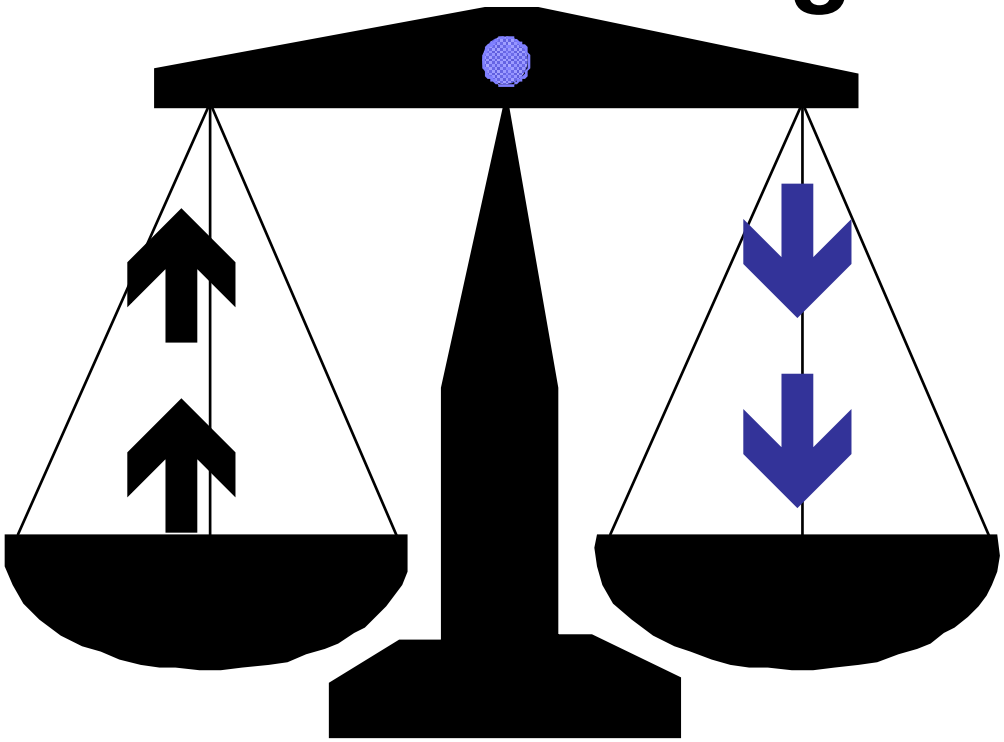
Herbicide Toxicity…How Dangerous Are These Products?

Topics

- Risk Management
- Relative Toxicity
- Practical Ways to Reduce Exposure
- Communication and Applying the Knowledge

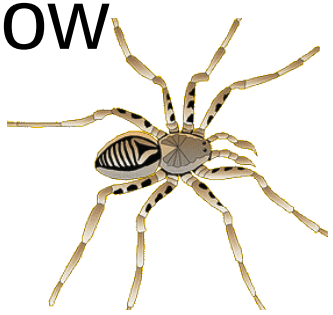
Risk Management

low risk **high benefit**



Risk Perception

- **Hazard** = harm/injury
- **Risk** = harm/injury x how likely
- ***Perceived*** **Risk** = harm/injury x how likely x *'fear' or 'outrage' factor* *



Risk Perception

- People are more concerned about some things than others.

...***pick your "poison"***...

– "Toxic Chemicals" vs. "Molds or Bugs"

Public Attitudes about Vegetation Management

- Comfortable
- Concerned
- Uncommitted

Public Attitudes about Vegetation Management

- Comfortable - **8.4%**
- Concerned - **8.6%**
- Uncommitted - **83%**

Primary Areas of Concern

- Safety
- Application Methods
- Effects on Property

Are the herbicides used for weed and brush control considered toxic?

- Toxicity - materials ability to cause injury. Like most substances, too much of any substance can be considered toxic
- If ingested, herbicides generally have low toxicity when compared to many substances that we come in contact with daily

Example: table salt is about as toxic as many herbicides, whereas, aspirin and caffeine are generally more toxic

- People often confuse toxicity with hazard. **To determine hazard, you must consider dose.** Dose makes the difference
- Many substances beneficial in small doses can be harmful in large doses

Risk Management

RISK	=	TOXICITY	X	EXPOSURE
?	=	1,000,000	X	0
?	=	0	X	1,000,000

Toxicity Measurement “Units”

- **Toxicity = LD_{50}**
- **Environmental Detects = “Parts”**
  - per thousand
  - per million
  - per billion
  - per trillion

LD_{50}

L = Lethal

D = Dosage

50= 50% of those exposed

Acute Vs. Chronic Toxicity

Acute Tests

- Oral (LD50)
- Skin irritation
- Eye irritation
- Skin absorption
- Acute inhalation

