

The Applicator and the Environment



Matt Kraushar



What is there to be worried about?!

- Environment
- Applicator- (that's you!)
- Landowners- a.k.a. the pesky people that get in the way.



Environmental Concerns:

why worry?!

- Drift
- Runoff
- Leaching
- Spills
- Brownout



What are you spraying?

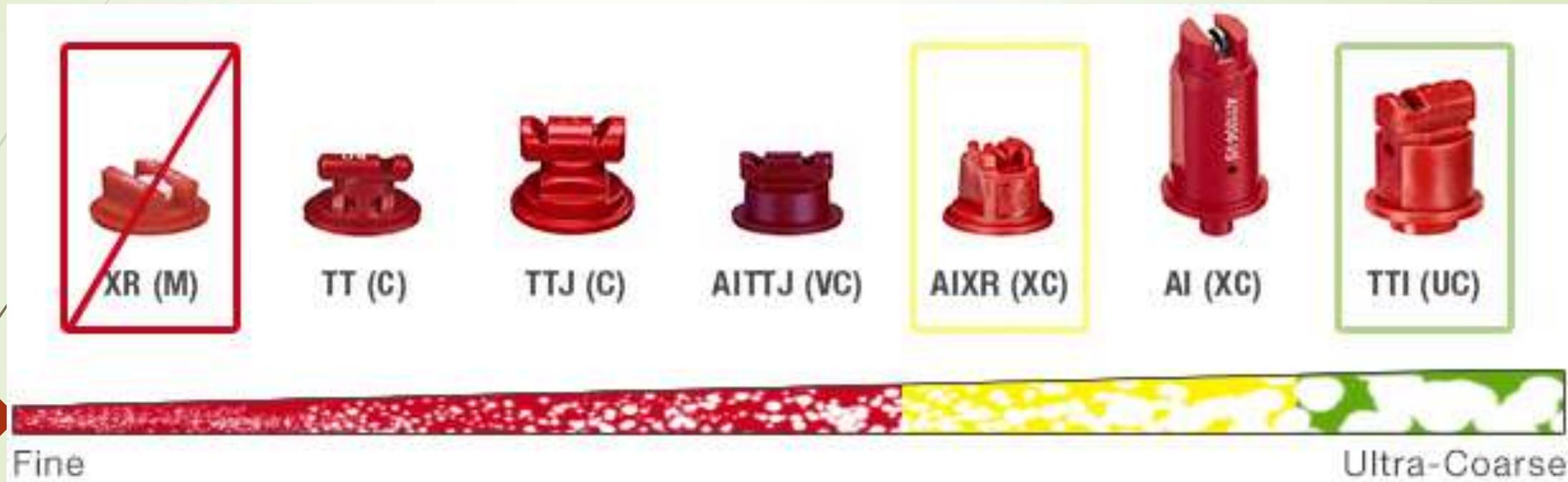
- Target: what you want to treat.
 - Off/Non-target: anything that you were *NOT* supposed to treat.
- 



Drift: what is it?

- Drift occurs when the product being applied misses the target due to wind
 - Applications that result in product drift can have some serious (and expensive!!) non-target damage to the vegetation downwind and/or downslope such as crops, trees, yards, and ornamental plants
 - How far can drift go?
 - A function of droplet/particle size
 - Wind speed
- 

Nozzles and droplet size

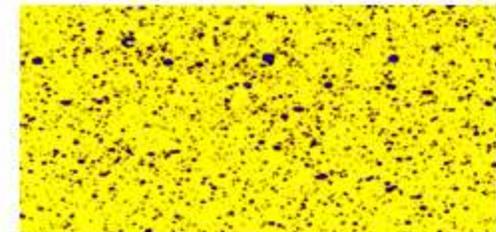
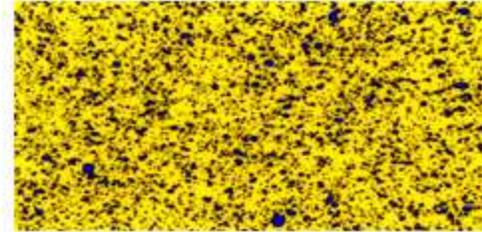
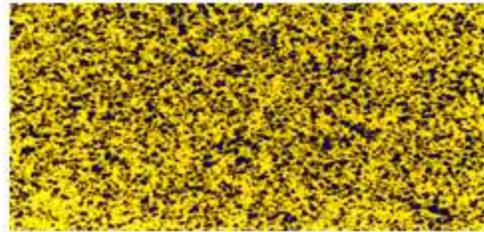


