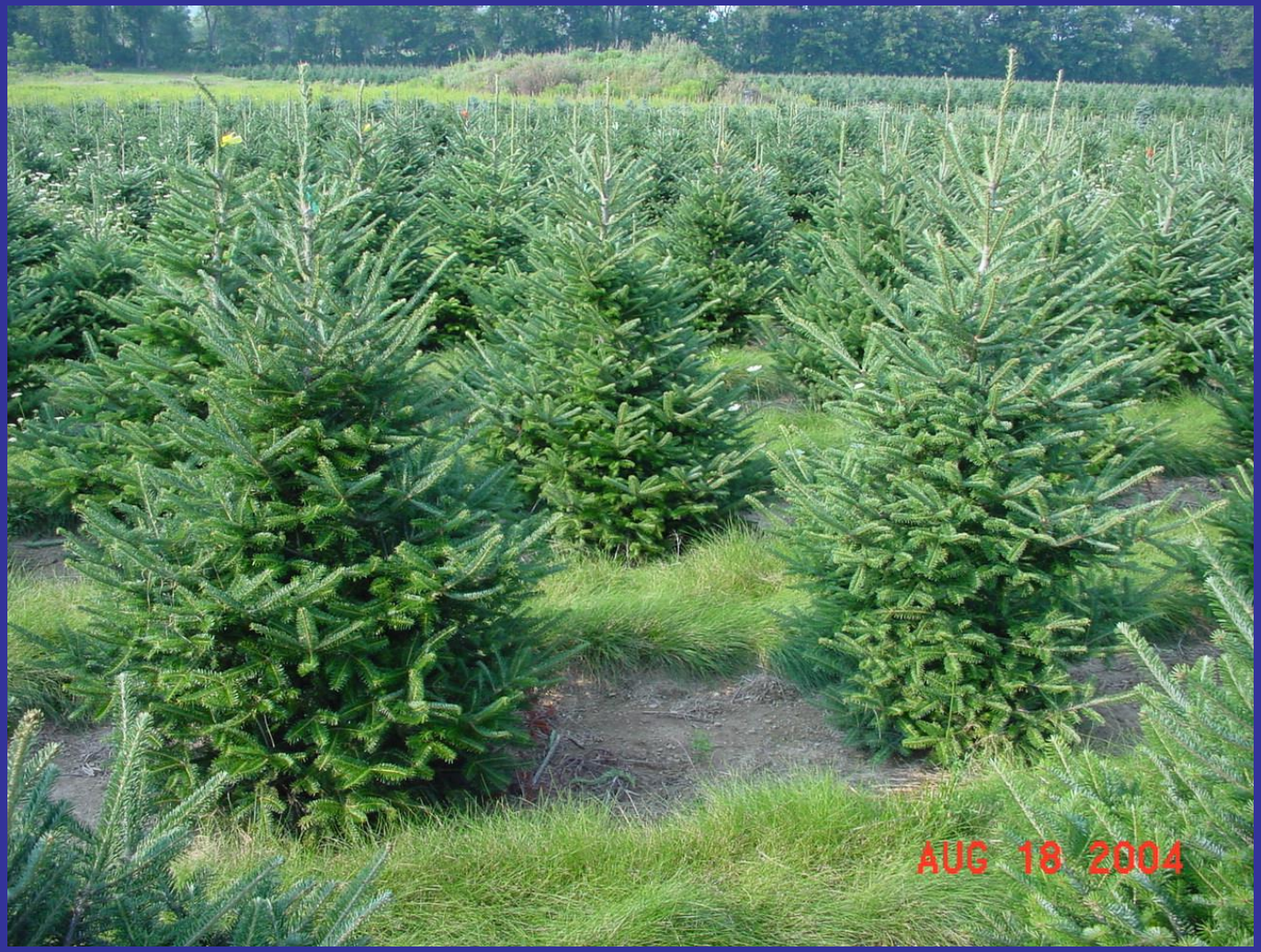
# Vegetation Management in Christmas Tree Plantations

Larry J. Kuhns
Kuhns Tree Farm &
Penn State University

# OBJECTIVE



# INTRODUCTION

- Don’t try growing a sod cover crop without a good herbicide-based weed control program
- Alleleopathy – one plant produces a chemical that inhibits the growth of another.  Cool season perennial grasses are alleleopathic to woody plants.

