blister Beetles, Boxelder Bug, Boxwood Leafminer, Flea Beetles, Japanese Beetle, Lace Bugs, Leafhoppers, Leafrollers, Periodical Cicada, Plant Bugs, Psyllids, Rose Aphid, Rose Slug, Scale insects in the crawler stage, Tent Caterpillars and exposed Thrips, apply thoroughly to the infested plants at the first sign of damage. For best results on scale, apply in Spring and early Summer when scale crawlers are present. Repeat applications up to 3 times per year, but not more often than once every 7 days. Do not apply to plants above chest height.

HOME LAWNS:

To kill Chinch Bugs, Sod Webworms (Lawn Moths), Fall Armyworms, Cutworms, Earwigs, Leafhoppers, and Millipedes, sprinkle lightly on grass.
To kill Ants (except harvester, pharaoh, and carpenter ants), Chiggers, Fleas, Ticks and Spiders (except Brown recluse and Black widow), sprinkle lightly on grass. Will only kill pests present at the time of application. Pest must be directly contacted by product to be effective. For best results apply after rain or watering and do not water for at least 2 days after application. Repeat treatment as needed, but not more than every 2 weeks and not more than 4 times per year.

EARWIGS

This material is effective in killing earwigs and when properly used will reduce the number gaining entrance to homes and buildings. Lightly dust a band 3 to 4 inches wide around the outside foundation wall of the home. Be sure to treat in front of all steps and other entrance areas. Earwigs breed over wide areas around yards and fields and are driven by cold weather to seek shelter in homes. Apply also around refuse piles, lumber, mulch and other concealment areas. Repeat treatment as needed, but not more than every 2 weeks and not more than 4 times per year.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.
PESTICIDE STORAGE: Store in cool, dry, secured area.
PESTICIDE DISPOSAL: Contact your local solid waste agency for disposal instructions for unused pesticide.
CONTAINER DISPOSAL: Non-refillable container. Do not reuse or refill this container. If empty: Place in trash or offer for recycling if available. **If partly filled:** Call your local solid waste agency for disposal instructions. Never place unused product down any indoor or outdoor drain.

NOTICE: TO THE EXTENT CONSISTENT WITH APPLICABLE LAW BUYER ASSUMES ALL RISKS OF USE, STORAGE OR HANDLING OF THIS PRODUCT NOT IN STRICT ACCORDANCE WITH DIRECTIONS GIVEN HEREWITH. VOLUNTARY PURCHASING GROUPS, INC. WARRANTS THIS PRODUCT TO CONFORM TO THE CHEMICAL DESCRIPTION ON THE LABEL AND FOR THE PURPOSES STATED ON THE LABEL. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW THE LIMIT OF ANY LIABILITY INCURRED SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER.

Manufactured By:
VPG Voluntary Purchasing Groups, Inc.
230 FM 87 • BONHAM, TEXAS 75418
EPA Reg. No. 7401-69
EPA Est. No. 7401-TX-1
Visit Us At: www.hi-yield.com
50M-5-1111

7 32221 31120 6

Image credit: S. Baker, Extension Agent

Keys to Using Pesticides Safely

- ID the pest: FIRST STEP
  Pesticides can be specific as to what they control
- Determine if treatment is warranted
  Is the damage or potential damage from the pest worth the time and expense to apply a pesticide
- Always follow the label
- Only purchase quantities you think you will use in a season
  Eliminates need to store pesticide until next season
- Only store in original container and in a safe, secure place
  Minimizes risk that someone will mistake pesticide for something else or get access when this could be dangerous (ex. Child)

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Video: Toxicity and Exposure Risk

Signal Words

Indicator of pesticide acute hazard– Use with Precautionary Wording to Understand Hazard

Signal Word

Caution: Low toxicity; lethal dose more than an ounce

Warning: Moderate toxicity; lethal dose a teaspoon to a tablespoon

Danger** : High toxicity; lethal dose a drop to a teaspoon

Danger– Poison (these products typically not available for homeowner use)

**Some products are listed as Danger for effects such as eye damage or corrosivity to skin

Example of signal word language used on labels
Sevin – 5% Dust

CAUTION: Harmful if swallowed. Harmful if absorbed through the skin. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove contaminated clothing before reuse.

WHEN & HOW TO APPLY:

Begin applications when insect or damage is first observed and repeat as directed below.

- Wearing household latex or rubber gloves, use this ready-to-use shaker can to apply product. Dust lightly to cover upper leaf surfaces with a thin, even film of dust.
- Apply when air is calm.
- Start applying at the farthest comer of the treatment area and work backward. For plants above chest high, consider using a liquid carbaryl product.

Another example of language you might see on a label GardenTech Daconil Fungicide Ready-To-Use–

CAUTION

Harmful if swallowed, inhaled or absorbed through the skin. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals. Remove contaminated clothing and wash clothing before reuse. Wash thoroughly with soap and water after handling.

