

Pesticide Safety

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Asst. Extension Educator for Pesticide
Safety Education

What is a pest?

- A pest is..



What is a pesticide?

- Definition: Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest
- Insecticides
- Fungicides
- Herbicides

Pesticide label

Pesticide Company

Pest No More **Herbicide**

Controls grasses and grassy weeds
(crabgrass, foxtail, nutsedge, and others) in landscape areas

Active Ingredients:

Monosodium acid methanearsonate.....	9.81%
2,4-D, dimethylamine salt.....	3.18%
Mecoprop-p, dimethylamine salt.....	1.60%
Dicamba, dimethylamine salt.....	0.79%

Other ingredients..... 84.62%

Total 100.00%

Pesticide Company, Inc.
125 Pest Control Rd.
Lincoln, NE 68583
(402) 555-5555
EMERGENCY 800-555-1234

Group	☒	HERBICIDE
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KEEP OUT OF REACH OF CHILDREN
CAUTION

Net contents 1 gal

Contains 0.8 lbs of active ingredient per gallon.
EPA Reg. No.: 123-456-78901
EPA Est. No.: 54321-WT-3

PSEP, Univ. of Nebraska-Lincoln

Pesticide label and labeling

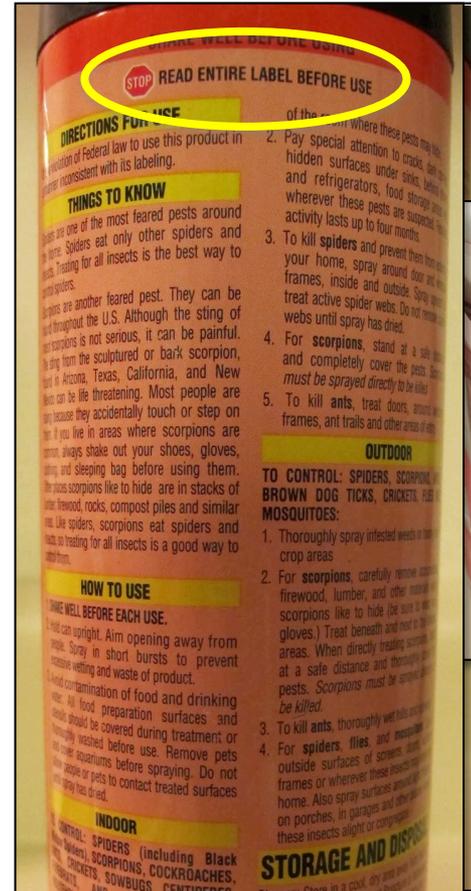
- The label and labeling is binding legal agreement between
 - The product registrant (Usually the manufacturer)
 - The US EPA (Reviews the data, the label and registers pesticide)
 - The end user (You!)
- You must read the label instructions and use directions



What is label and labeling?

Terms to know

- Label – Information printed on or attached to the pesticide container
- Labeling – label + others
 - Received from the manufacturer at the time of purchase
 - Eg: brochures, leaflets, fliers



PSEP, Virginia
Cooperative Extension

Pesticide use classifications

- Restricted-Use pesticides
 - Pesticide need additional regulatory restrictions
 - Only certified applicators or **trained people** working under **direct supervision**
 - Label says “restricted-use pesticide” on the front panel of the label
- Unclassified or general use pesticides

When do you read the label?

Read the label before you:

- Buy the pesticide
- Mix, load and apply the pesticide
- Store the pesticide
- Dispose of unused pesticide and empty containers



Parts of a pesticide label

NOMO'TODES is a fictitious label used for instructional only

NOMO'TODES 3E

Nematicide

For effective control of nematodes on turfgrasses.

RESTRICTED USE PESTICIDE

Due to High Acute Toxicity and Toxicity to Wildlife

For Sale to and Use Only by a Certified Applicator for Uses Authorized by His Certification, or By Persons Under His Direct Supervision.

Ingredient statement

Net contents

ACTIVE INGREDIENT:

Krypton Ethyl 3-phenyl (methyl) phosphoramidate..... 35%

INERT INGREDIENTS: 65%

TOTAL 100%

Contains Aromatic Petroleum Distillates

Contains 3 pounds of KRYPTON per gallon.

EPA Reg. No. 1234-567

EPA Est.No. 122-NC-2

Pesticide names

- **Trade name**
 - Roundup
- **Common chemical name**
 - Glyphosate
- **Technical chemical name**
 - Isopropylamine glyphosate
(N-(phosphonomethyl)glycine)



	1.0 INGREDIENTS	
	ACTIVE INGREDIENT:	
common name →	Glyphosate N-(phosphonomethyl)glycine	
identifies active ingredient	in the form of its isopropylamine salt	41.0%
	OTHER INGREDIENTS:	59.0%
		100.0%
	chemical name	
	describes the active ingredient	

Signal words and symbols

- Signal words indicate the relative acute (onset <24 hours) toxicity to humans and animals



®™ Trademarks of Dow AgroSciences, DuPont or Pioneer and their affiliated companies or respective owners

For the control of woody plants, broadleaf weeds in range and pasture, forests and non-crop areas, including manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, and around farm buildings; and applications to grazed areas, and establishment and maintenance of wildlife openings, and in Christmas tree plantations and aquatic sites.

For use in New York State, comply with Section 24(c) Special Local Need labeling for Garlon 3A, SLN NY-110005.

Active Ingredient:

Triclopyr: 2-[(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid, triethylamine salt.....	44.4%
Other Ingredients.....	55.6%
Total	100.0%

Acid equivalent: triclopyr - 31.8% - 3 lb/gal

Precautionary Statements

Hazard to Humans and Domestic Animals

EPA Reg. No. 62719-37

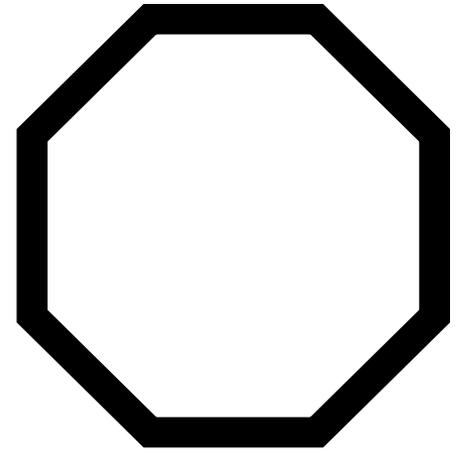
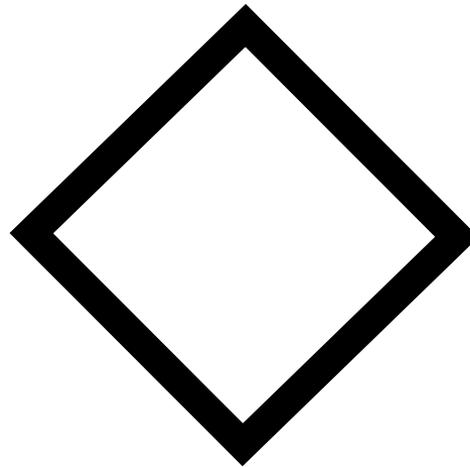
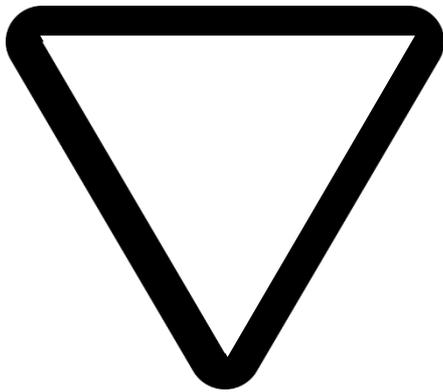
Keep Out of Reach of Children