# Fraser Fir With & Without a Sod Cover


# Douglas Fir With & Without a Sod Cover


Dense roots add organic matter to the soil

# Grass Covers Compete with Weeds

**Hard Fescue and Red Fescue**

**Perennial Ryegrass**

# Hard Fescue vs Tall Fescue

# Dwarf White Clover

# INTRODUCTION TO CONTROLLING WEEDS

- Timing of applications
  - With respect to emergence of the weeds
  - With respect to stage of growth of the weed
  - With respect to stage of growth of the crop

# INTRODUCTION TO CONTROLLING WEEDS

- Type of Weeds
  - Broadleaved
  - Grass
  - Nutsedge

# INTRODUCTION TO CONTROLLING WEEDS

- Type of Weeds - General
  - Annual
    - Summer Annual - Pigweed, Foxtail
    - Winter Annual - Marestail, Yellow Rocket
  - Biennial - Wild Carrot, Musk & Bull Thistle
  - Perennial - Can Thistle, Milkweed

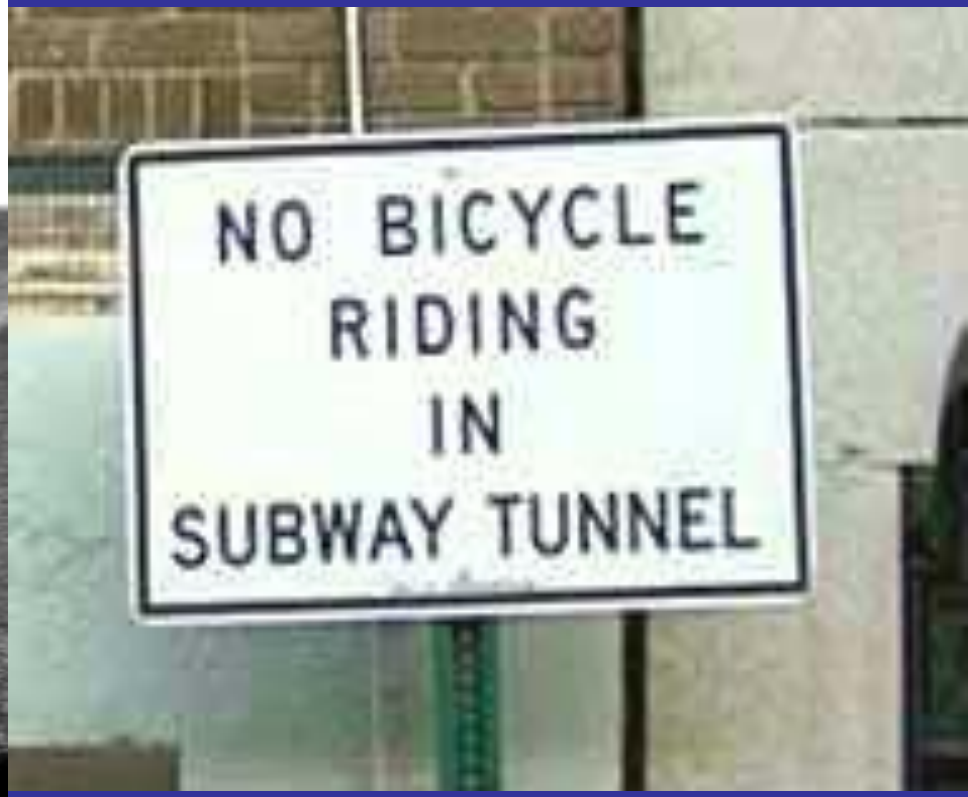
# INTRODUCTION TO CONTROLLING WEEDS

- Type of Weeds - Specific
  - Triazine resistant weeds
    - Pigweeds, Smartweeds, Lambsquarter, Marestail
  - Wild carrot is resistant to Sureguard
  - Sureguard is the only thing that works well for controlling Asiatic Dayflower
  - Roundup resistant Marestail (Horseweed)

# CONCEPT:
# ‘WEED CONTROL PROGRAM’

- Eliminate weeds prior to planting
- Prevent weed growth
- Eliminate ‘Escapes’