PERSONAL PROTECTIVE EQUIPMENT

Wear long sleeved shirt, long pants and chemical resistant gloves made of any waterproof material while mixing and applying this product.

Pesticide Formulations

Pesticides are rarely sold as 100% active ingredient. They are composed of active and inactive ingredients.

The chemical(s) that actually kills or mitigates the pest is called the active ingredient.

The added chemicals dilute or extend the pesticide and are inert (other) ingredients. There is no requirement that the other ingredients be identified.

Common pesticide formulations include:

Apply without further mixing

- Aerosols: low concentrate solutions applied as a fine spray or mist
- Baits: adding the active ingredient to an edible or attractive substance
- Dusts: adding the active ingredient to a fine inert powder or talc
- Granules: similar to dust formulations except larger and heavier; low active ingredient levels. May be mixed with fertilizers.
- Ready to Use solutions (RTU): contain correct among of active ingredient when you buy them; no mixing or dilution is necessary

Dilution required before application

- Emulsifiable concentrates (EC or E): active ingredient mixed with an organic solvent forming an emulsion
- Water dispersible granules (WDG) / Dry Flowables (DF): formulated as a flowable, like a wettable powder; lower inhalation hazard compared to wettable powders
- Wettable Powders (WP): combine active ingredient with a fine powder; need continuous agitation

The links below provide additional information on pesticide formulations

Pesticide Formulations

Pesticide Formulations

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Classification

Pesticides can be grouped according to how they work. Many work in more than one way:

- Contact. Kill pests by simply touching them or the pest contacting the pesticide. For herbicides, affect only the plant part sprayed.
- Systemic: Absorbed or ingested and circulate in the body (blood of an animal or sap of a plant).
- Selective Pesticides: affect only certain kinds of plants or animals
- Nonselective pesticides: kill many pests in a category

Use Pesticides Properly

- Only purchase quantities you think you will use in a season
  - Eliminates need to store pesticide until next season
- Only store in original container and in a safe, secure place
  - Minimizes risk that someone will mistake pesticide for something else or get access when this could be dangerous (ex. Child)
  - Do not use products packaged for agricultural or commercial use. Choose those intended for the home garden

Pesticide Drift

- **Pesticide drift** occurs whenever pesticide leaves the intended target site **through the air during or soon after application.**
- Pesticide drift can cause injury to plants, people, livestock, wildlife and the environment
- To prevent drift, it is important to understand the pesticide product, application equipment, and site and weather conditions:

  Know the area around where you are putting the pesticide

  (bees, sensitive plants, ground water)

  Read the pesticide label carefully

It is the responsibility of the user to ensure proper application!

Pesticide Drift

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Personal Protective Equipment. Photo credit: Missouri.edu

Personal Protection Equipment

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Personal Protective Equipment.
Photo credit: ufl.edu

Personal Protection Equipment

The label contains legal requirements for the type of PPE users must wear using the product

The Law

Liability

Human Health

Photo credit

Personal Protective Equipment

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GLOVES

Chemically Resistant

- Nitrile
- Butyl
- Neoprene
- Natural Rubber
- Barrier Laminate

- Water resistant – latex or rubber gloves usually indicated for homeowners
- Gloves reduce dermal exposure by

  99% when mixing, loading, and applying

Recommended gloves: nitrile; neoprene and butyl rubber; Credit: UNL.edu

Note: Leather and cloth gloves do not provide adequate barrier or protection. Pesticide can soak through leather to skin.

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Pesticide Safety: Choosing the Right Gloves

FOOTWEAR

Your feet and shoes need protection from pesticide spills.

Put your pant legs over the tops of your boots / shoes

Shoes - Read the label for what is required but always wear appropriate footwear, not sandals.

Leather and canvas shoes cannot be leaned thoroughly and should never be worn without rubber or neoprene boots.