DANGER

Corrosive • Causes Irreversible Eye Damage • Harmful If Swallowed Or Absorbed Through Skin • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reaction In Some Individuals

Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

Signal words and symbols



CAUTION (III)

WARNING (II)

DANGER (I)

**Relatively Non-toxic to
Slightly Toxic**

**Moderately
Toxic**

Highly Toxic

Signal words and symbols

- Labels can have 4 risk symbols



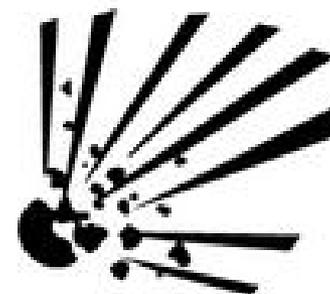
Poison



Flammable



Corrosive



Explosive

Precautionary statements

- Hazards to humans and domestic animals
 - “Danger-poison”, “Danger”, “Warning”, and “Caution”
- Routes of entry statements
 - “May be fatal If swallowed or inhaled”
- Specific action statements
 - “Avoid contact with skin or clothing”
- Protective clothing and equipment (PPE) statements

Personal protective equipment (PPE)

- Follow the directions for PPE stated on the label
- Lack of statement does not mean you do not need further protection

PROTECTIVE CLOTHING REQUIREMENTS

When making applications, applicators must wear: a long-sleeved shirt, long pants, mid-forearm length protective gloves and protective boots. In addition, a protective apron and goggles or face shield must be worn during mixing/loading.

Statement of practical treatment

- First-aid
- Lists recommended treatments for accidental exposure or poisoning

some individuals.

FIRST AID	
IF ON SKIN	<ul style="list-style-type: none">• Take off contaminated clothing.• Rinse skin immediately with plenty of water for 15-20 minutes.• Call a poison control center or doctor for treatment advice.
IF INHALED	<ul style="list-style-type: none">• Move the 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 SWALLOWED	<ul style="list-style-type: none">• 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 a poison control center or doctor.• Do not give anything by mouth to an unconscious person.
For MEDICAL emergencies, Call 24 Hours a Day 1-800-225-2883	
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-225-2883	

Statement of practical treatment

- Information for the physician
- Note to physician describes medical treatment for poisoning emergencies



Environmental hazard statements

ENVIRONMENTAL HAZARDS

To protect the environment, do not allow pesticide to enter or run off into storm drains, drainage ditches, gutters or surface waters. Applying this product in calm weather when rain is not predicted for the next 24 hours will help to ensure that wind or rain does not blow or wash pesticide off the treatment area. Rinsing application equipment over the treated area will help avoid run off to water bodies or drainage systems. This pesticide is toxic to wildlife. This product is toxic to bees exposed to direct treatment. Do not apply this product while bees are actively visiting the treated area.

PHYSICAL OR CHEMICAL HAZARDS: Do not apply this product in or on electrical equipment due to the possibility of shock hazard.

NOTICE: To the extent allowed by law, buyer assumes all risks of use, storage or handling of this product not in accordance with directions.

†**THE ORTHO® GUARANTEE:** If for any reason you, the consumer, are not satisfied with this product, mail us proof of purchase to obtain a full refund of your purchase price.

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PROTECTION OF POLLINATORS



APPLICATION RESTRICTIONS EXIST FOR THIS

PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon
application site for specific use restrictions and instructions to protect bees and
other insect pollinators.

in the Directions for Use for each

This product can kill bees and other insect pollinators.

Bees and other insect pollinators will forage on plants when they flower, shed pollen, or

Physical or chemical hazards

- Describes any special, fire, explosive or chemical hazards
- **Flammable:** Do not use or store near heat or open fire
- **Corrosive:** Store only in a corrosion resistant tank



Hazard statements on different labels are not necessarily located in same place

Directions for use

- The statement **“It is a violation of Federal law to use this product in any manner inconsistent with its labeling”**

DIRECTIONS FOR USE

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

IMPORTANT APPLICATION INFORMATION

- For indoor and outdoor residential use sites only.
- Not for commercial production.
- Do not apply this product in a way that the spray will contact persons, either directly or through drift.
- Keep children and pets out of treated areas until sprays have thoroughly dried.
- When applying outdoors:
 - Do not apply if wind speed exceeds 10 mph.
 - Always stand “up wind” when applying this product.

HOW TO APPLY

Tank Sprayer

Shake container gently before using.

- Mix 1.5 fl. oz. of product per gallon of water.
 - Hold sprayer 8 to 12 inches from the area to be treated.
 - Direct spray toward the upper and lower leaf surfaces and stems where the pests appear.
- Spray only until the surface of the foliage is wet.

Ortho® Dial 'N Spray® Applicator

Shake container gently before using.

Directions for use

- The statement “**It is a violation of Federal law to use this product in**

Buffer zones

Drift management

DIRECTIONS FOR USE

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

IMPORTANT APPLICATION INFORMATION

Rotational crops

- When applying outdoors:
 - Do not apply if wind speed exceeds 10 mph.
 - Always stand “up wind” when applying this product.

HOW TO APPLY

Tank Sprayer

Shake container gently before using.

Resistance management

Ortho® Dial N Spray® Applicator

Shake container gently before using.

Directions for use

- Modes of action and resistance management
- Listing of crops, pests, and specific directions
- Spray drift information
- Tank mixtures, restricted-entry interval, and buffer zones
- Application instructions
- Agriculture and/or non-agricultural use requirements

Storage and disposal

STORAGE AND DISPOSAL

PROHIBITIONS

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

STORAGE

Store in original container in a well ventilated area separately from feed and foodstuffs. Avoid cross-contamination with other pesticides. Spillage or leakage should be contained and absorbed with clay granular dust, or equivalent material for disposal.

PESTICIDE DISPOSAL

Triple rinse pesticide from containers and use rinsates in the pesticide application. Wastes which cannot be used according to label instructions should be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL

Plastic or Metal: After triple rinsing (or equivalent), offer for recycling, reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities, such as burning in incinerators. If burned, stay out of smoke.

Uses inconsistent with the labeling

- Applying to or on plants, animals, or sites not stated on the label
- Applying at a higher rate
- Not wearing the specified PPE
- Mishandling

Know your pesticide

Follow the label

Pesticide Labels Will Be Changing To Protect Threatened and Endangered (Listed) Species and Their Habitat Only a few labels will be changing from 2024!

EPA Explains...

How to Read a Pesticide Product Label

- ✓ Read the entire label
- ✓ The label is the law
- ✓ Below is an example of information found on a pesticide product label

Active Ingredients

- ✓ Main chemical ingredients

EPA Registration Number

- ✓ U.S. laws require EPA to register all pesticides

Directions for Use

- ✓ Germs the product kills
- ✓ Where and how to properly use the product

ACTIVE INGREDIENTS:
Alky (60% C14, 30% C16, 5% C12, 5% C18) 10.0%
Dimethyl Benzyl Ammonium Chloride 90.0%
OTHER INGREDIENTS: 100.0%
TOTAL: 100.0%
EPA REG NO. 55555-55-55555

CAUTION

Directions for Use

INSTRUCTIONS FOR USE:
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For Disinfection of Healthcare Organisms:
Staphylococcus aureus, Pseudomonas aeruginosa.

To Disinfect Hard, Nonporous Surfaces:
Pre-wash surface. Mop or wipe with disinfectant solution. Allow solution to stay wet on surface for at least 10 minutes. Rinse well and air dry.

