EXTENDING KNOWLEDGE ›› CHANGING LIVES

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Pesticides, Labels and Safety, Oh my!

Kelly J. Leo, Ag and Natural Resources Extension Agent
NDSU Extension Williams County

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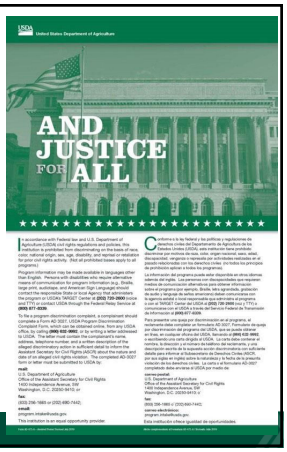

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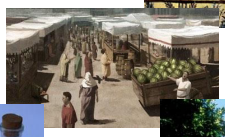
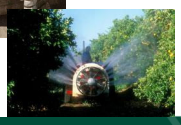
Pesticide History

- Agriculture beginnings
- First insecticide use 4,500 years ago
- Greece and Rome
- Smoke
- Plant compounds
- Salt and sea water
- Pyrethrums
- Inorganics
- Problems?



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Pesticide Industry Development

- Up until 1940's
- Drawbacks
- Development of DDT, 2, 4-D and others
- 'Silent Spring' by Rachel Carson
- 1970's and 1980's
- 1990's
- Today




Credit: International Union of Pure and Applied Chemistry

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What is a pesticide?

Pesticide law defines a "pesticide" as:

- 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

www.epa.gov


The term pesticide includes all of the following: herbicide, insecticides nematicide, molluscicide, piscicide, avicide, rodenticide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, and lampricide.

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In legal terms:

According to the Environmental Protection Agency:
"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.

Except in limited circumstances, any substance falling within this definition of a pesticide must be registered by the EPA before it can be legally sold or distributed in the United States."


Types of Pesticides

- Herbicides – control plant pests
  - ex. – 2, 4-D, dicamba,Trifluralin, glyphosate
- Insecticides – controls insect pests as well as some other small pests such as mites or nematodes
  - Ex. Carbaryl, pyrethrins, malathion
- Fungicides – chemical that controls fungus
  - Ex. Copper, chlorothalonil
- Rodenticides – controls rodent pests
  - Ex. Zinc phosphide, bromethalin


Pesticide Selection

BEFORE YOU BUY:

- ✓ What are the target pests and will pesticide give adequate control?
- ✓ *What is highest level of pest population you can tolerate?
- ✓ Are there alternative methods of pest control available?
- ✓ Can pesticide be applied safely and legally under the conditions that exist when you apply the product?
- ✓ Do you know site where pesticide can and cannot be applied?
- ✓ What is necessary application and safety equipment?
- ✓ How much pesticide is needed for the application?
- ✓ What are restrictions for use of the pesticide?
- ✓ *Could pose problems for children, pets, non-target plants?

The Label

Anatomy of the Label:

- ❑ Front Panel – Classification, trade (brand) name, type, site and pest information, active ingredient and signal word
- ❑ Back Panel – storage, disposal, signal word, other information, etc.
- ❑ Central portion – all information regarding proper use and pests controlled



Brand Name Vs. Active Ingredient

Brand Name – each manufacturer assigns a brand name to a product and different brand names from different manufacturers may contain the same active ingredient
ex. Roundup (Monsanto) and Glystar Plus (Albaugh, LLC)


Common name – general name given to a particular chemical
ex. 2, 4-D
Active Ingredient – the chemical that does the 'work'
ex. 2,4-dichlorophenoxyacetic acid

Signal Words

"Found on pesticide labels that relay acute (short-term) toxicity of pesticide products."