Protective wear

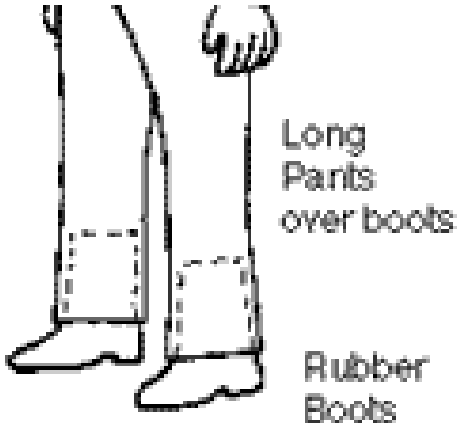

Photo credit: uky.edu

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EYEWEAR

Protective Eyewear

- Shielded safety glasses

The label will identify what is required

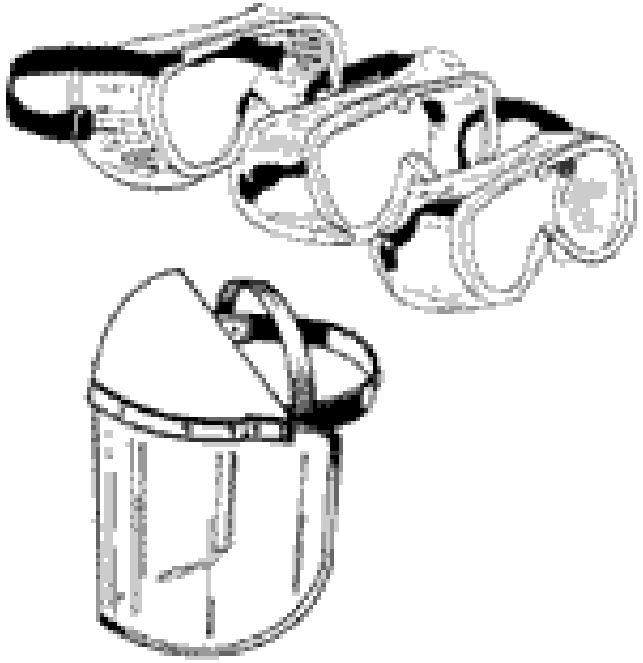

Photo credit: uky.eud

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CLOTHING/COVERALLS

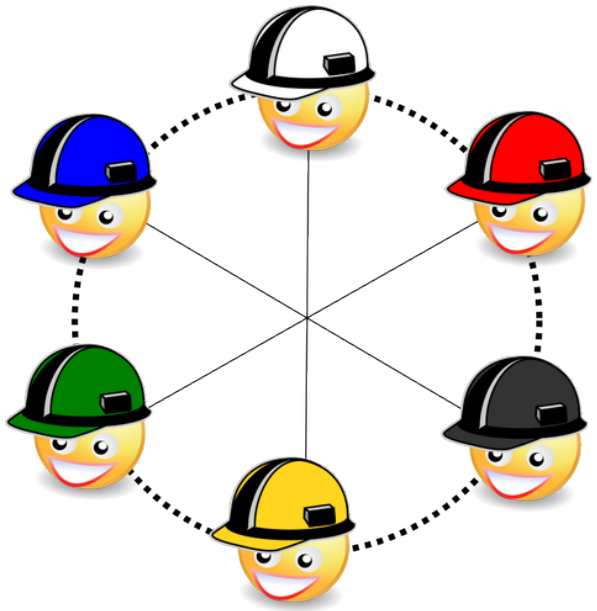
All labels require at least: Long-sleeved shirt and pants
Woven or Nonwoven long sleeved shirt and long legged pants

Read the label

Other Protection

The label may require other PPE under certain circumstances.

Note that significantly different PPE is often required for commercial, agricultural and professional applicators and products than is required for homeowner products.



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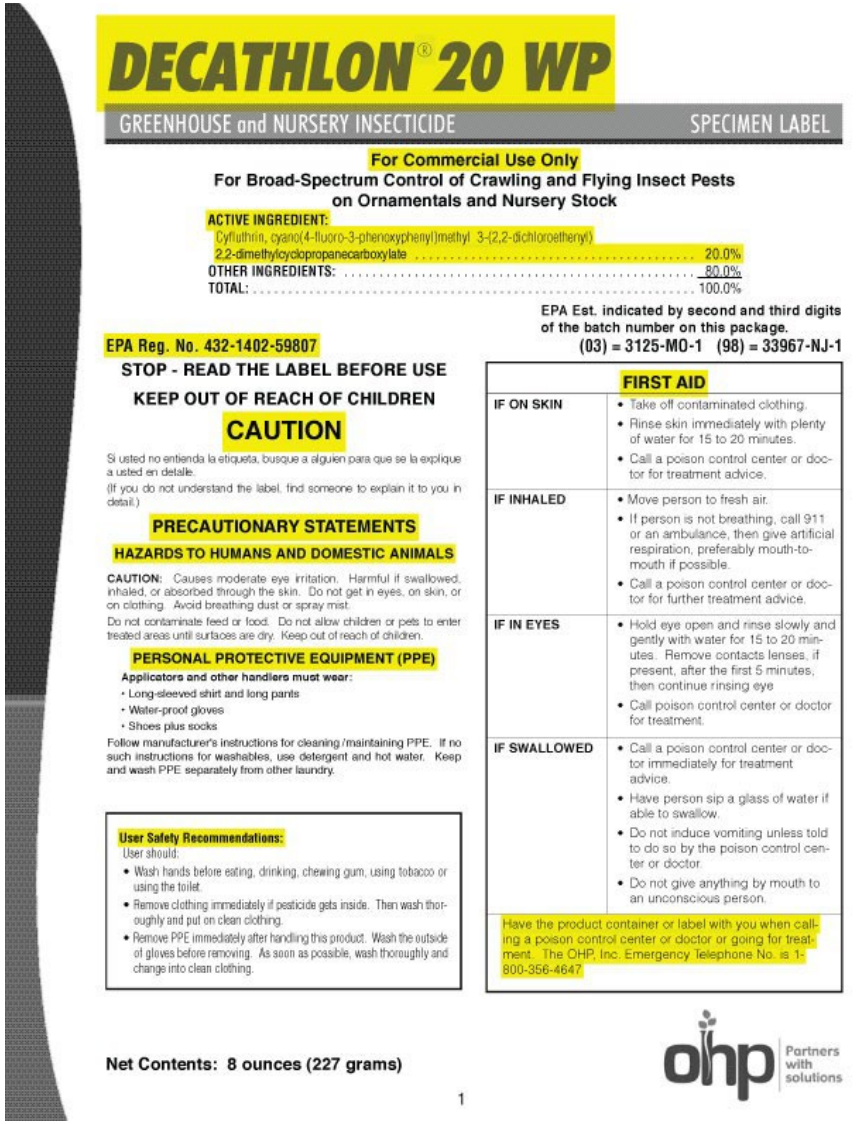
PPE