PRECAUTIONARY STATEMENTS:
Hazardous to humans and domestic animals. Wear gloves and eye protection.

CAUSES MODERATE EYE IRRITATION. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Avoid contact with foods.

FIRST AID: IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes.

POISON CONTROL: Call a Poison Control Center (1-866-366-5048) or doctor for treatment advice.

STORAGE AND DISPOSAL: Store this product in a cool, dry area away from direct sunlight and heat. When not in use keep center cap of lid closed to prevent moisture loss. Nonrefillable container. Do not reuse or refill this container.

Precautionary Statements

- ✓ The identified risks of product use
- ✓ Denotes whether personal protective equipment is needed

First Aid

- ✓ What to do if you get the product in your eyes or mouth, on your skin, or if you breathe it in

Storage and Disposal

- ✓ How to store
- ✓ Instructions on disposal and reuse of container

epa.gov/pesticides

What is the Endangered Species Act (ESA)

- The ESA was first passed in 1973.
- As listed in the statute the agencies that enforce the ESA are the [U.S. Fish and Wildlife Services](#) and/or the [U.S. National Marine Fisheries](#)
- EPA assesses the risk and consults with "the Services" as needed.
- If there is potential harm, the agency will modify the labels as needed to mitigate risk.

Government Agency Roles



EPA

Regulates pesticides and approves labels



FWS

Protects listed terrestrial and freshwater species



NMFS

Protects listed marine (saltwater) species



USDA

Analyzes impacts of mitigations for agriculture



The "Services"

Why Now? “Megasuit” settlement was finalized on **Sept 12, 2023**

"...the EPA **may not avoid compliance** with the ESA..."

Migrant Clinicians Network vs EPA. Dec 2023, 9th Circuit

"Before registering a pesticide, EPA must consult with the statutorily specified agencies that have expertise on risks to species' survival. **But for decades EPA routinely skipped that step when it registered pesticides....**"

Center for Biological Diversity v. EPA, Dec. 2022, DC Circuit

Timeline: When Could Labels Change?

- Individual labels will have to be changed after notice and comment period
- This has started now and will continue for years to change pesticide labels
- Strategies are coming for all types of conventional pesticides:
 - All strategies should have similar mitigation elements
 - Herbicides finalized (August 2024),
 - Insecticides (2025),
 - Fungicides (2026), and
 - Rodenticides finalized (2024)

Mead's Milkweed
US FWS



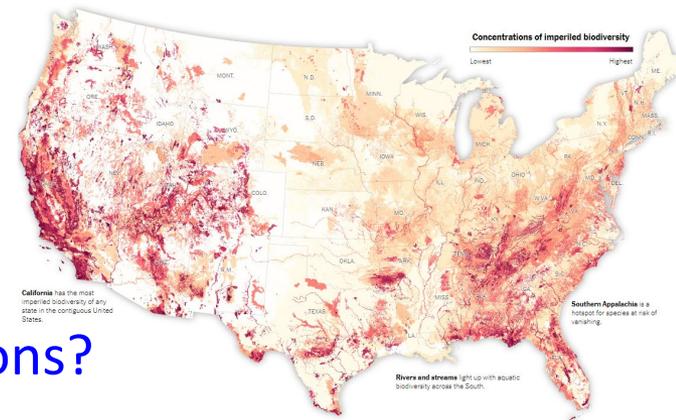
ESA Protection: People Say this is Too Complicated. But the EPA or Courts Have Three Main Registration Choices

Option 1: Remove pesticide from the U.S. marketplace

Option 2: Restrict its use to only crops/sites in counties or states without listed species or critical habitat

Option 3: Add mitigations to protect species

Outlook: Would you prefer to not have access to the product or have access to it with mitigations?



Label Changes to Protect Listed Species and Their Critical Habitat

Herbicide Strategy: First example Liberty[®] Ultra

There are three types of label changes possible, aimed at mitigating the following:

- Spray drift
- Runoff/Erosion
- Impacts to specific geographic locations where listed species or their critical habitat are found, Pesticide Usage Limitation Areas (PULAs)

Herbicide Strategy: Finding Required Mitigations

For conventional agricultural uses, mitigations have to be determined for each field, not an entire farm

Required spray buffer and runoff/erosion mitigation can be different for each herbicide and crop combination.

Mitigations may appear on up to 3 places:

- On the product label
- Label may direct user to Bulletins Live! Two (BLT) webpage
<https://www.epa.gov/endangered-species/bulletins-live-two-view-bulletins>
- Label may direct user to Mitigation Menu webpage
<https://www.epa.gov/pesticides/mitigation-menu>

Additional Information

- Pesticides and Endangered Species Education Resources Toolbox
<https://www.epa.gov/endangered-species/pesticides-and-endangered-species-educational-resources-toolbox>

EPA Reg. No. 10163-21
EPA Est. No.



Produced For:
Gowan Company
P. O. Box 5569
Yuma, AZ 85366-5569
800-883-1844

2. Go to the Bulletins Live! Two website (it is compatible with most internet browsers):

<https://www.epa.gov/endangered-species/bulletins-live-two-view-bulletins>

3. Enter the EPA Registration Number into the search bar and select your product.

Location Search:
Find Place

Application Month:
April 2024

EPA Registration Number:
10163-21

MALATHION 8 (10163-21) ; "GOWAN MALATHION 8"; "GOWAN MALATHION 8 FLOWABLE"; "MALATHION 8 FLOWABLE"

Example ESA Bulletins Live! Two: Pesticide Use Limitation Area (PULA) Dicamba – Aug 2024 application, Lexington KY

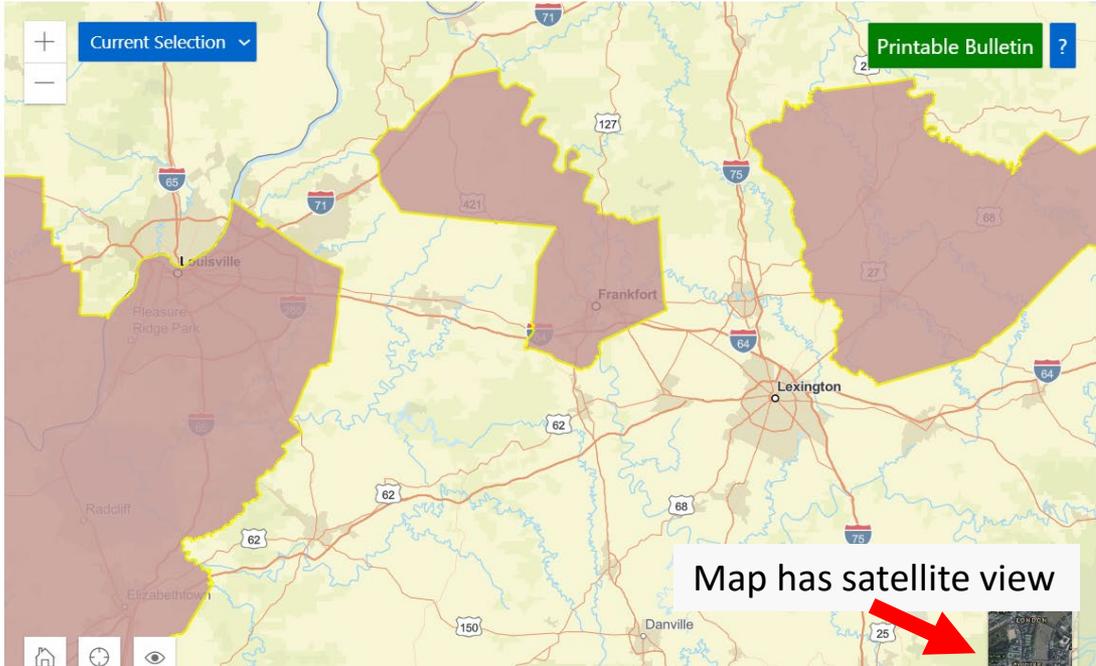
Areas in pink are to protect listed species, 310 foot in-field wind-directional spray drift buffer and a 57-foot omnidirectional in-field buffer. Website has a lot more details.