# There are some things you just should not do

# DO NOT APPLY HERBICIDES WITHOUT CALIBRATING YOUR SPRAYER

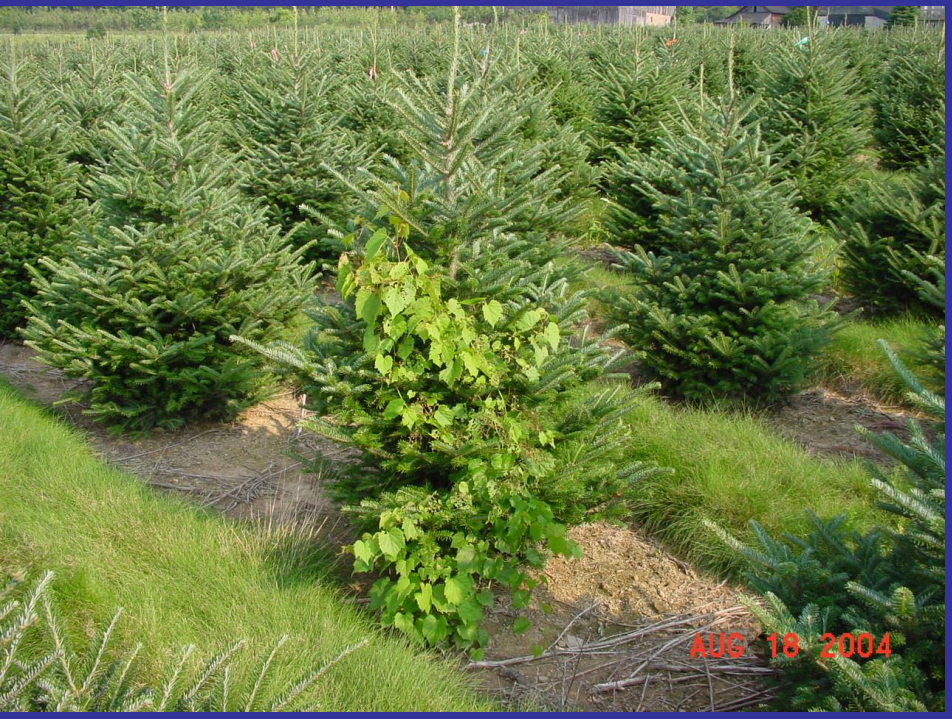
# CONCEPT:
# "WEED CONTROL PROGRAM"

- Eliminate tough to control perennial weeds prior to planting

# SUMAC


# POISON IVY

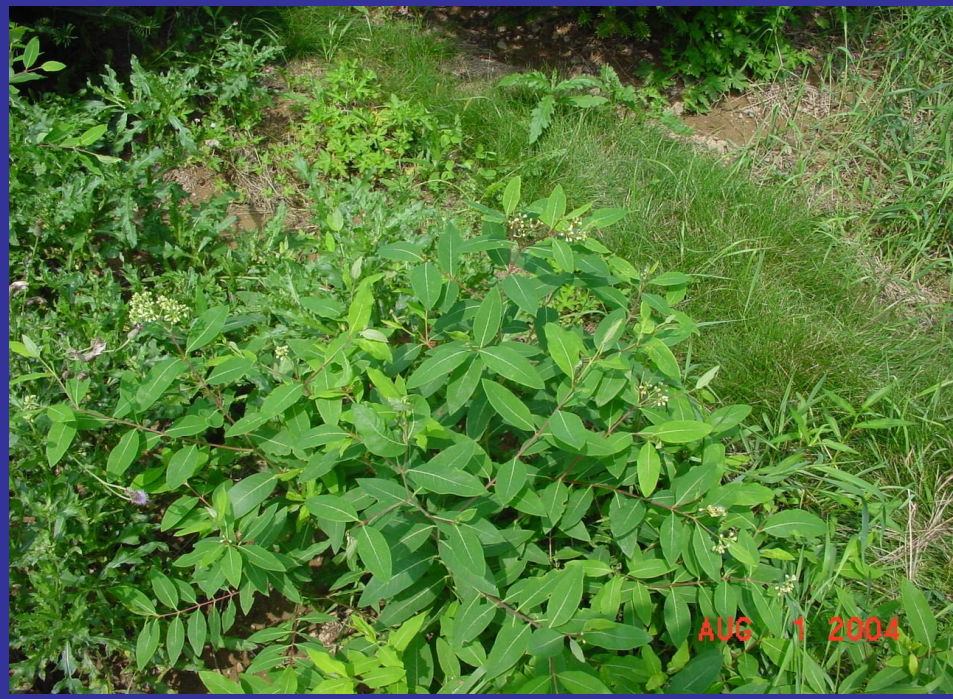
# WILD GRAPE




# CANADA THISTLE

# MILKWEED


# HEMP DOGBANE



# Bad Time to Start a Weed Control Program

Physical methods of control are not practical for these weeds.

Chemical controls are needed.

What are the options?