LD_{50}

The HIGHER the LD_{50}

The LOWER the toxicity

LD_{50} Values are for Formulated Concentrate

Dilution Reduces Potential Hazard

Comparison of Acute Oral LD_{50}'s

Values for rats in mg/kg body weight

Chemical	LD_{50} (mg/kg)	Lethal amts for 154 lb human*
Nicotine	52	0.13 oz
Gasoline	150	0.37 oz
Caffeine	190	0.5 oz
Bleach	192	0.5 oz
Aspirin	558	1.4 oz
Spike 40P	644	1.6 oz
Garlon 3A	1,847	4.56 oz
Table salt	3,000	7.4 oz
Garlon 4 Ultra	3,200	7.9 oz
Baking Soda	3,500	8.6 oz
Capstone	3,752	9.3 oz
Milestone	>5,000	>12.3 oz
Arsenal	>5,000	>12.3 oz
Accord XRT II	5,600	13.8 oz
Accord Conc./Rodeo	5,600	13.8 oz

*Values shown are for 100% concentrated product

Source: WSSA Herb Handbook, MSDS, Farm Chemical Handbook

What About Chronic Toxicity

Chronic Toxicity

Describes the delayed effects of repeated exposures over a life span. Effects evaluated in laboratory animals include: potential tumors, birth defects, and reproductive effects.

Sub-chronic/Chronic Testing

Long term feeding tests

Subchronic 3 to 9 months	- No adverse effects
Chronic 1 to 2 years	- No adverse effects
Biochemical and metabolic studies	- No adverse effects
Teratology studies	- No adverse effects
Reproduction studies	- No adverse effects
Mutagenicity studies	- No adverse effects
Delayed Neurotoxicity studies	- No adverse effects
Carcinogenicity studies	- No adverse effects
Skin Absorption tests	- No adverse effects

All sub-chronic & chronic tests must indicate no significant or treatment related effects, otherwise product is not registered with the U.S. EPA.

Toxicity Info Sources

- **Reported values:**
  - **MSDS** for ***Formulated Product***
- **Label “clues”:**
  - Concentration of Active Ingredient in Product
  - Restricted Use (reason?) vs. General Use
  - PPE Requirements
  - Re-Entry Interval (REI)
  - other label Precautions and Instructions
  - Label Signal Word

Risk Management

RISK	**=**	**TOXICITY**	**X**	**EXPOSURE**
Low	**=**	**high (low LD_{50})**	**X**	**0**
?	**=**	**low (high LD_{50})**	**X**	**?**

Reducing Exposure

= low (high LD50) X

- Efficient Use
- Proper Use
- Safe Work Habits
- Engineering Controls
- PPE Use

Efficient Use

- Best management practices (BMPs)
- Integrated Vegetation Management (IVM)
- Directed / selective applications

Proper Use

Start With the Label

Product Selection

DANGER-POISON

PELIGRO

DANGER/PELIGRO

WARNING/AVISO

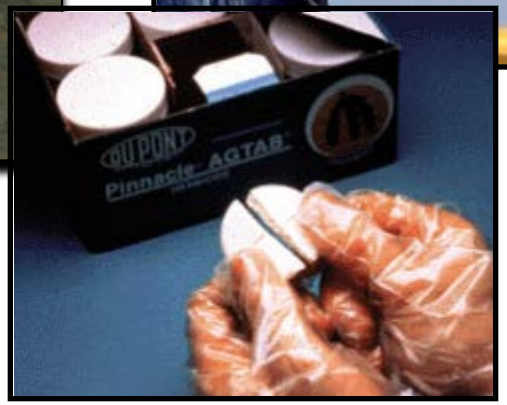
Si usted no entiende la etiqueta
you do not understand the labe

CAUTION PRECAUCION

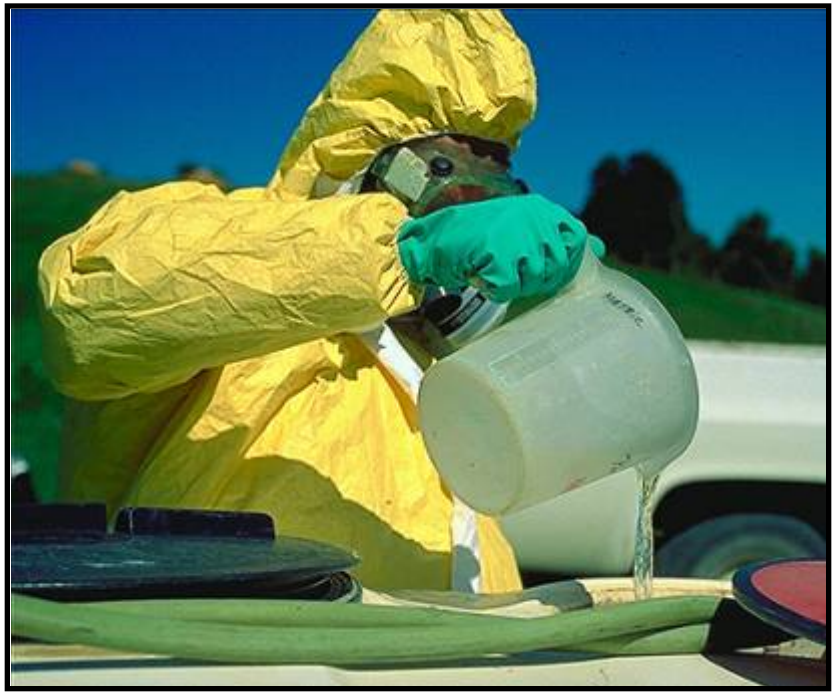
Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