12 gpa

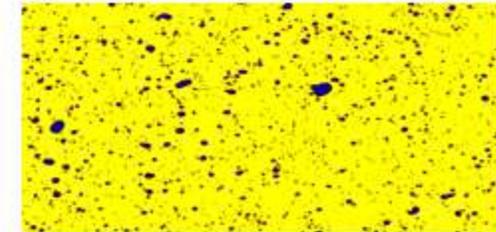
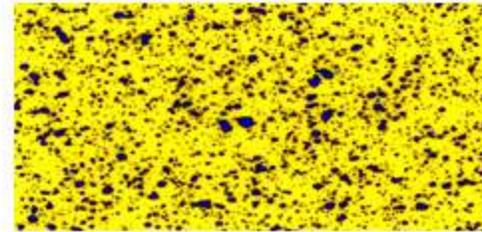
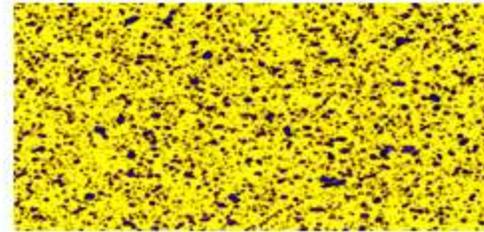
8 gpa

4 gpa

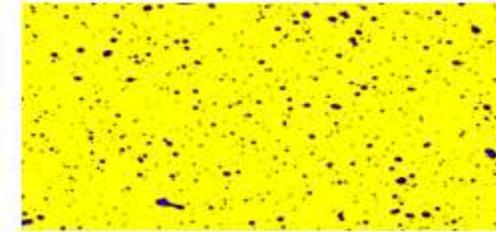
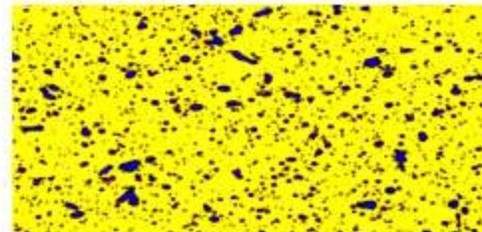
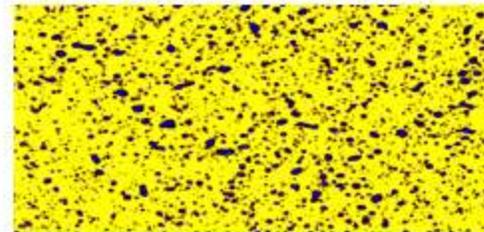
Fine



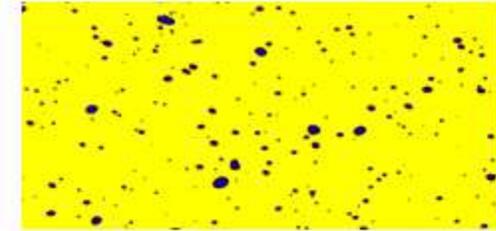
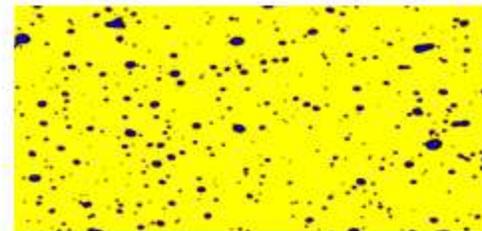
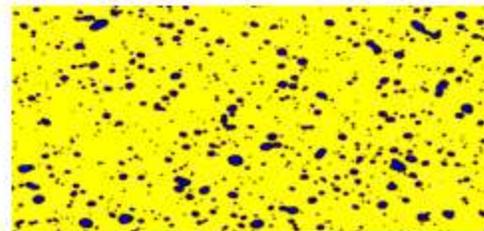
Medium



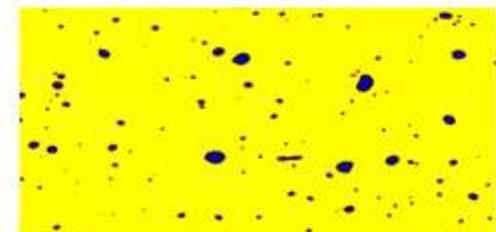
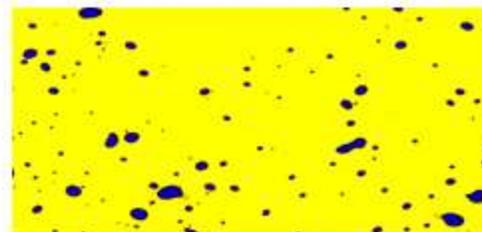
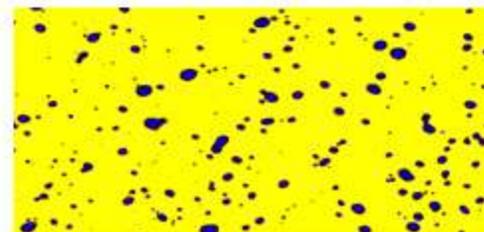
Coarse