# Chemical Control Options
# Site Preparation

- Glyphosate / Roundup
- Garlon 4E or 3A
- 2,4-D  E or A

  - E  -  Ester  -  Oil-based
  - A  -  Amine – Salt, Water-based

# RECOMMENDATION
## Site Preparation

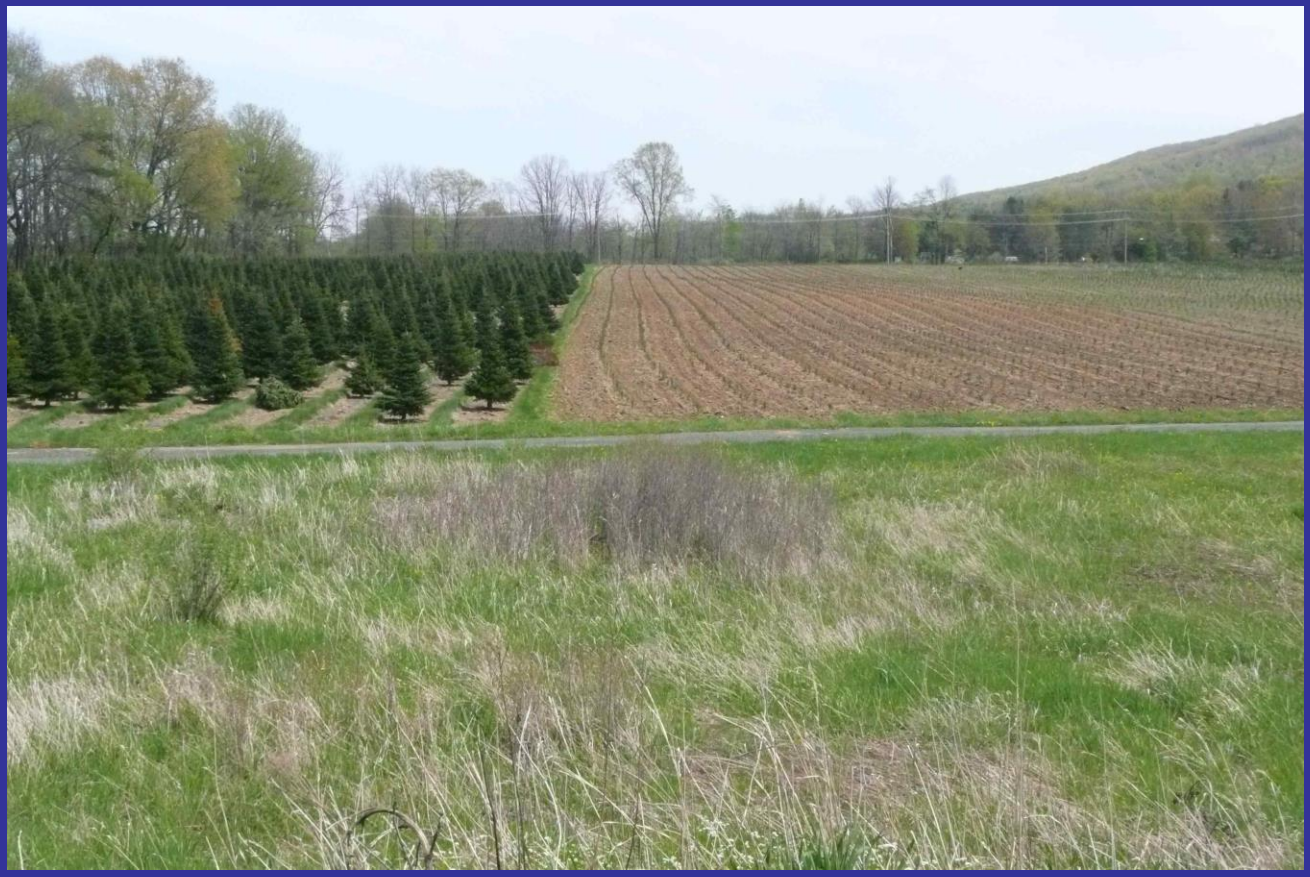
- Glyphosate at 2-4 qts per acre
- OR
- Glyphosate at 2 qts per acre Plus Garlon 4E at 1-2 qts per acre
- OR
- Glyphosate at 2 qts per acre Plus 2,4 D at 1-2 qts per acre