Safe Work Habits

Engineering Controls



PPE



Garlon 4 Ultra

Causes Moderate Eye Irritation • Harmful If Swallowed • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reactions In Some Individuals

Avoid contact with skin, eyes, or clothing. Wear gloves and protective clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.

Personal Protective Equipment (PPE)

- Long-sleeved shirt and long pants
- Chemical-resistant gloves (≥ 14 mils) such as barrier laminate, nitrile rubber, neoprene rubber, or viton
- Shoes plus socks

Follow the 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.

Specimen Label

Dow AgroSciences

Garlon® 4 Ultra

Specialty Herbicide

®Trademark of Dow AgroSciences LLC

For the control of woody plants and annual and perennial broadleaf weeds in non-crop areas, including industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, forests and in the establishment and maintenance of wildlife openings. Use on these sites may include application to grazed areas.

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester	60.45%
Inert Ingredients	39.55%
Total	100.00%

Acid equivalent: triclopyr – 43.46% - 4 lb/gal

EPA Reg. No. 62719-527

Keep Out of Reach of Children

CAUTION PRECAUCION

DOW® Dow AgroSciences

Applying the Knowledge

How do I know the amount of herbicide applied won't hurt wildlife or domestic animals?

Herbicides are designed to affect plants. The herbicide's ingredient disrupts the growth processes within the plant by affecting enzymes unique to plants. They do not have a similar effect on animals or insects.

What if a person walks across a treated area?

You should not recommend re-entry for the public onto an area that has been treated with herbicides while it is still wet. However, scientists have considered accidental exposure like this. Studies determine a No-Observable-Adverse-Effect-Level (NOAEL) for each herbicide as a benchmark.

Exposure may occur if the foliage is still damp from a foliar treatment. However, the dose is quite low. Using the NOAEL figures for a 150 lb person there would be a safety factor of 100 considering the maximum label rate. In other words, you would be 100 times below the NOAEL for a particular herbicide.

What if a person accidentally eats berries found in a treated area?

You should not consume berries that have been treated using these herbicides. However, scientists have considered accidental ingestion. Studies determine a No-Observable-Adverse-Effect-Level (NOAEL) for each herbicide as a benchmark.

Based on these studies and residue levels likely to be found at the highest use rate, scientists have determined the amount of treated berries that an average person (150 lbs) could consume for the rest of their lives without experiencing any adverse effects from the herbicide.

What if a person accidentally eats berries found in a treated area?

Herbicide	Reference Dose *(includes 100X margin of error from the observed NOAEL)*[1]	Quarts of Berries eaten per day for a lifetime
Garlon 4 Ultra/Garlon 3A	0.05 mg/kg/day	5.5 qts
Milestone	0.5 mg/kg/day	550 qts
Rodeo, Accord XRT II	2.0 mg/kg/day	220 qts
Tordon	0.2 mg/kg/day	88 qts

We know that this scenario is not practical and is based on an accidental exposure that should not persist for a lifetime; however, it does place the relative risk in perspective.

There is practically no risk of harmful chronic or acute exposure to these herbicides by consuming treated berries.

Aminopyralid

Human Health and Ecological Risk Assessment – FINAL REPORT

Prepared for:
USDA/Forest Service
and
National Park Service

Submitted to:
Paul Mistretta, COR
Joy Frier-Scott, Contracting Officer
USDA/Forest Service, Southern Region
1720 Peachtree RD, NW
Atlanta, Georgia 30309

USDA Forest Service Contract: **AG-3187-C-06-0010**
USDA Forest Order Number: **AG-43ZP-D-06-0018**
SERA Internal Task No. **52-04**

Prepared by:
Patrick R. Durkin
Syracuse Environmental Research Associates, Inc.
5100 Highbridge St., 42C
Fayetteville, New York 13066-0950

Fax: (315) 637-0445
E-Mail: SERA_INC@msn.com
Home Page: www.sera-inc.com

Summary

- **Risk Management** – a balance of “real” risk and benefit
- **Relative Toxicity** – understanding herbicide toxicity compared to common everyday items helps us understand and communicate a “real risk”
- **Ways to Reduce Exposure**
  - Use products efficiently
  - Use products in the proper way
- **Apply the Knowledge & Communicate Effectively** – by understanding the products we use and why we use them, we can better communicate the benefits and alleviate fears