READ THE LABEL

Wear the PPE required by the label and follow label requirements for use and for cleaning clothing after application



DECATHLON® 20 WP

GREENHOUSE and NURSERY INSECTICIDE — SPECIMEN LABEL

For Commercial Use Only

For Broad-Spectrum Control of Crawling and Flying Insect Pests on Ornamentals and Nursery Stock

ACTIVE INGREDIENT:

Cyfluthrin, cyano(4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl) 2,2-dimethylcyclopropanecarboxylate 20.0%

OTHER INGREDIENTS: 80.0%

TOTAL: 100.0%

EPA Est. indicated by second and third digits of the batch number on this package.
(03) = 3125-MO-1 (98) = 33967-NJ-1

EPA Reg. No. 432-1402-59807

STOP - READ THE LABEL BEFORE USE

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entienda la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Causes moderate eye irritation. Harmful if swallowed, inhaled, or absorbed through the skin. Do not get in eyes, on skin, or on clothing. Avoid breathing dust or spray mist.

Do not contaminate feed or food. Do not allow children or pets to enter treated areas until surfaces are dry. Keep out of reach of children.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Water-proof gloves
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations:

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID

IF ON SKIN	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
IF INHALED	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. Remove contacts lenses, if present, after the first 5 minutes, then continue rinsing eye • Call poison control center or doctor for treatment.
IF SWALLOWED	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. The OHP, Inc. Emergency Telephone No. is 1-800-356-4647.

Net Contents: 8 ounces (227 grams)

ohp Partners with solutions

1

[Photo credit]

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Pesticides Might Enter the Body

Orally

By mouth

Dermally

Through the skin

By Inhalation

By breathing in pesticide

Photo credit

Some pesticides may be skin or eye irritants

Absorption through the skin is the most common route of poisoning.

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Systemic Effects of Pesticide Poisoning

More Typical of Insecticides and Rodenticides

(Pesticides that target animals)

- Insecticides: some affect nervous system
- Rodenticides: commonly affects circulatory system

Symptoms of overexposure to some insecticides: nausea, vomiting, diarrhea, headache, dizziness, weakness, excessive sweating, tearing, chills, thirst, chest pain, breathing difficulty, body aches & cramps

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If Overexposure Occurs..

- Call 911 – have pesticide label available for medical personnel
- Administer First Aid (according to label)
  - On skin: remove contaminated clothing, wash skin, gently dry and loosely cover (or as label directs)
  - In eyes: wash across eyes for 15 minutes (or as label directs)
  - If inhaled, get victim to fresh air (or as label directs)
  - Do not induce vomiting unless the label, poison control center or a doctor specifically says to do so

Application

- Always follow label directions about how to make an application, how much to apply, how often
- Use measuring equipment only for pesticides – mark it clearly and keep it secured with the pesticides so it is not used for other purposes
- Apply only as much as the label says

Sprayer Calibration

Many pesticide labels give rates of application in volume per unit area (teaspoons per 100 square feet). These pesticides must be delivered by properly calibrated equipment.

Calibration for sprayers
This website covers multiple topics related to calibration

Calibration Procedure

- Calculate the area to be treated (multiply length times width to determine area)
- Choose and mark off a test area (e.g. ¼ the size of the actual area)
- Fill the sprayer about ½ full of water and pump it to the normal operating pressure
- Time yourself as your spray the test area at your normal walking speed
- Spray into a bucket for the same amount of time it took you to spray the test area
- Pour the water from the bucket into a graduated container to measure the volume you would apply to the test area accurately
- Calculate the volume of water and pesticide you need to treat the target area; For example if you used 1 gallon for 200 foot, that equals 5 gallons for 1000 feet. If the instructions call for 1 quart per 1000 square foot, then you would dilute one quart in 5 gallons.