# Timing of the Site Preparation Application

- Spring is not good
- Late summer is best
  - Late July through early September

**After Eliminating all Weeds, Add Lime and Fertilizer if Needed; Then Plow, Disk, and Plant a Cover Crop in the Fall**

# Preventing Weed Growth With Preemergence Herbicides



# Use a Combination of Products

| | | | |
|---|---|---|---|
| **2,4-D AMINE 600** | 2,4-D amine | Acide carboxylique | 4 |
| **DEVRINOL** | Napropamide | | |
| **DUAL MAGNUM / DUAL II MAGNUM** | S-métolachlore | Chloroacétamide | 15 |
| **FRONTIER MAX** | Diméthénamide-P | | |
| **GARLON XRT** | Triclopyr | Acide carboxylique | 4 |
| **GF-1966** | Clopyralide | Acide carboxylique | 4 |
| **GOAL 2XL** | Oxyfluorfène | Diphényléther | 14 |
| **KERB** | Propyzamide | | |
| **LONTREL 360** | Clopyralide | Acide carboxylique | 4 |
| **Plusieurs formulations** | Glyphosate | Dérivé de glycine | 9 |
| **PRINCEP NINE-T** | Simazine | Triazine | 5 |
| **PROWL $H_2O$** | Pendiméthaline | Dinitroaniline | 3 |
| **SIMADEX / SIMAZINE** | Simazine | Triazine | 5 |
| **SUREGUARD** | Flumioxazine | Dicarboximide | 14 |
| **VELPAR DF / L** | Hexazinone | Triazinone | 5 |
| **VENTURE L** | Fluazifop-P-butyl | Aryloxyphénoxy propionate | 1 |

# Preemergence
# Best on Broadleaved Weeds

| | |
|---|---|
| • Simazine | Simazine and others |
| • Oxyfluorfen | Goal 2XL |
| • Flumioxazine | Sureguard |
| • Hexazinone | Velpar ??? |

# Preemergence
# Best on Grasses

- Pendimethalin — Prowl $H_2O$
- Metolachor — Dual Magnum
- Dimethenamide — Frontier Max ???
- Napromapide — Devrinol
- Hexazinone — Velpar ???
- Pronamide — Kerb
  - Propyzamide ???

# A Typical Application (per acre)

- Simazine 4L at 2 qts +
- Pendulum 3.3 at 2 qts +

And if weed seedlings are present, add:

- Goal at 1 qt  OR  Roundup at 1 pint

# Hazards of Long Term Use

- Simazine and Velpar are both ‘Triazine’ herbicides.
- Many Triazine-resistant weeds have developed

# REDROOT PIGWEED

# TUMBLE PIGWEED

# MARESTAIL / HORSEWEED

# LAMBSQUARTER

# PA. SMARTWEED

# SUREGUARD

- MOA Similar to Goal, but it's better, but much more expensive

# Apply Sureguard Before Budbreak to Avoid Foliage Burn


# SUREGUARD

- Good on Broadleaves and Grasses
- Controls Triazine-Resistant Weeds
- Provides Long-Term Control
- DOES NOT CONTROL WILD CARROT

# SUREGUARD

- Apply in fall
  - Roundup at 1-1.5 qts per acre +
  - Sureguard at 4-8 ounces per acre

# SUREGUARD

- Apply in early spring BEFORE BUDBREAK

  -Sureguard at 8-12 ounces per acre

  +

  -Pendulum at 2 qts per acre

# Eliminating Escapes During the Growing Season

- Glyphosate at Low Rates
  - 4-8 ounces per acre

# Eliminating Escapes
# During the Growing Season

- Glyphosate at Low Rates
- Stinger / Lontrel at 4-8 oz per acre
  - Backpack – 20 ml (2/3 oz) per 3 gal

# RAGWEED

# WILD CARROT

# BULL THISTLE

# CANADA THISTLE

STINGER / LONTREL DOES NOT CONTROL THE MOST COMMON TRIAZINE-RESISTANT WEEDS, EXCEPT MARESTAIL

# Eliminating Escapes
# During the Growing Season

- Glyphosate at Low Rates
- Stinger / Lontrel
- Goal at 1 pt to 1 qt per acre
  - Add surfactant after trees are hardened

# Eliminating Escapes
# During the Growing Season

- Glyphosate at Low Rates
- Stinger / Lontrel
- Goal
- Stinger / Lontrel + Goal

# Eliminating Escapes
# During the Growing Season

- Graminicides (Grass Killers)
  - Fusilade – Fluazifop-p-butyl

# Eliminating Escapes
# During the Growing Season

- Glyphosate at Low Rates
- Stinger / Lontrel
- Goal
- Stinger / Lontrel + Goal
- Stinger / Lontrel + Goal + Fusilade

# Eliminating Escapes With a Fall Application

Glyphosate and / or Garlon, plus a Preemergence Herbicide


ohn Ahrens
1977-2012

# Glyphosate Formulations

*Roundup Original

*Roundup Pro

*Other products that contain glyphosate as the a.i.