Very Coarse



Extra Coarse



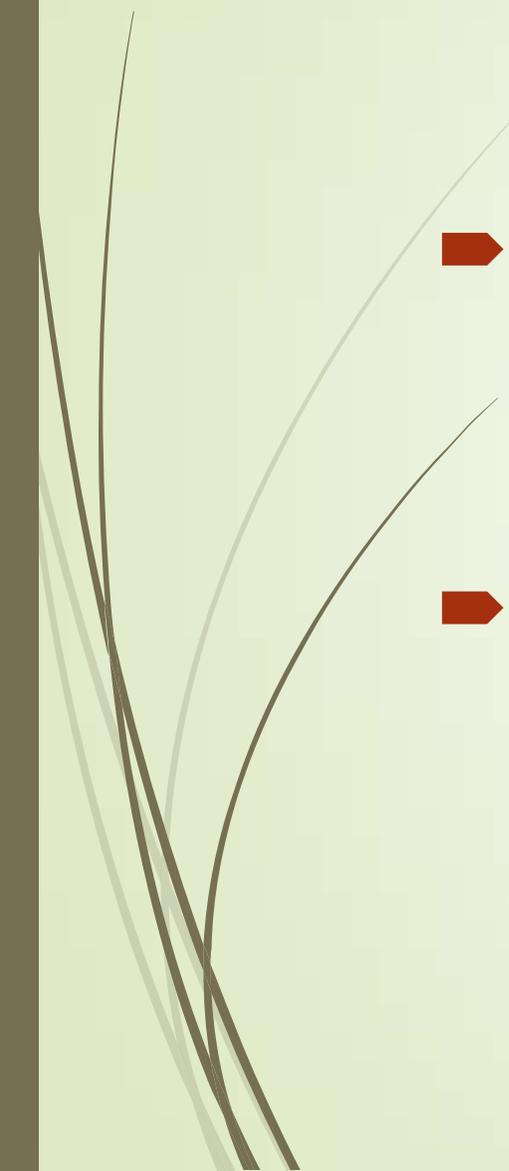
How do we fix drift?

- ↓ Pressure
- ↑ Volume
- Distance- can you get any closer?
- Speed- slow and steady wins the race!
- Drift Control Products
 - A little goes a long way!!!
- Wind Speed AND Direction
 - 3-5 mph is ideal
 - What direction is best?





What about Inversions?

- ▶ Have you ever see smoke drop instead of rise?
 - ▶ Most common early morning and late evening.
 - ▶ Temperature inversions can result in spray droplets that stay suspended and travel great distances- avoid spraying during a temperature inversion!!
- 





Vapor issues- volatilization

- Vapor is produced when the herbicide spray changes from liquid to a gas after application.
 - Do you ever notice a really strong odor after you have sprayed?
 - Caused by high temperatures when using certain formulations
- This vapor can injure non-target vegetation.
- Try to limit use of highly volatile products (commonly the ester/oil formulations) when:
 - Temperatures are above 85 degrees F
 - High humidity conditions

Vapor and volatilization.





How did it get over there!?!---Runoff

- Runoff, or the lateral movement of herbicide mixtures from flowing water *OVER* the soil surface.
- Most common when:
 - application is followed by heavy rainfall
 - Application of a soil active product is applied on a slope or water way where water flow moves soil particles.
- Avoid applications on steep slopes
- Use caution on surfaces that limit penetration/absorption such as rock or gravel as well as compacted, clay or saturated soils





We didn't spray into that well!--Leaching

- Leaching is the *downward* movement *through* the soil.
- In the worse cases, leaching can lead to ground water contamination.
- Use caution when applying on sandy soils or when water table is very shallow.
- Some products are more likely to leach than others- **READ THE LABEL!**



How to minimize the effects of leaching:

- Use anti-siphon devices (or an air gap) when filling your sprayer
- READ THE LABEL!
 - Some products that are known to leach provide different use rates for certain soils or may require various setback distances from water sources.
- Clean up your spills
- Properly dispose of your containers
 - don't leave a big pile of empty jugs that haven't been properly rinsed out



That's not good!! The barrel fell off the truck...

- Spills happen to all of us *BUT* there are a few things you should do to minimize spills:
 - Properly secure containers (both the sprayer and jugs/drums/totes)
 - Especially during transport down the ROW
 - Properly store containers
 - Tighten the lids and don't over stack pallets
 - Keep them small- use the right equipment and containers.



What do you do if a spill happens?

- Size it up.
- Contain- Use spill kit that's on the truck/sprayer
- Refrain- keep people away from the spill until cleaned up
- Don't leave and inform your supervisor- they may have experience with this.
- Who do you report it to and do you have to report it?
 - Varies state to state- have the numbers handy (in your phone/ in your truck)
 - Indiana- IDEM if it threatens a waterway



Man, that stuff sure got smoked...