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Video: Calibrating backpack sprayer

Choosing the Right Pesticide

- Consider the problem and the best approach to addressing it.
- Consider the site. Will this pesticide have a negative impact on children, pets, wildlife? Who uses this site?
- What Equipment is Required? Is specialized equipment required and do you have it and know how to use it?
- Minimize waste. Purchase only what you plan to use; if you need to store, can you keep it safe?
- Choose the least hazardous product.
- Environmental hazards. Can you use it without causing problems?
- Disposal. Can you properly dispose of any unused pesticide / container?

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Questions to Ask Before Using Pesticides

- Is the problem caused by a pest? If so, what kind
  Pesticides can be specific as to what they control
- Determine if treatment is warranted
  Is the damage or potential damage from the pest worth the time and expense to apply a pesticide
- Can the pest be controlled at this stage of its life cycle
- Are pesticides registered for the pest and site? Follow the label
- Is pesticide use the best management option?

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Integrated Pest Management

- Integrated pest management (IPM) can reduce the need for pesticides. This includes prevention through good cultural practices, choosing pest-resistant plant varieties, encouraging beneficial insects, and close monitoring of pest population levels. Control may be achieved through physical removal of the pests, biological controls, use of a pesticide or other means.

- Integrated pest management means understanding your pest problem before applying pesticides so you can use the proper chemical at the proper time for your particular insect or disease.

Major Components of an IPM Program

- Identify the pest.
- Monitor pest populations and assess their damage.
- Determine a guideline (threshold) for when pest management action is needed (e.g., the point at which the pest is causing economic losses from its activity).
- Attempt to prevent the pest problem.
- Combine nonchemical and chemical control methods to "reduce" pest populations.
- Assess how well the IPM tactics controlled the pest.
- It is important to note that the goal of IPM is often not to eliminate the pest population, but to "reduce" it to levels that are considered acceptable (or below threshold levels). Using an integrated pest management program helps promote a more balanced ecosystem.

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[An introduction to integrated pest management]
[Integrated pest management for vegetable gardens]
[Video: IPM Pesticides in Practice]

Summary

- The label is your friend – read and follow its instructions!
- Understand use, storage and disposal
- Know first aid for overexposure
- It is a violation of Federal Law to misuse a pesticide

End of Slide Set

You can continue to next slide: 'Suggested Readings'

OR

Click on the box below to return to the Navigation Page

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Suggested Readings

- Pesticides and water pollution (11 pages)
- Gloves for Handling Pesticides (7 pages)

Pesticide Environmental Stewardship website

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Tests of Knowledge

Help Desk Quiz

Pesticide Jeopardy

Apply What You Have Learned

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Apply What You Have Learned

1. Read a pesticide label and identify its class, hazards, and personal protective equipment required for its use

2. Identify a pest in your yard/garden; Using an integrated pest management approach, identify strategies you might implement prior to and including pesticide use. (E.g. cultural, mechanical, etc.)

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Help Desk Quiz Answers on next slide

1. I want to use a pesticide to kill the bugs eating my flowers, but I don't want to kill the bees. What can I do?
2. What kinds of things can I do to prevent the insects from eating my veggies without using chemical insecticides?
3. How do I know which pesticide is best to use for insects in my garden?
4. What is a good general pesticide for use in the garden?

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Help Desk Quiz

1. I want to use a pesticide to kill the bugs eating my flowers, but I don't want to kill the bees. What can I do?

Answer: Use the insecticide that is least toxic to bees (the label of the product should state this). Also, spray only early in the morning or late in the evening when the bees are least active.

2. What kinds of things can I do to prevent the insects from eating my veggies without using chemical insecticides?

Answer: Choose pest resistant varieties; encourage beneficial insects; frequent monitoring for early detection of pests; physical removal of pests at their first appearance; keep garden area free of debris; healthy plants deter many pests and diseases.

3. How do I know which pesticide is best to use for insects in my garden?

Answer: Consider the following: Is it recommended for the specific type of insects you want to kill? Is it recommended for the site you plan to use it on? Do you have the equipment needed to use it (i.e. sprayer)? Can you mix a small enough amount for your intended use? Which product is least toxic? Which has the least environmental hazards?

4. What is a good general pesticide for use in the garden?

Answer: General insecticides include Carbaryl, Malathion, Permethrin, Bifenthrin. Organic compounds include Pyrethrin & neem. Read labels carefully for warnings and on how to use. Make sure the label says it is used for the insect you want to kill. Many insecticides are harmful to animals and bees, so read the label carefully on use.