You can use state, city or longitude then latitude of field application site and see if it is part of a PULA

Limitations for Selected Area

Pula ID: 52
Event Name: Dicamba - 2020
Application Month: August 2024

Product	Count
A21472 PLUS VAPORGRIP TECHNOLOGY (100-1623) <i>Alternate Names:</i> TAVIUM PLUS VAPORGRIP TECHNOLOGY	1
ENGENIA HERBICIDE (7969-472)	1
FEXAPAN PLUS VAPORGRIP TECHNOLOGY (352-938)	1
TAVIUM PLUS VAPORGRIP TECHNOLOGY (100-1623) <i>Alternate Names:</i> TAVIUM PLUS VAPORGRIP TECHNOLOGY	1



Map has satellite view

Make sure to in zoom enough so you can see the application area – especially if it is on the edge of a PULA.

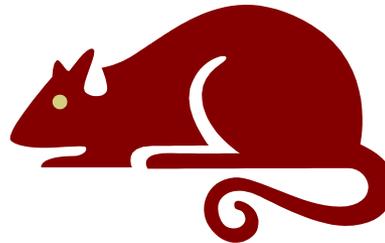
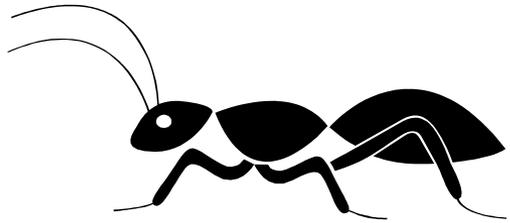
2. Pesticide hazards and first aid



Pesticide action network (PAN)

Pesticides and humans

- Similar nervous , circulatory, and respiratory systems



- Health effects

What is Hazard?

HAZARD = Toxicity x Exposure

Hot TEa

risk; the potential for injury

the capacity of a pesticide to cause injury

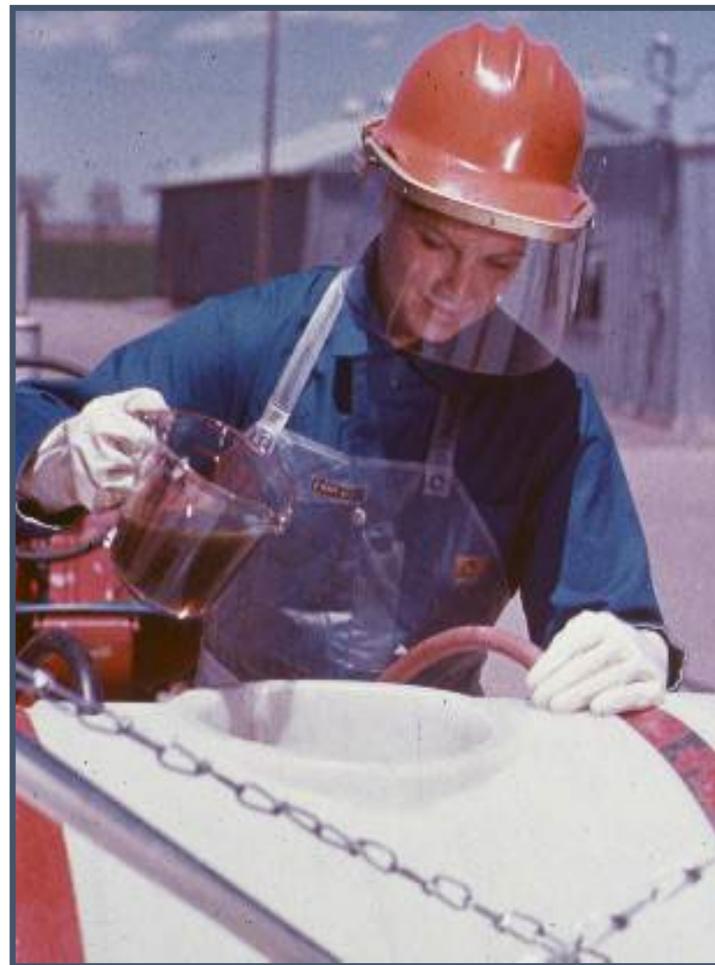
the risk of a pesticide contacting or entering the body

Hazard

- Higher toxicity = greater hazard
- Lower toxicity = less hazard
- Higher exposure = greater hazard
- Lower exposure = less hazard

Hazard increase..

- When mixing and loading the concentrate
- With a very high single exposure
- After many exposures over time

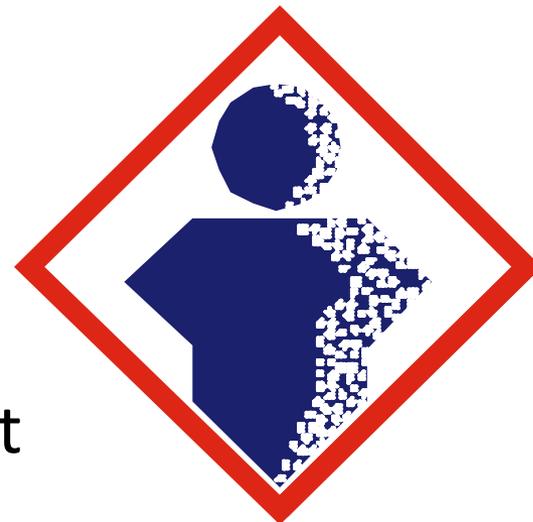


Poisoning effects

- Contact
- Systemic
- Allergic

Contact effects

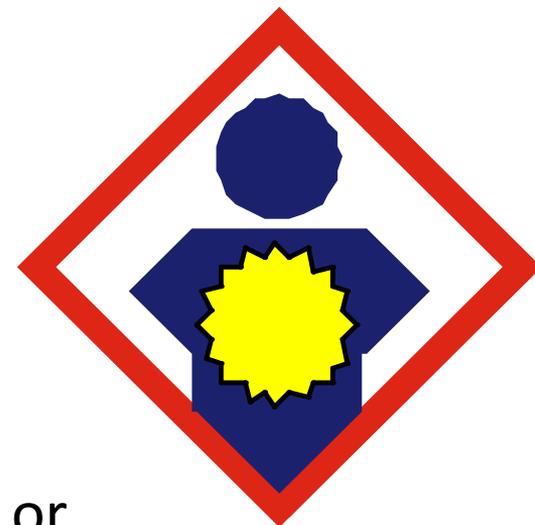
- Injury at the point of contact
- Skin, eyes, respiratory tract are most often affected



Contact injury to the skin
is the most common form of
pesticide poisoning!