Avoiding Brownout

- What is brownout?
- Why is brownout bad?
- How do you minimize brownout?
 - Good- Apply later in the growing season
 - Better- Use products that don't cause rapid brownout
 - BEST- Treat the target plants when they are small!!
 - don't wait to spray a 30' tall tree or a 15' wall of brush- treat it when its small and thin- people won't notice as much!



Questions about any of these?

- Drift
- Runoff
- Leaching
- Spills
- Brownout

Herbicide Applicator Safety





Understanding the hazards

- Toxicology
 - Exposure
 - PPE
 - First Aid
- 



Where do I find out about the hazards?

- Step 1- Read the Label
- Step 2- Read it again.
- Parts of a label pertaining to health hazards
 - Signal words (toxicity)
 - PPE Recommendations (exposure)
 - First Aid measures (exposure)

GROUP	4	HERBICIDE
Active Ingredient:		
Triisopropanolammonium salt of 2-pyridine carboxylic acid, 4-amino-3,6-dichloro-.....	2.22%	
Triethylamine salt of [(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid).....	16.22%	
Other Ingredients	81.56%	
Total	100.0%	

Acid Equivalents:
aminopyralid (2-pyridine carboxylic acid, 4-amino-3,6-dichloro-)
- 1.15% (0.1 lb/gal)
triclopyr (3,5,6-trichloro-2-pyridinyl oxyacetic acid) - 11.63% (1 lb/gal)

Precautionary Statements

Hazards to Humans and Domestic Animals

CAUTION

EPA Reg. No. 62719-572

Harmful if Swallowed • Causes Moderate Eye Irritation
Avoid contact with eyes, skin or clothing.

Personal Protective Equipment (PPE)

Some of the materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category C on an EPA chemical-resistance category selection chart.

Applicators and other handlers must wear:

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

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

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS (40 CFR 170.240(d)(4-6)), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

- Users 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 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 a poison control center or doctor. Do not give anything by mouth to an unconscious person.
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. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Not For Sale, Distribution, or Use in New York State.

Entry Restrictions: For applications on non-cropland areas, do not enter or allow others to enter the treated area until sprays have dried.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains requirements for protective clothing and exceptions pertaining to the restricted-entry interval. The exceptions pertaining to the restricted-entry interval. The exceptions listed in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry into treated areas that is permitted under the Worker Protection Standard (WPS) involves contact with anything that has been treated, such as plants, surfaces, or equipment. PPE that is:

- Coveralls
- Shoes plus socks
- Protective eyewear
- Chemical-resistant gloves (≥ 14 mils) such as butyl rubber, neoprene rubber or nitrile rubber

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS does not pertain to non-agricultural use on sites, such as, rangeland, permanent grass pastures, and other areas. For more information, see the Agricultural Use Requirements section for this product.

Entry Restrictions for non-agricultural uses: For applications on non-cropland and permanent grass pastures (not harvested for hay) and non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

Storage and Disposal

Do not contaminate water, food, feed or fertilizer by storage or disposal. Open dumping is prohibited.

Pesticide Storage: If this product is exposed to subfreezing temperatures, the active ingredient may crystallize and settle out of solution. Under these conditions the product should be warmed to at least 40°F and agitated well to dissolve any crystallized active ingredient prior to use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Nonrefillable containers 5 gallons or less:

Container Handling: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by State and local authorities.

Pressure Rinse: Rinse container (or equivalent) promptly after use. Empty the remaining contents into application equipment or a mix tank within 10 seconds.

After the flow begins to drip. Fill the container with water to the recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Refillable containers larger than 5 gallons:

Container Handling: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the

Signal Word

PPE

First Aid



Toxicology terms

- Exposure- how it enters the body
 - Dermal- through the skin or eyes
 - Oral- consuming it
 - Inhalation- breathing the vapors, mist or dust particles
- Acute
 - Injury caused by a single event, typically of short duration
- Chronic
 - Injury caused by multiple/repeated events or constant exposure, month or years



Toxicity

- Oral LD50 of Gasoline- 18.75 mg/kg
 - Made up of more than 15 chemicals
- LD50 of Roundup Original Max Herbicide- > 5000 mg/kg
 - Gasoline- 266 x (18.75 ml/kg)
 - Caffeine- 26 x (192 mg/kg)
 - Aspirin- 25 x (200 mg/kg)
 - Table salt- 1.6 x (3000 mg/kg)
- Oral LD50 of caffeine 192 mg/kg (this is about 575 ml of coffee for a rat or 80 cups for an average man)

GHS - Hazard Pictograms and Related Hazard Classes		
		
Expanding Bomb <ul style="list-style-type: none"> Explosives Self-reactives Organic Peroxides 	Corrosion <ul style="list-style-type: none"> Skin corrosion/burns Eye damage Corrosive to metals 	Flame Over Circle <ul style="list-style-type: none"> Oxidizing gases Oxidizing liquids Oxidizing solids
		