COPY OF QUIZ Pest Management: An Integrated Approach

1. The instructions and warnings on pesticide labels are binding legal agreements between the user and the EPA and the company that made the produce. a. True b. False
2. Pesticide labels must contain which of the following:
   a. EPA registration number b. Active ingredient and amount c. Signal word or symbol
   d. All of the above
3. The pesticide container label provides instructions on proper disposal of the empty container.
   a. True b. False
4. Pesticide labels must tell what personal protective equipment the user should wear when using that pesticide.
   a. True b. False
5. Pesticide labels must tell you legal sites, timing **and** rates of application of the pesticide.
   a. True b. False
6. The **first step** in pest management decision making is:
   a. Read the label b. ID the pest c. Wash your hands d. Put on protective clothing

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Continued on next page

Copy OF QUIZ Pest Management: An Integrated Approach

7. How much of a dose of a pesticide labeled 'warning' would a human have to consume to be lethal? a. The whole can or bottle b. More than an ounce c. A few drops d. Teaspoon to tablespoon
8. The only way a pesticide can hurt you is if you swallow it (orally). a. True b. False
9. A systemic pesticide works in which way?
   a. by only touching the pest b. by being absorbed or ingested and circulated in the body
   c. by making the plant inedible d. All the above
10. What should NOT be done if overexposure to pesticides occurs:
    a. Dilute the pesticide b. Wash skin if exposed c. Get victim to fresh air (for inhaled chemical)
    d. If pesticide is ingested, inducing vomiting should be done immediately.
11. For eye exposure to pesticides, wash the eye(s) with large amounts of water for:
    a. An hour b. Half an hour c. 15 minutes d. One full minute

Pesticide Use and Safety
Jeopardy
Scroll down to Play

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Pesticide Effectiveness
20 points

Name 2 common factors that can reduce pesticide effectiveness

Answer next slide

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Pesticide Effectiveness
20 points

Name 2 common factors that can reduce pesticide effectiveness

- RAIN WATER
- APPLICATION TECHNIQUE

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Pesticide Effectiveness
30 points

Name 3 ***chemical*** characteristics that influence pesticide effectiveness

Answer next slide

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Pesticide Effectiveness
30 points

Name 3 ***chemical*** characteristics that influence pesticide effectiveness

- SOLUBILITY (in water)
- ABSORPTION (movement in plant)
- PERSISTENCE (breakdown of the chemical)

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PESTICIDE EFFECTIVENESS 40 points

List 3 ***soil*** characteristics affecting soil incorporated pesticides rates

Answer next slide

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PESTICIDE EFFECTIVENESS 40 points

List 3 ***soil*** characteristics affecting soil incorporated pesticides rates

- SOIL TEXTURE (sand, silt, clay)
- PEST PRESSURE (pest infestations)
- ORGANIC MATTER (carbon content)

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PESTICIDE EFFECTIVENESS
50 points

Name 4 pesticide groups by what they are used to control

Answer next slide

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PESTICIDE EFFECTIVENESS
50 points

Name 4 pesticide groups by what they are used to control

- HERBICIDES
- INSECTICIDES
- FUNGICIDES
- GROWTH REGULATORS

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Off-Target Movement 10 points

How can you reduce or prevent VOLATILITY (VAPOR DRIFT)

Answer next slide

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Off-Target Movement 10 points

How can you reduce or prevent VOLATILITY (VAPOR DRIFT)

- LOWER PRESSURE
- USE COARSER SPRAY TIPS

Off-Target Movement 20 points

How can pesticide residues affect non-target areas or objects.

Answer next slide

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Off-Target Movement 20 points

How can pesticide residues affect non-target areas or objects.

- Contaminate other plants or animals
- Contaminate food products ready for harvest

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Off-Target Movement 30 points

"Sensitive Areas" to consider when applying pesticides to the landscape:

Answer next slide

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Off-Target Movement 30 points

"Sensitive Areas" to consider when applying pesticides to the landscape:

- HOMES
- SUSCEPTIBLE PLANTS
- CREEKS AND PONDS

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Off-Target Movement 40 points

How can you avoid or reduce_*Drift*?

Answer next slide

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Off-Target Movement 40 points

How can you avoid or reduce *Drift*?

- APPLY IN NO WIND
- APPLY IN EARLY am LATE pm
- LOW PRESSURE APPLICATION
- COARSE SPRAY / LARGE DROPLETS
- APPLY CLOSE TO TARGET

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Off-Target Movement 50 points

What contributes to ground water contamination?