Systemic effects

- Poisoning effects that occur at sites than their entry point
- Effects on us similar to those in the target animals
 - Insecticides: nervous system (inhibition or damage)
 - Rodenticides: circulatory system (impairs blood clotting)

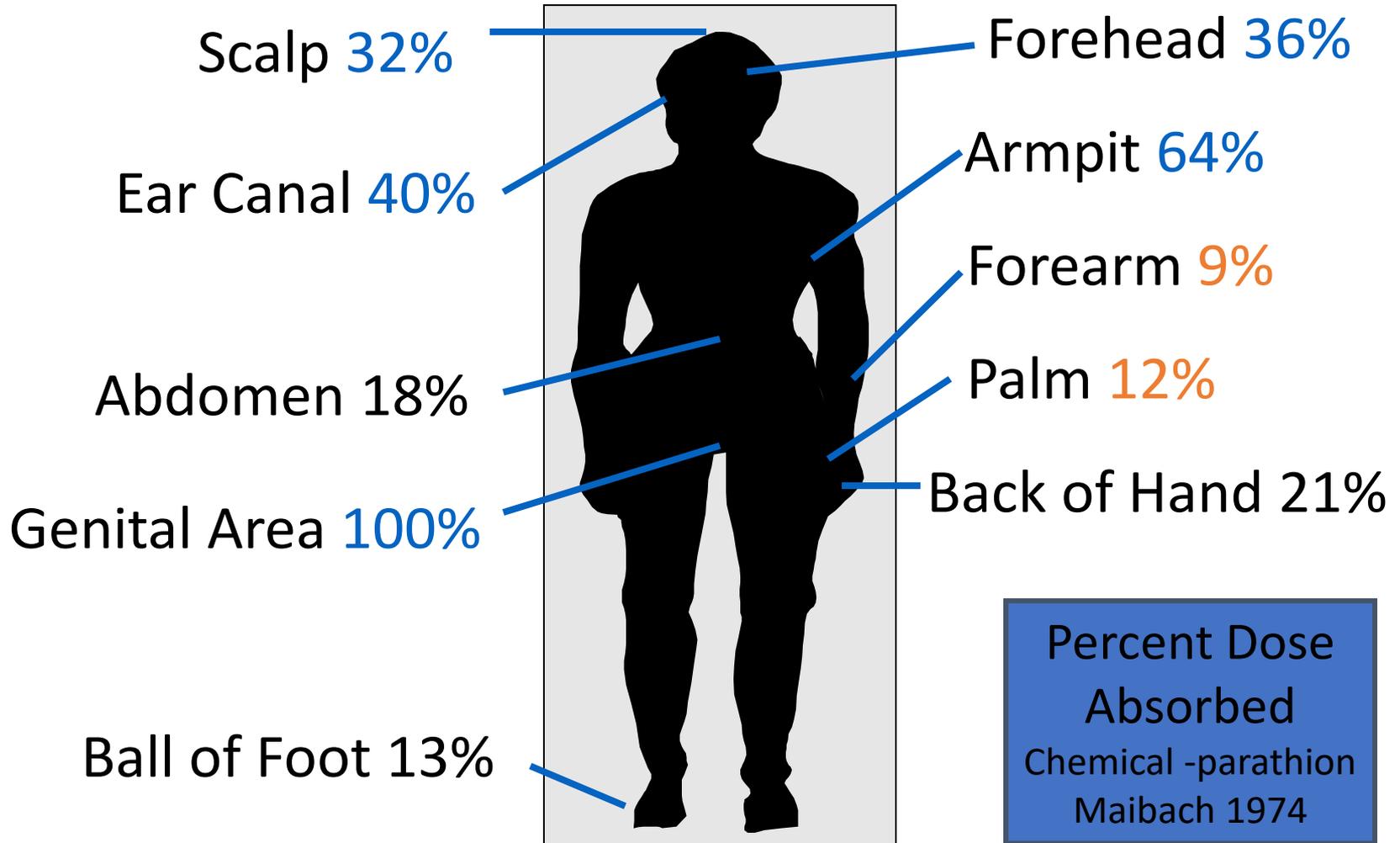


Allergic effects

- Refers to hypersensitivity to a specific substance
- Dermatitis, blisters, hives
- Life-threatening shock
- Red or itchy eyes
- Respiratory discomfort, asthma



Routes of pesticide entry



Skin (dermal)



97% of all body exposure during spraying is by skin contact!



Skin (dermal)

- Warm, moist area
- Cuts, abrasions, and rashes
- Pesticide formulations affect absorption

**Least
absorbed**

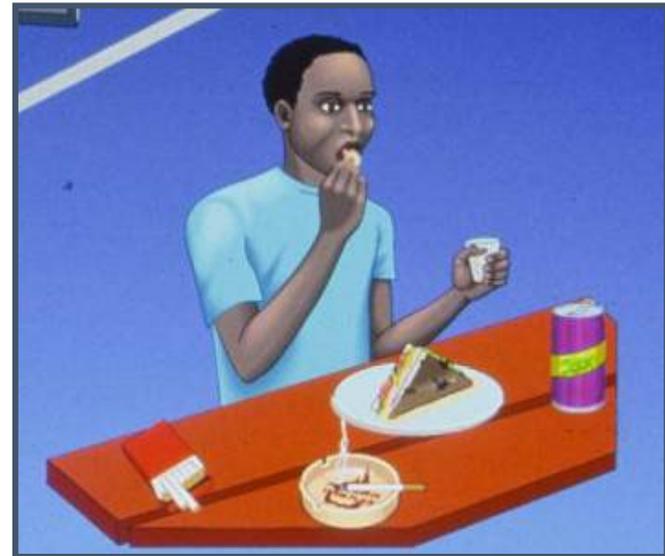


**Most
absorbed**

Oral (Mouth)

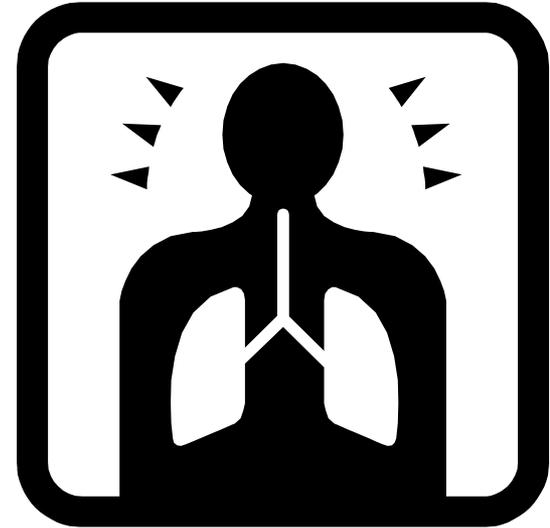
Always wash your hands!

...before eating, drinking smoking, or going to the bathroom at breaks!!



Inhalation (Lungs)

- Inhalation exposure can occur
- When using
 - Wettable powders
 - Dusts
 - Gases, vapors
 - Sprays
- While mixing and loading
- During applications



Steps to take:

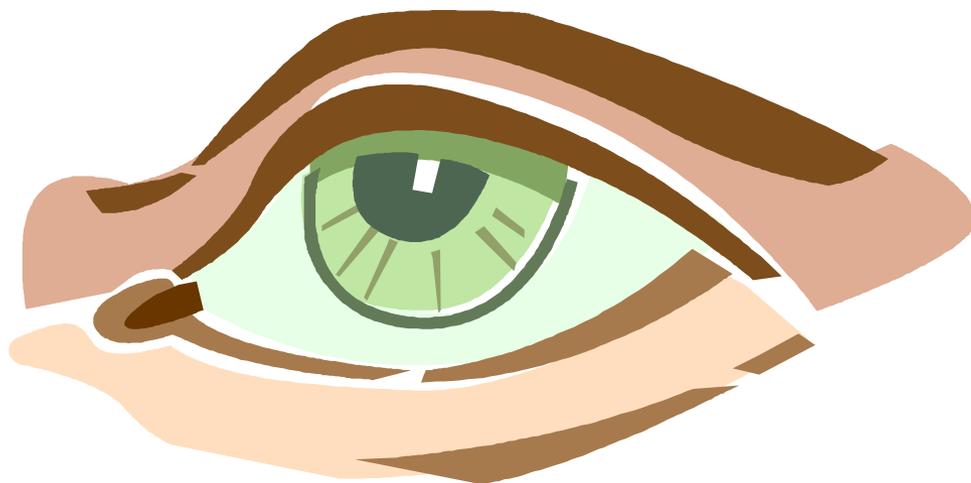
1. Move victim to fresh air
2. Loosen tight clothing
3. Seek medical attention

Ocular or eye exposure

- Eyes are able to absorb surprisingly large amounts of chemical

Steps to take:

1. Remove any contact lenses
2. Rinse eyes quickly and gently with clean water for 15 minutes or longer



Appearance of effects

- Acute toxicity effects
- Delayed effects
- Chronic toxicity effects

An acute effect..