Gas Cylinder <ul style="list-style-type: none"> Gases under pressure 	Environment <ul style="list-style-type: none"> Aquatic toxicity 	Skull & Crossbones <ul style="list-style-type: none"> Acute toxicity (fatal or toxic)
		
Exclamation Mark <ul style="list-style-type: none"> Irritant (eye & skin) Skin sensitizer Acute toxicity Narcotic effects Respiratory tract irritant Hazardous to ozone layer (non-mandatory) 	Health Hazard <ul style="list-style-type: none"> Carcinogen Mutagenicity Reproductive toxicity Respiratory sensitizer Target organ toxicity Aspiration toxicity 	Flame <ul style="list-style-type: none"> Flammables Pyrophorics Self-heating Emits flammable gas Self-reactives Organic peroxides

Signal words

➤ CAUTION

➤ slightly toxic

➤ WARNING

➤ moderately toxic

➤ DANGER

➤ highly toxic

WARNING

NO SMOKING STOP MOTOR

Smoking and running engines can ignite a spark. To reduce the risk of fire, extinguish all smoking materials and turn off engine before fueling process.



ALWAYS extinguish cigarettes before getting out of your car.



NEVER leave engine running during fueling process.

Electrical Discharge Warning

Cellular phones, pagers and personal electronic devices may cause electrical discharge. Do not use while fueling.



NEVER use electronic devices during fueling process.



NEVER allow children to use pump. Only persons of licensed age should use pump. Keep children away from pump area. Do not allow children under licensed age to use the fuel dispenser.

HEALTH WARNINGS

- Gasoline is harmful or fatal if swallowed.
- Long-term exposure to vapors has caused cancer in laboratory animals.
- Avoid prolonged breathing of vapors.
- Keep face away from nozzle and gas tank.
- Keep away from eyes and skin.
- Never siphon by mouth.
- For use as a motor fuel only.

Static Electric Spark Explosion Hazard

A static electric spark can occur when filling portable containers sitting on truck bed liners or on any vehicle's carpeting or floor matting. This spark will explosively ignite a gasoline vapor fire. **SERIOUS INJURY OR DEATH COULD OCCUR.** It is unlawful and dangerous to dispense gasoline into unapproved containers.



NEVER fill portable containers that are in or on vehicle.



ALWAYS place containers on ground. Keep nozzle in contact with container while filling.



BEFORE fueling, discharge any static electricity build-up by touching your bare hand to a metal surface away from the nozzle.



DO NOT re-enter your vehicle while gasoline is pumping. Re-entry could cause static electricity build-up.

DO NOT OVERFILL TANK OR PORTABLE CONTAINER.

Hold-Open Latch Warning

Persons using dispensers with hold-open latches must remain at the refueling point during fueling process.



NEVER leave refueling area when using dispensers with hold-open latches.

IN CASE OF FIRE

- **DO NOT REMOVE NOZZLE FROM VEHICLE.**
- Evacuate all passengers from the vehicle and refueling area.
- Activate Emergency Shutoff Switch.
- Notify attendant.
- Call 911, if no attendant is on site.

Don't always listen to your boss...

Your safety and well being is up to you!

Demand the *right* PPE!



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PPE- Personal Protection Equipment

What do you have to wear?

➔ Eyes

➔ Skin

➔ Mouth

➔ Head

➔ Feet

➔ Ears



That's not good- Jim just got exposed to the herbicide- What do we do?!

- Check the label and the MSDS sheet!!
 - Follow instructions EXACTLY.
 - Seek medical attention
- Minimal supplies on the spray truck:
 - Label and MSDS
 - Clean/New PPE
 - Clean water
 - Soap
 - Clean clothes/coveralls/Tyvek/etc



Remember- the dose determines the poison.

- Select products with safety concerns in mind
- Read the label
 - PPE
 - Mixing and handling instructions
 - First Aid
- The greatest potential for exposure is at the time of mixing- Why?



Questions about the hazards?

- Toxicology
 - Exposure
 - PPE
 - First Aid
- 



What can we do to
minimize these issues/impacts?!