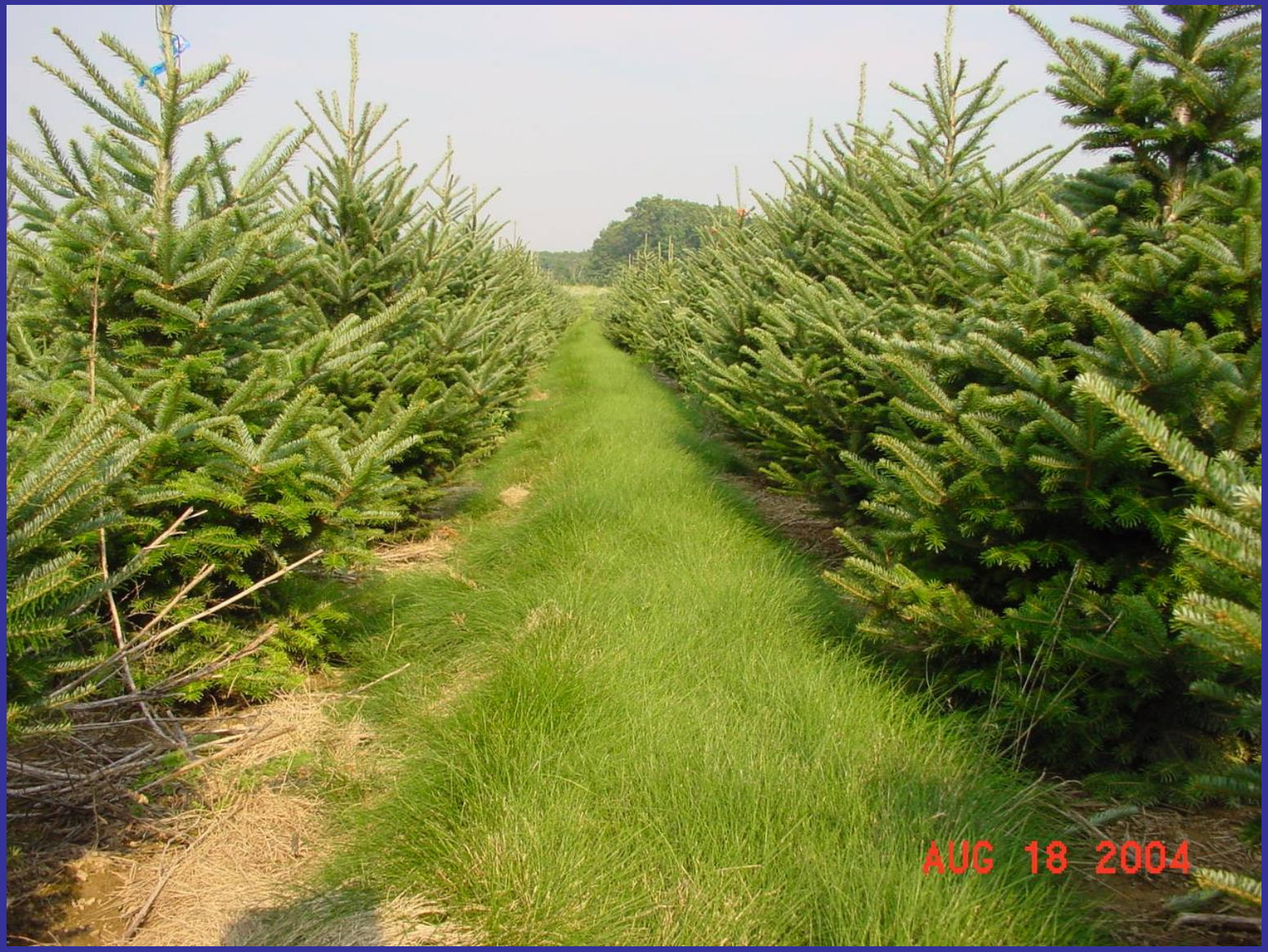
# COMBINATIONS (per acre)

- Glyphosate at 1.5 pts to 1.5 qts +
- Simazine at 1 qt

- Glyphosate at 1.5 pts to 1.5 qts +
- Sureguard at 4 to 8 oz

# COMBINATIONS (per acre)

- Glyphosate at 1.5 pts +
- Garlon 3A at 1.5 pts +
- Simazine at 1 qt OR
- Sureguard at 4 – 8 oz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# Glyphosate and Adjuvants