- Occur from a single exposure
- Develops within 24 hrs of exposure
- Usually expressed as LD_{50} or LC_{50}



Delayed effects..

- After 24 hrs
- After repeated exposures

For example, multiple low dose exposure to organophosphate and carbamate insecticides



Chronic effects

- Low dose exposures over an extended period of time
- Effects include
 - Birth defects
 - Toxicity to a fetus
 - Production of tumors
 - Genetic changes
 - Blood disorders
 - Nerve disorders
 - Reproductive effects



How to recognize symptoms?



Varies, according to the pesticide and the individual

Rash, headache, nausea, dizziness

If exposure occurs, administer first aid



- Dilute the pesticide
- On skin: remove contaminated clothing, wash skin, gently dry and loosely cover
- In eyes: wash across the eyes for 15 minutes
- If inhaled: get victim to fresh air and laid down
- If ingested: induce vomiting EXCEPT.. (read the label) and administer activated charcoal in water
- **DO NOT USE syrup of ipecac – ineffective!**

Seek medical attention

Take the label

Keep extra copies of the label
(and MSDS, now SDS) in your
vehicle and office for
emergencies!!



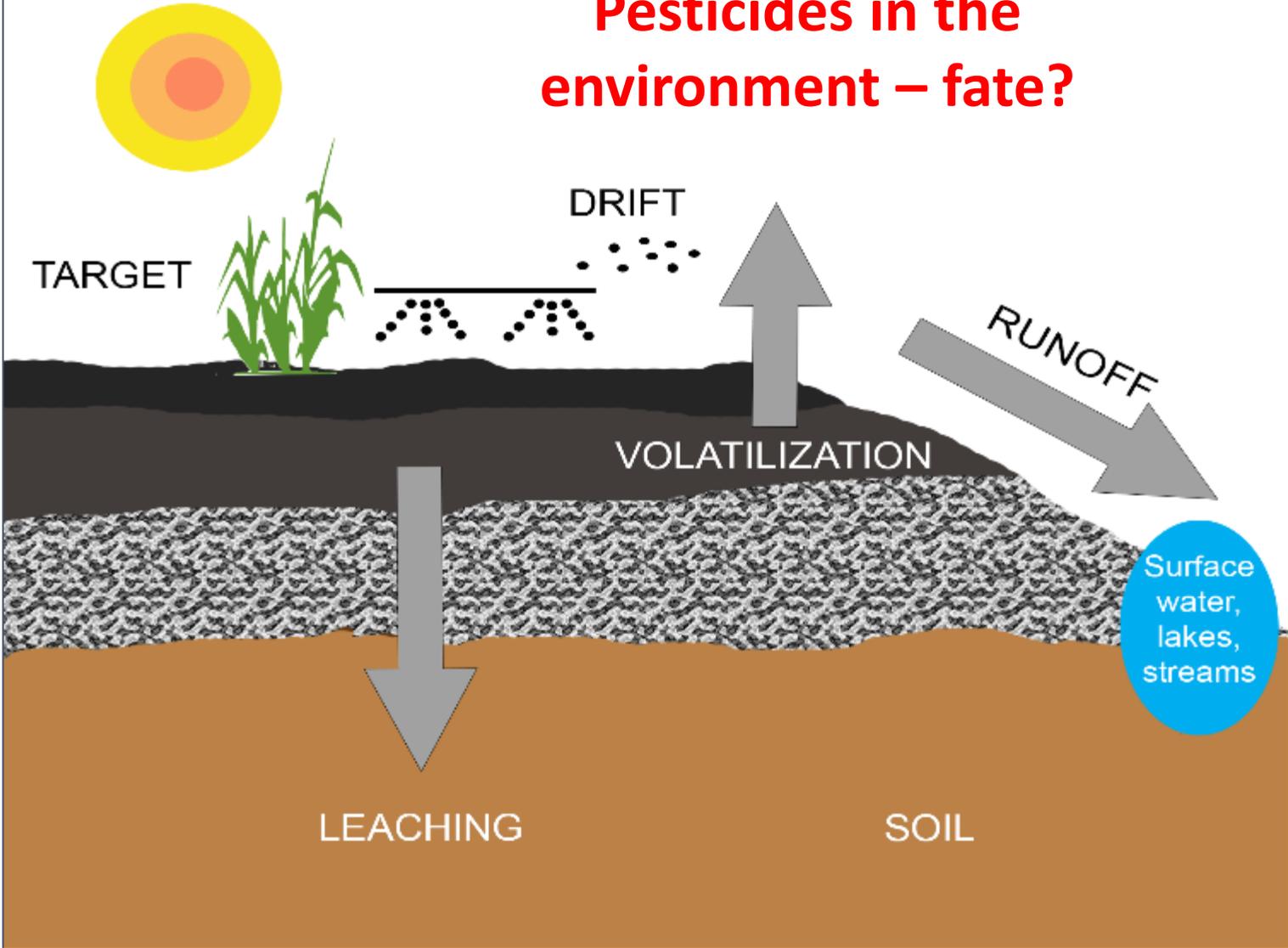
4. The environment and pesticides

- Air, soil, water, plants, animals, people, buildings
- Beware of beneficial organisms, endangered species, water, and people
- There is significant concern about the effects of pesticides on the environment



PSEP, Univ. of Georgia

Pesticides in the environment – fate?

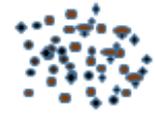


Pesticide characteristics

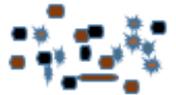
- Solubility – Dissolves easily in water,

Pesticide characteristics

- Solubility –
- Adsorption – Tightly attached (strongly adsorbed) to soil particles
 - Soil texture, structure, permeability
 - Soil pH, organic matter
 - Slope
 - Moisture, rainfall