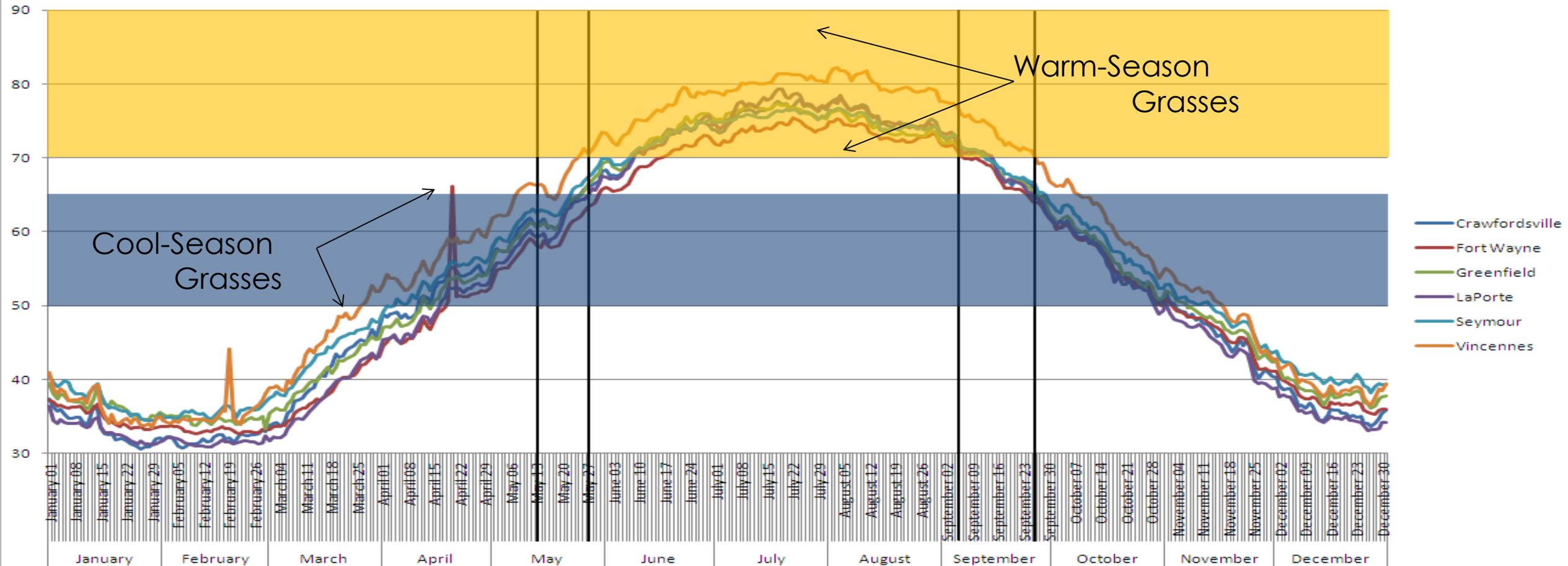
- Environment
- Exposure



Timing your targets

Soil Temps @ 4" in Grass cover

4" Grass Soil Temps (Farenheit)





Escort

Registration Review: Preliminary Problem Formulation for Environmental Fate and Ecological Risk, Endangered Species, and Drinking Water Assessments for Metsulfuron-methyl , **Escort**, date, US Environmental Protection Agency September 22, 2011

► Two 48-hr acute contact tests with **honeybees** (*Apis mellifera*) were conducted in the same study (MRID 00122010; Acceptable). One test (Test A) used 200 bees and the other (Test B) used 240 bees. The bees were tested at 0 (control), 6.25, 12.5 and 25 ug ai/bee in Test A and at 0 (control), 3.125, 6.25, 12.5 and 25 ug ai/bee in Test B. Carbaryl was used as a reference chemical. There were no mortalities in Test A. Mortality in Test B was 15%, 20% and 10% in 6.25, 12.5 and 25 ug ai/bee, respectively. Based on this study, the LD₅₀ > 25 ug ai/bee; therefore, **metsulfuron is classified as practically non-toxic to honeybees on an acute exposure basis**

Method

- ▶ Aminocyclopyrachlor EPA-HQ-OPP-2009-0789-0014 Registration Decision
- ▶ Registration of the New Active Ingredient **Aminocyclopyrachlor** for Use on Non-Crop Areas; US Environmental Protection Agency August 24, 2010.
- ▶ A study was submitted that evaluated the acute contact toxicity and acute oral toxicity of the acid on female young adult worker honey bees (MRID 475601-31). In the contact portion of the study, there was a **complete lack of mortality** and sublethal effects at any treatment level after 48 hours. The LD50 was >100 ug a.e./bee, and the NOAEL was 100 ug a.e./bee. The contact portion of the study satisfies guideline requirements and **classifies the acid as practically non-toxic.**

Changes for the better:

- The new and improved Vastlan now comes with a “Warning” signal word compared to Garlon’s “Danger”
- Milestone
 - With an amended label allowing treatment to waters edge on brush.
- Method
 - Allowing more use areas by adding Individual Plant Treatments

Times are a Changing:

Custom blending

Two HUGE reasons:

- ▶ Reducing worker exposures
- ▶ Reduction of environmental impact
 - ▶ An example for 2000 acres:
 - ▶ blending on site required a **day+** (several laborers) to collapse boxes, triple rinse jugs, drop off at recycling center.
 - ▶ Using returnable refillables required **< hour** to call for pickup.