1. **Caution** – "slightly toxic if eaten, absorbed through skin, inhaled, or it causes slight eye or skin irritation."
   a. Lower in toxicity – these are category III or IV pesticides
   b. Oral LD_{50}>500-5,000 mg/kg or >5,000 mg/kg
   c. Inhalation LC_{50} >0.5 – 2.0 mg/L or >5,000 mg/kg
   d. Dermal LD_{50} >2,000 – 5,000 mg/kg or >5,000 mg/kg
   e. Primary eye irritation – corneal involvement or other eye irritation clearing in 7 days or less or minimal effects clearing in 24 hours or less
   f. Primary skin irritation – moderate irritation at 72 hours or mild or slight irritation at 72 hours

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2. **Warning** – pesticide product is moderately toxic if eaten, absorbed through skin, inhaled or it causes moderate eye or skin irritation
   a. Moderate toxicity - Category II pesticides
   b. Oral LD_{50} >50-500 mg/kg
   c. Inhalation LC_{50} >0.05-0.5 mg/L
   d. Dermal LD_{50} >200 – 2,000 mg/kg
   e. Primary eye irritation – corneal involvement or other eye irritation clearing in 8-21 days
   f. Primary skin irritation – severe irritation at 72 hours (severe erythema or edema)

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3. **Danger/Danger-Poison** – pesticide product is highly toxic by at least one route of exposure. May be corrosive, causing irreversible damage to skin or eyes. May be highly toxic if eaten, absorbed through skin, or inhaled. (Poison must be used in these cases)
   a. Category I pesticide
   b. Oral $LD_{50} \leq 50$ mg/kg
   c. Inhalation $LC_{50} \leq 0.05$ mg/L
   d. Dermal $LD_{50} \leq 200$ mg/kg
   e. Primary eye irritation – corrosive(irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days.
   f. Primary skin irritation – Corrosive (tissue destruction into the dermis and/or scarring)

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Other Parts of Label

- EPA Registration number and establishment number
- Ingredient statement – active and inert ingredient
- Net contents – ie pounds of active ingredient (ai) per gallon
- Keep out of Reach of Children – required on all pesticides
- Name and address of manufacturer – toll free number
- First aid statement – aka statement of practical treatment and note to physicians
- Precautionary statements – identify potential hazards
- Directions for Use – illegal to use a pesticide in any way not permitted by the labeling
- Agricultural Use Requirements - doesn't apply to gardens
- Storage and Disposal
- General Use Instructions

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Safe is as Safe Does!

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Harmful if swallowed. Causes moderate eye irritation. Avoid contact with eyes or clothing. Prolonged or repeated use of this product may cause allergic reaction in some individuals. Do not allow people or pets to enter the treated area until sprays have dried. Wear a minimum of a long-sleeved shirt, long pants, shoes and socks, safety glasses, and chemical resistant gloves made of any waterproof material when handling or applying this product.

Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or using tobacco. Remove and wash contaminated clothing before reuse. Remove saturated clothing as soon as possible and shower.

Label will specify **requirements for safe application**

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Calibration – What?

Ensures correct amount of pesticide is applied in the proper dilution to control a particular pest.

- Determine amount of pesticide to add to the tank
- Expressed in gallons per 1,000 square feet or gallons per acre or ounces per gallon

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But What About Natural Products?

- Are they pesticides?
- Do they require the same precautions?
- ALWAYS READ AND FOLLOW LABELS ON COMMERCIALLY SOLD PRODUCTS!!
- PPE – do you need it if the product is natural?
- Off-target species
- Are they as effective?

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Some Examples:

BT (*Bacillus thuringiensis*) – different strains effective against different species – used for decades in agriculture
Beneficial nematodes – colonize grubs of coleoptera
Diatomaceous Earth (DE) – dehydrates insect – can be harmful, use PPE
Nosema locustae – miscroscopic fungi used in grasshopper baits
Neem Oil – several formulations; work by either smothering insects or acting as insecticide (azadirachtin)
Pesticidal Soaps – multiple species control; insecticides, herbicides, fungicides, and algaecides
Pyrethrins – already mentioned in history
Spinosad – natural bacterium in soil; can be toxic to insects – toxic to bees so should not be used when bees foraging
(see organic pesticide handout)

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