- Non-ionic surfactants
- Silicone-based surfactants
- Ammonium sulfate

# INTRODUCTION

- Classifying weeds
  - Broadleaves
  - Grasses
  - Sedge

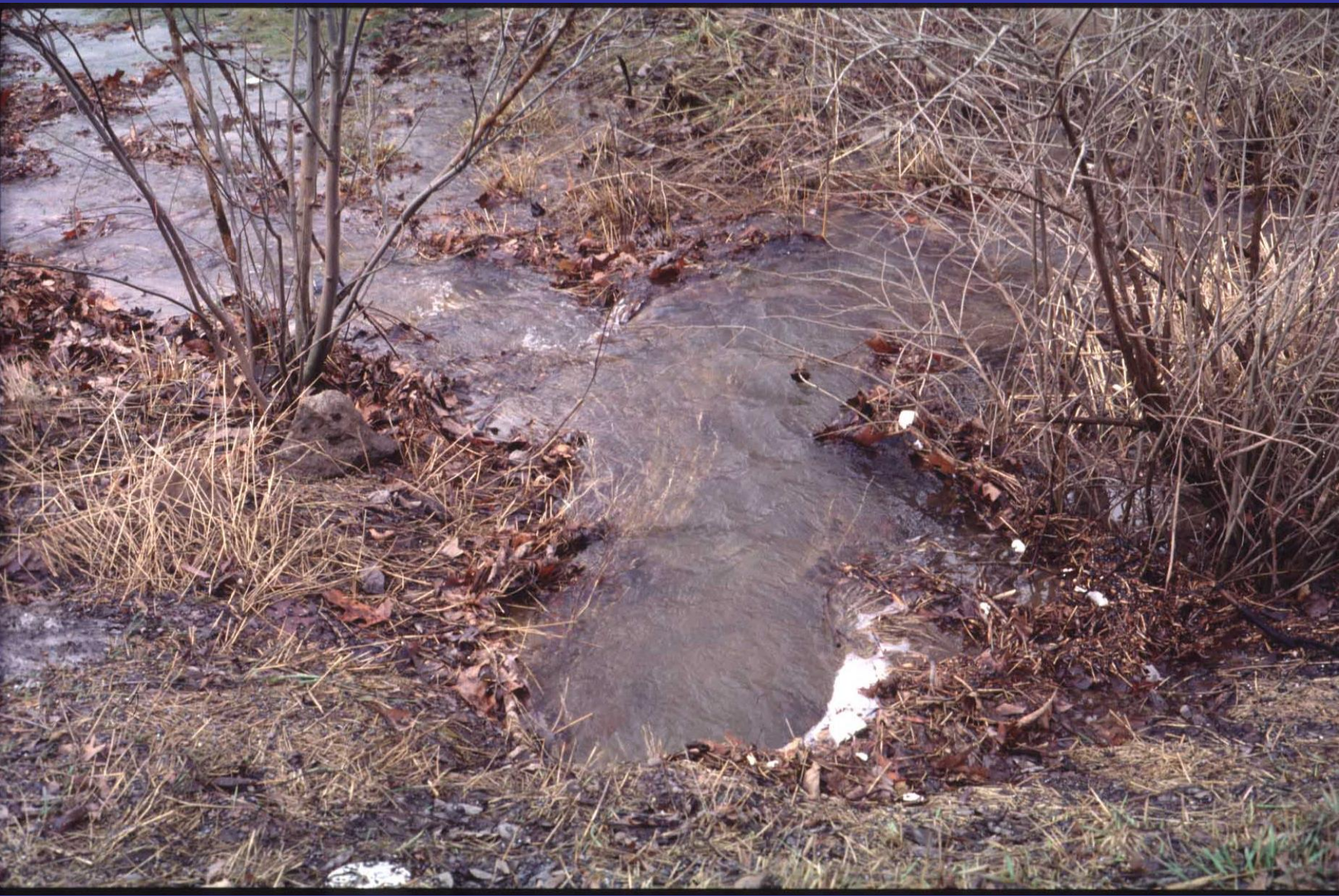
# INTRODUCTION

- Classifying herbicides
  - Preemergence
  - Postemergence
    - Selective v. Nonselective
    - Contact v. Translocated
    - Residual v. Non-residual

# INTRODUCTION

- Importance of sprayer calibration
  - Low rates may not provide the control needed
  - High rates may injure the crop

# GOLDENROD



# Cover Crop Competition

- If the grass grows up to the base of the trees, how much will it affect their growth?

# What is the Mode of Action of Glyphosate?

Glyphosate inhibits the production of several amino acids. One of them is tryptophan, which is a precursor Indole-acetic acid (IAA), which is one of the most important hormones (AUXIN) in any plant. 2,4-D is in the class of herbicides known as hormone herbicides.

# Why is it's MOA Important?

Though glyphosate breaks down quickly in the soil, once it enters the plant it is very stable. If the plant is only injured, and doesn't die, glyphosate injury symptoms can show up in the plant for years. Hormones move in the plant with the seasons, so new growth can be affected each year.

# Glyphosate Moves in Association with Carbohydrates in the Plant

It is critical that you understand this to get the most benefit from an application of glyphosate. In spring net carbohydrate movement is upward in newly emerging, and young, perennial weeds. Application at this time will result in the death of the top of the plant, but not the root or rhizome system. Re-growth will occur.