Save Time and Money

- R/R containers eliminate the need for container disposal



VS.



The Public.....

- Just yesterday, I had to explain about the safety of herbicides
 - Got me thinking...
 - We need to do a better job of educating the public on:
 - What we are doing,
 - Why we are doing it.
 - Why doing it this way, is better.

The Public.... Continued...

What we are doing:

- A: “Killin’ brush, ma’am”
- B: “Utilizing the best tools we have available to eliminate the hazards found in the ROW as effectively and efficiently as possible while minimizing environmental impact.”

The Public.... Continued...

Why we are doing it:

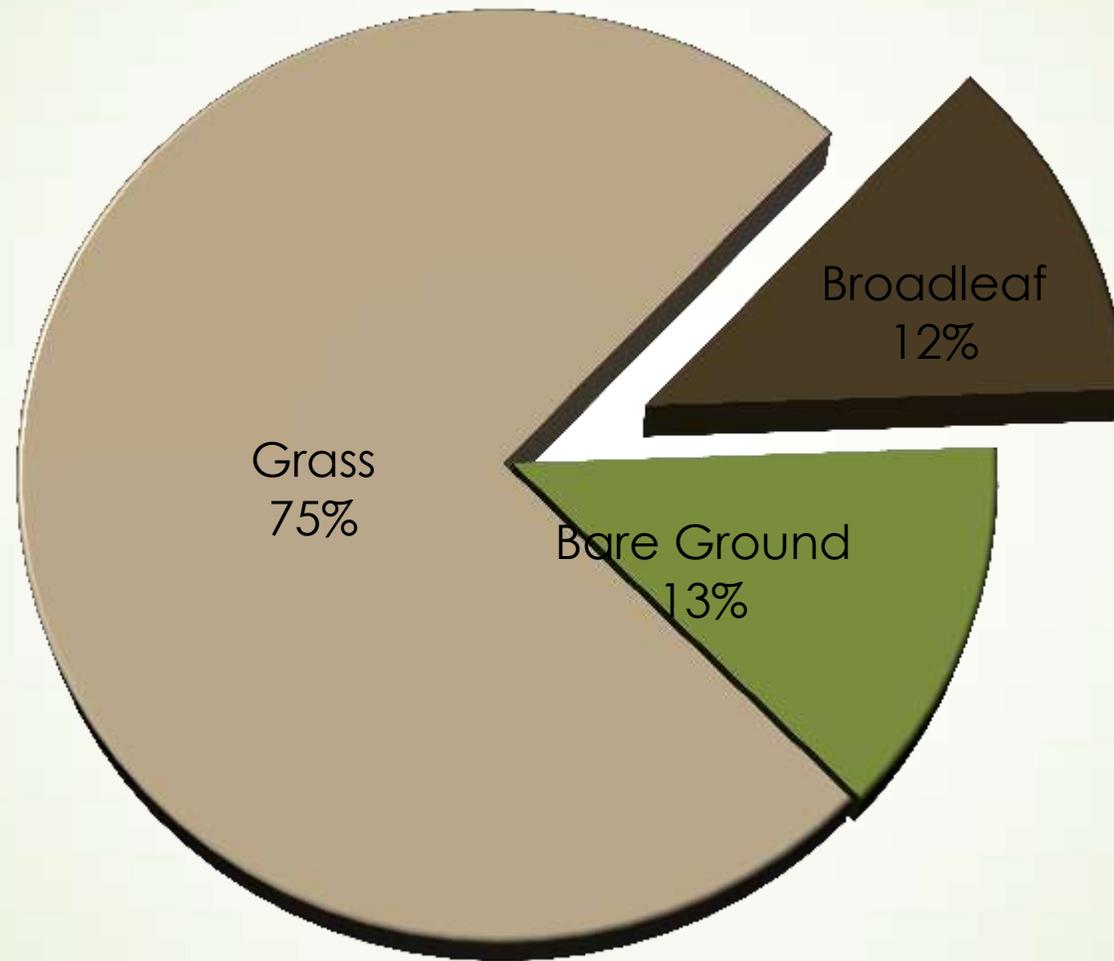
- A: “Cause we have to keep that sh*@ from growing up in them lines.”
- B: “By selectively treating the vegetation that causes the most issues, we are able to provide a more consistent service to you and your neighbors.”

The Public.... Continued...

Why doing it this way is better:

- ▶ A: “This stuff kills sh*@, ma’am. I’ve got work to do...”
- ▶ B: “We realize that these very safe and effective treatments may look a little unsightly for a short time, but in the long run this ROW will become great habitat for a number of species while still serving the purpose it was intended to with the least amount of environmental impact.
.....Cheaper.... Cleaner.... Safer...”