Answer next slide

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Off-Target Movement 50 points

- What contributes to ground water contamination?
- Use of soluble / leachable chemicals
- Carelessness when applying near water
- Carelessness when mixing / loading near water (ponds, well heads, etc.)
- Spills!!
- Leaking equipment and containers

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Harmful Effects 20 points

Answers on next slide

Name the type of pesticide exposure (dermal, oral, inhalation, ocular)

- Most Common Exposure
- Applying + Eating Lunch
- Interior Application
- Splash or rub eyes

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Harmful Effects 20 points

- Name the type of pesticide exposure (dermal, oral, inhalation, ocular)

- Most Common Exposure
  - DERMAL
- Applying + Eating Lunch
  - ORAL + DERMAL
- Interior Application
  - INHALATION
- Splash or rub eyes
  - OCULAR

Harmful Effects 40 points

Which are symptoms of pesticide poisoning NOT heat stress? Answer next slide

- vomiting
- headaches
- nausea
- dry mouth
- sweating
- dizziness
- chills
- weakness
- chest pains
- confusion
- clammy skin
- difficulty breathing

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Harmful Effects 40 points
Which are symptoms of pesticide poisoning NOT heat stress?

- Vomiting
- Difficulty breathing
- Chest Pains

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Harmful Effects 50 points
List first aid for these pesticide poisonings

- INHALATION (breathing)
- DERMAL (skin)
- OCULAR (eyes)
- ORAL (mouth)

Answer next slide

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Harmful Effects 50 points
List first aid for these pesticide poisonings

- INHALATION (breathing)

  get to fresh air, loosen clothes, mouth-to-mouth
- DERMAL (skin)

  drench skin/clothes with water, wash skin w/soap water
- OCULAR (eyes)

  Flush w/ water for 15 minutes
- ORAL (mouth)

  rinse mouth w/ water, induce vomiting if label suggests

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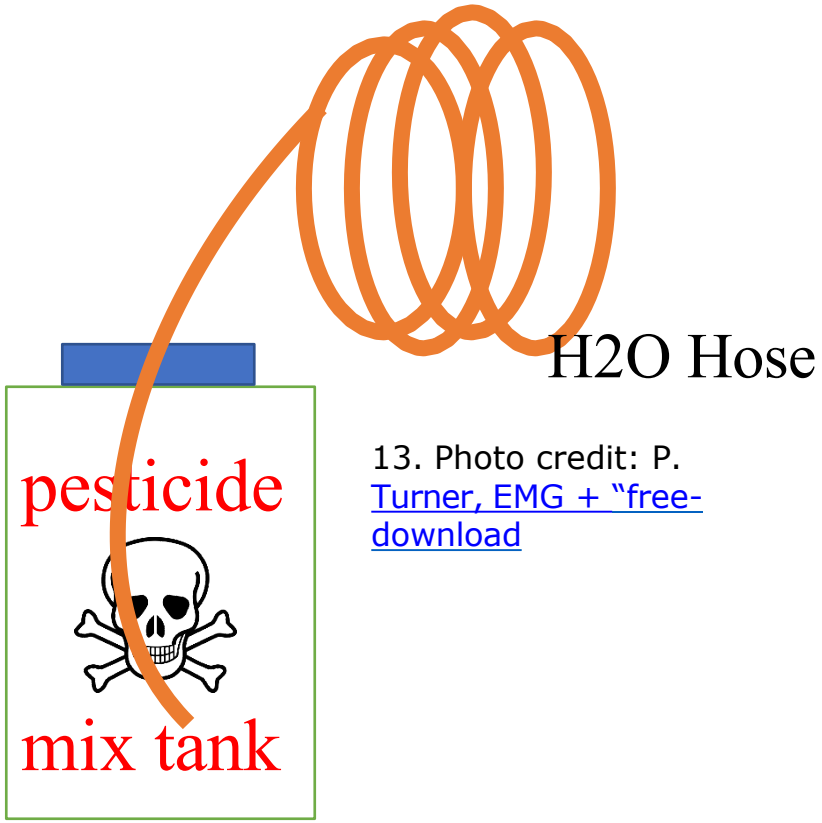
Show & Tell 10 points