Clay



Silt



Sand

PSEP, Ohio state university

Pesticide characteristics

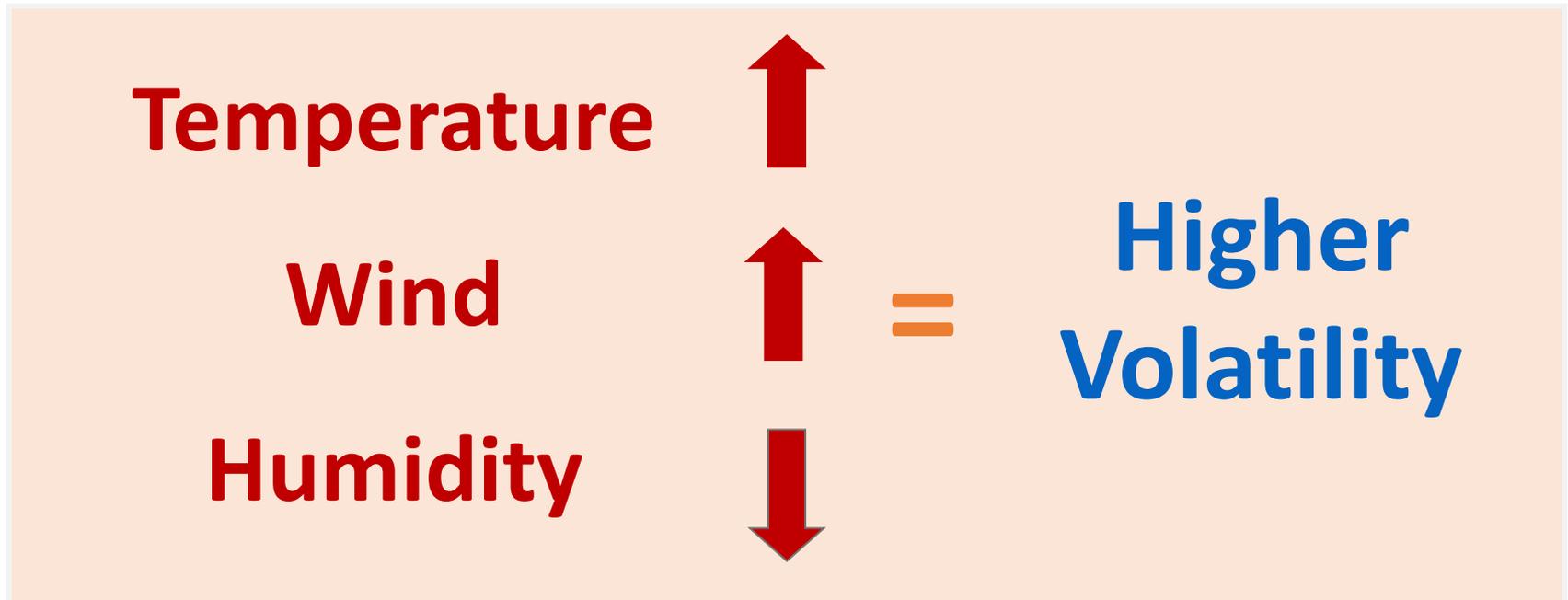
- Solubility –
- Adsorption –
- Persistence – Decomposes slowly and remains active in the environment long after application, providing continued pest control

Pesticide characteristics

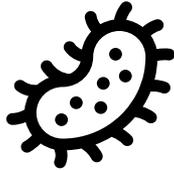
- Solubility –
- Adsorption –
- Persistence –
- Volatility – Tendency of the pesticide to turn into a gas or vapor

Pesticide characteristics: Volatility

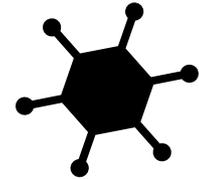
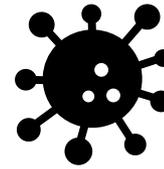
- Volatility – Tendency of the pesticide to turn into a gas or vapor



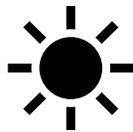
Pesticide degradation



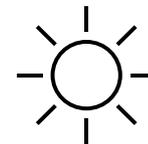
Microbial



Chemical

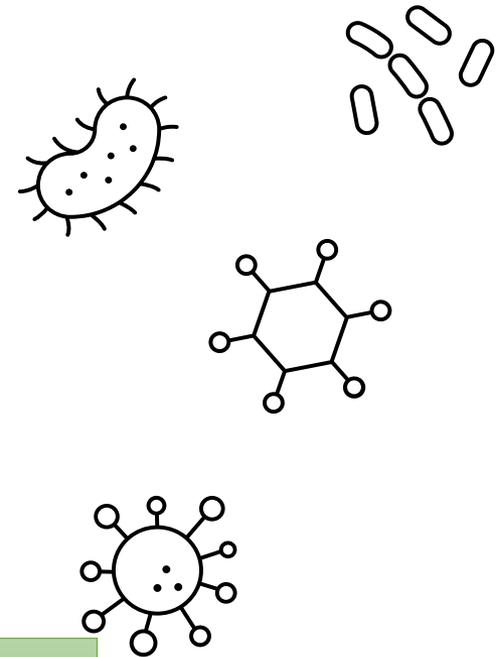


Photo



Microbial degradation

- Important means for degradation
- Some microbes use them as food
- Warm soil temp, moisture, fertility, pH, adsorption, and aeration



How adsorption influence?

Chemical degradation

- Non-living processes
- High pH can break down
 - In soil
 - In tank mix water
- Soil properties and conditions affect the rate and type of chemical reactions

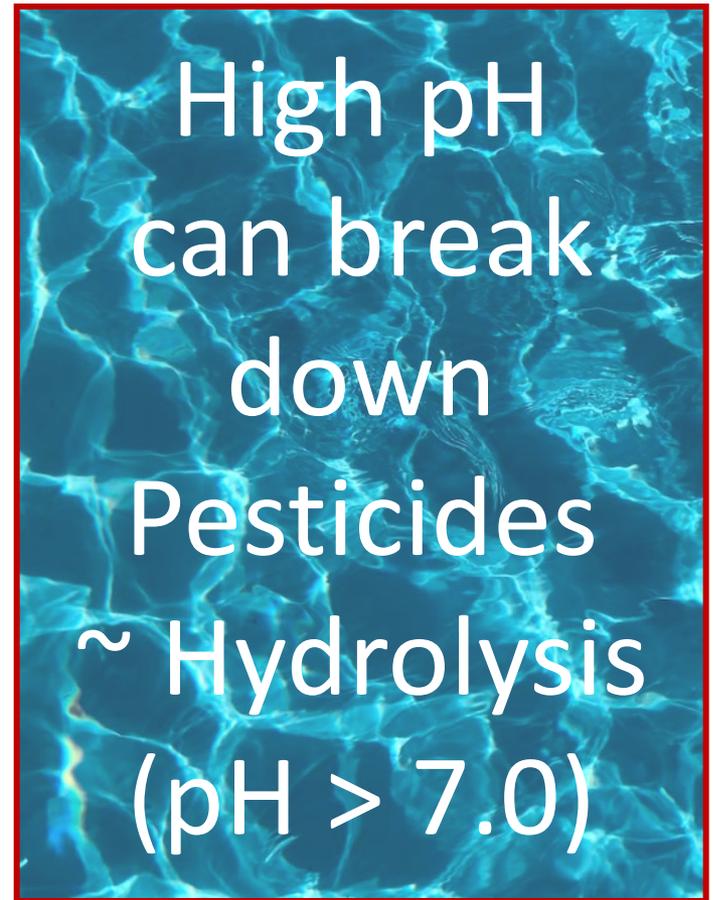


Photo by [Artem Miltonian](#) on [Unsplash](#)

Photo degradation

- Breakdown of pesticide by sunlight
- Maybe reduced by soil incorporation



Photo by [Tom Hauk](#) on [Unsplash](#)

Factors affecting pesticide movement

- Pesticide's chemical characteristics
- Pesticide user's practices
- Surface character of the application site
- Soil type at the application site
- How deep the water table is and the permeability of the local bedrock

Ways pesticides move

- **By air**
- Spray drift, vapor, & dust particles
- **By water**
- Surface runoff
- Movement through soil
- **By other objects**
- Residues on plants and animals
- On equipment, products, and supplies