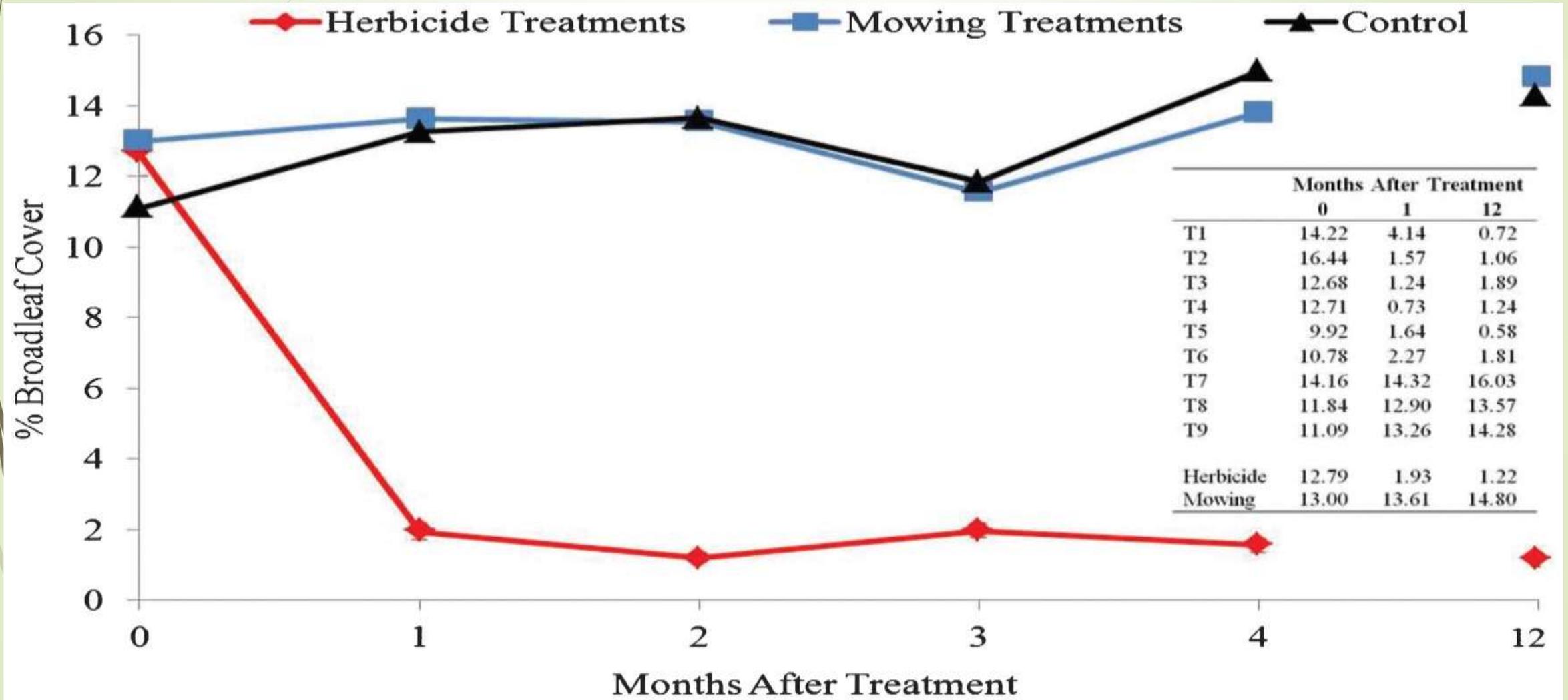
What if the public wants you to just mow it...



Is grass *REALLY* the problem?



Broadleaf Control



So what's your point?!

7.5
9.5
11.5

BROADLEAF WEEDS CONTROLLED

Use the higher spray volumes, herbicide and adjuvant rates for heavy weeds

1.75 to 4.5 Ounces per Acre

Aster
Bahigrass
Beebalm
Bittercress
Blackeyed-susan
Buttercup, bur
Carrot, wild
Catchfly, conical
Chamomile, false
Chickweed, common
Chicory
Clover
Clover, sweet
Cocklebur

1) Herbicides CONTROL weeds

2) Mechanical treatments alone don't control weeds

3) This is true for nearly all perennial vegetation management

Example:

INDOT “in house” Cost Comparison

Broadcast vs. Mowing (FY2013 actual per acre)

Roadside Selective

- 3 people
- 2 trucks
- 1 sprayer, 1 arrow board
- 76 acres/day (7hrs)
- \$28.57/acre

Per 1000 acres

- 13 days
- 93 man hours

Mowing (1 cycle)

- 4 people
- 1 truck
- 3 mowers
- 20 acres/day
- \$46.95/acre

Per 1000 acres

- 50 days
- 347 man hours

PROTECT YOUR ASS

THANKS!