- What's wrong with this picture?
- Suggest 2 corrections

Answer next slide



13. Photo credit: P. Turner, EMG + "free-download

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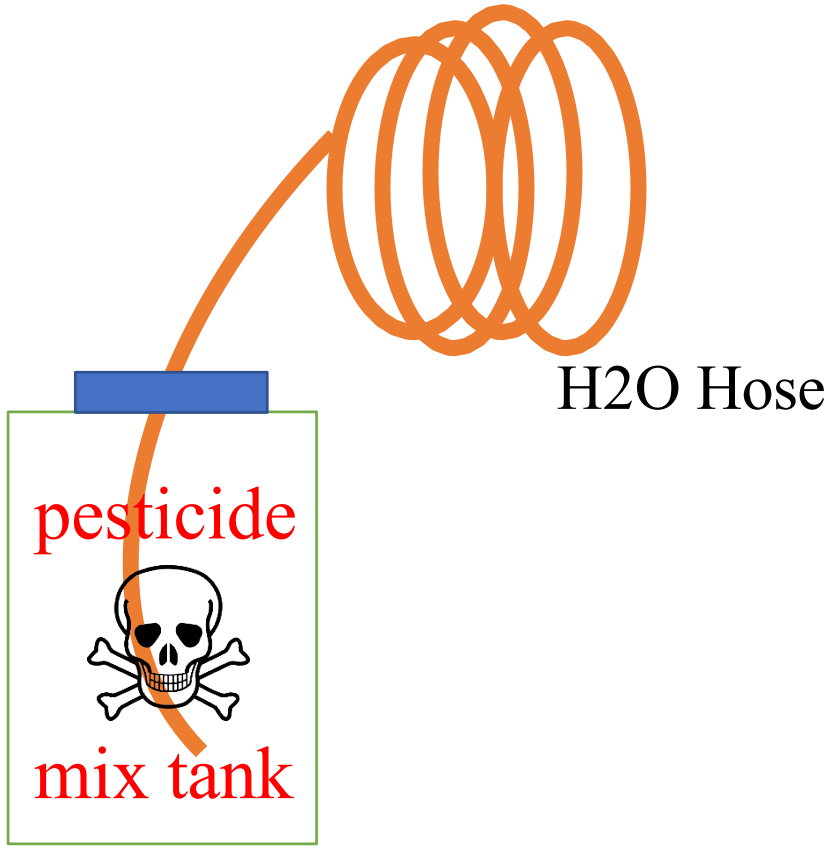
Show & Tell 10 points

Answer:

1. There is no backflow check valve to stop backflow of the chemical into the hose and possibly the water supply
2. The hose end should not be down in the pesticide



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Show & Tell 20 points

Name the PPE item and explain its protective qualities

- Respirator-
- Gloves-

- Safety Goggles-
- Hooded Coveralls-

Show & Tell 20 points

Name the PPE item and explain its protective qualities

- Respirator-
- INHALATION/ORAL PROTECTION
- Gloves-
- DERMAL PROTECTION
- Safety Goggles-
- OCULAR PROTECTION
- Hooded Coveralls-
- DERMAL PROTECTION

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Show & Tell 40 points

When is an applicator most susceptible to pesticide exposure?

- When is a pesticide container no longer “hazardous material”?

Answers next slide

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Show & Tell 40 points

When is an applicator most susceptible to pesticide exposure?

- DURING MIXING & FILLING

- When is a pesticide container no longer "hazardous material"?
  - AFTER TRIPLE RINSED AND PUNCTURED

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Show & Tell 50 points

What did Joe do wrong?

- Joe mixes and applies a batch of insecticide
- Joe goes home in coverall + rubber boots
- Joe leaves the boots by the door and puts his coveralls in the family hamper
- Joe washes all the clothes from the hamper together

Answer next slide

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Show & Tell 50 points

What did Joe do wrong?

- Joe should remove his coveralls & boots immediately after applying the pesticide – don't get into the truck / tractor with pesticides on his clothes
- Joe's coveralls should not go into the hamper with other clothes
- The coveralls should be washed separately from other clothes.

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Pesticide Handling 10 points

What's the first step any applicator should take before mixing pesticides?

Answer next slide

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Pesticide Handling 10 points

What's the first step any applicator should take before mixing pesticides?

READ THE LABEL TO DETERMINE PPE REQUIRED

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Pesticide Handling 40 points

Match the best pesticide treatment for each pest problem Answer next slide

- SYSTEMIC
- BAIT
- CONTACT
- FUNGICIDE

- Powdery mildew
- Rodent problem
- Perennial weeds
- Japanese beetles

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Pesticide Handling 40 points

Match the best pesticide treatment for each pest problem

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- BAIT
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- FUNGICIDE

- Powdery mildew
- Rodent problem
- Perennial weeds
- Japanese beetles

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Pesticide Handling 50 points
TRUE or FALSE?

- All pesticides of the same formulation are compatible?
- Two chemicals are mixed creating a solid. The weather was too cold for application.
- A tank mix resulting in lumps or gelling was compatible.
- 2 pesticides are mixed & appear compatible. The application yields NO pest control. This is a SYNERGISTIC relationship.

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Pesticide Handling 50 points

TRUE or FALSE?

- All pesticides of the same formulation are compatible? FALSE
- Two chemicals are mixed creating a solid. The weather was too cold for application. FALSE
- A tank mix resulting in lumps or gelling was compatible. FALSE
- 2 pesticides are mixed & appear compatible. The application yields NO pest control. This is a SYNERGISTIC relationship FALSE

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Jeopardy Program Created By

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