Pesticide movement – By air

- **Spray drift**
- Defined as airborne pesticide droplets that move off target/ application site
- Check label for drift management
- Spray drift is influenced by
 - Droplet or particle size
 - Height and direction of release
 - Temperature and humidity



<https://pesticidestewardship.org/>

Major drift factors

1. Applicator attitude
2. Weather conditions
3. Equipment set-up



Bob Nichols: USDA

Applicators attitude

- Assess the sensitive sites near application areas
- Assess weather conditions: stability, wind direction and speed
- Set up equipment with appropriate settings
 - Correct nozzles and pressures for sprayers
 - Decide speed and gate width for granular applications
- Make final decision: “**to spray or not**” that is the questions

Equipment setup

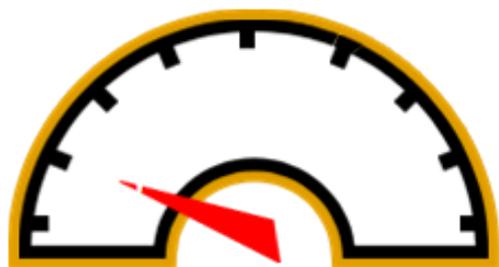
- Appropriate nozzle size and pressure
- Use lower pressures
 - Except with certain nozzles
 - Drift potential increases as distances increases
- Use nozzles that produce **medium** and **coarse** droplet sizes
 - Smaller orifice = smaller droplet



Equipment setup- Spray pressure

- Must increase pressure 4 times to double nozzle output – consider drift when changing pressure

Sprayer pressure
at 10 psi
Sprayer pressure at 10 psi



Sprayer output 1 bucket

Sprayer pressure at 40 psi



Sprayer output 2 buckets

Equipment setup – Boom height

- Reducing the distance droplets must fall before hitting the target site reduces drift potential
- This rule applies to all types of applications



PSEP, Univ. of Georgia

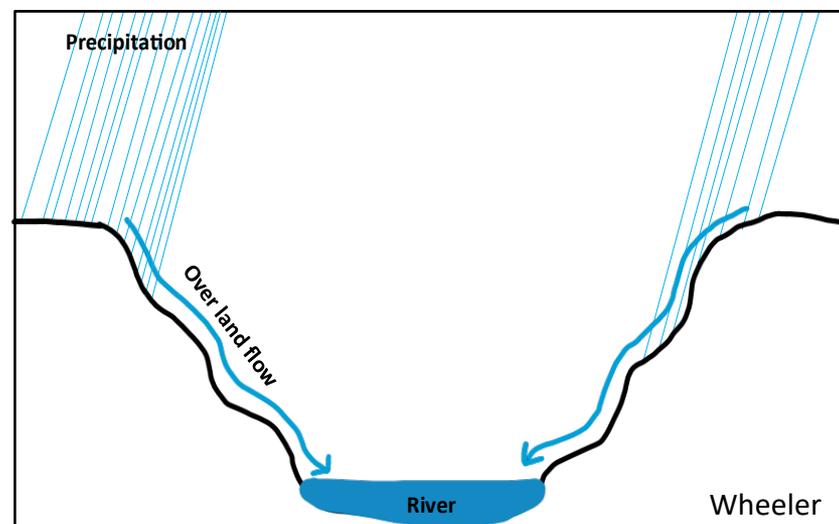
Weather conditions

- Read the wind
 - What's the downwind? **Direction**
 - How far will it move? **Speed**
- 0-3 mph: Could be stable
- 4-7 mph : Manage for off-target movement
- >7 mph: Carries more material movement downward

Pesticide movement: In water

Runoff

- Pesticides move in water over soil into surface water
- Contaminated ditches, streams, rivers, ponds, and lakes
- Surface water used for drinking and livestock water, irrigation, etc



Runoff amount depends on:

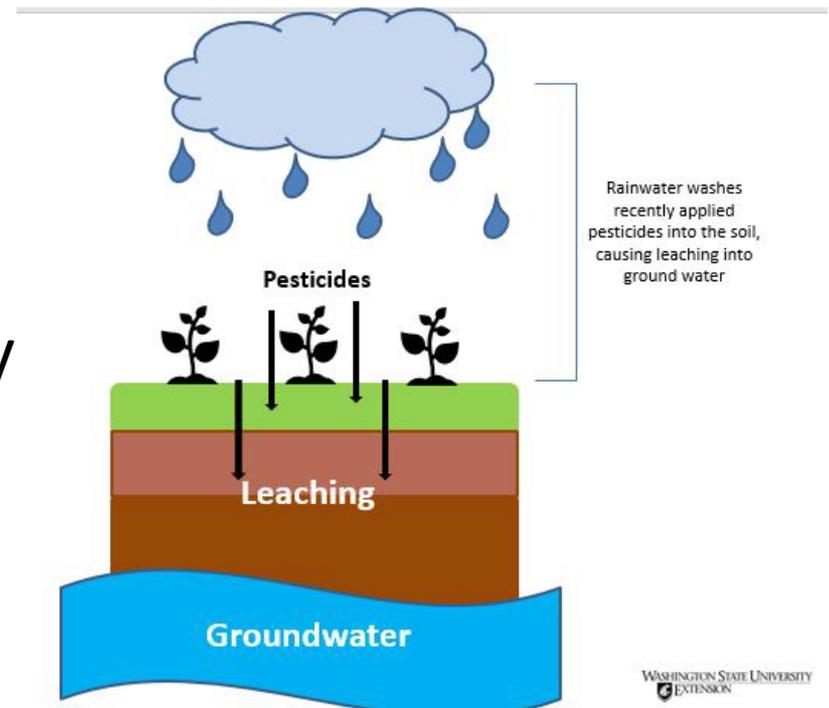
- Soil moisture
- Amount and timing of irrigation/rainfall
- Pesticide chemical characteristics
- Grade or slope of the area
- Soil texture
- Vegetation



Pesticide movement: In water

Leaching

- Movement of pesticide by water through soil
- Move horizontally to nearby roots or vertically towards groundwater
- Chemical characteristics



Leaching depends on..

- Geology – how permeable is the soil?
- Soil texture and structure
 - - Sandy: fast percolation
 - -Silt, clay or organic matter
- Depth to groundwater: shallow water tables pose a concern
- Amount and timing of rainfall or irrigation

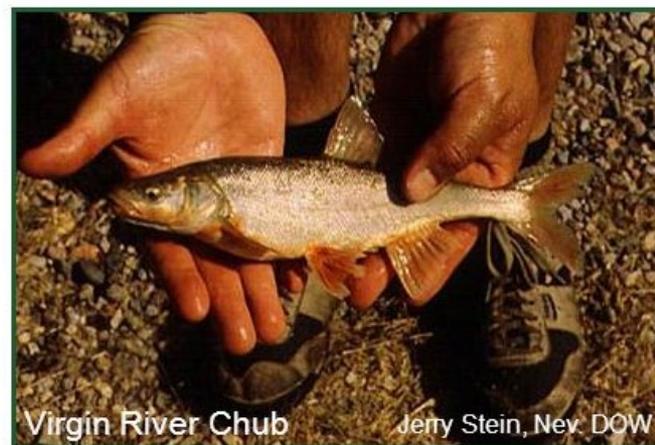
Protect water sources

- Mix and load site location
- Spills
- Post application run-off
- Dispose of wastes properly



Protect non-target organisms

- Plants
- Bees, other pollinators
- Other beneficial insects
- Fish and other wildlife
- Humans
- Threatened & endangered species



Thank you..

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