# Glyphosate Moves in Association with Carbohydrates in the Plant

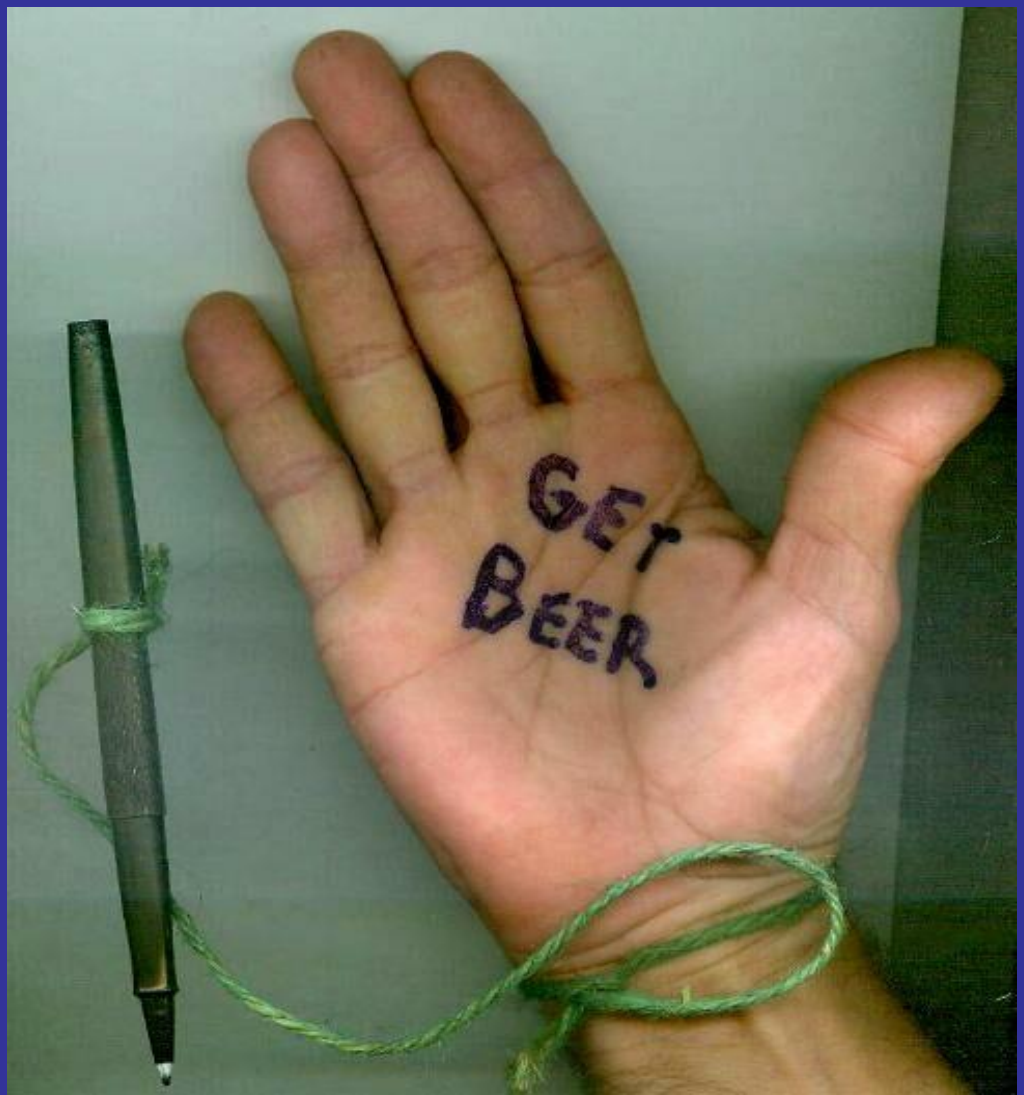
Applications to perennial weeds should be made when the growth is fully developed. Best control of underground parts is obtained around the time of flowering. Obviously, you don't want to wait until the plant has set seed.

# DIAGNOSING GLYPHOSATE INJURY

Most herbicides, or classes of herbicides, have distinctive symptoms of injury. Glyphosate does not. It has a range of symptoms that are possible.

With most herbicides, if injury occurs, the plants often fully recover from the injury in less than a year. Glyphosate injury lingers

# Redneck Palm Pilot



# What Makes Glyphosate So Good?

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5. It is a very simple molecule that is quickly broken down by microorganisms in the soil
6. It is water soluble (easy storage, mix, and clean up)

# Glyphosate is Non-Selective
## There are Exceptions to Every Rule

- Vinca
- English Ivy
- Many conifers
- Hard fescue
- Stage of Growth and Rate of Application are Critical. When spot-treating, rate of application is difficult to control.

# Best on Annual Grasses

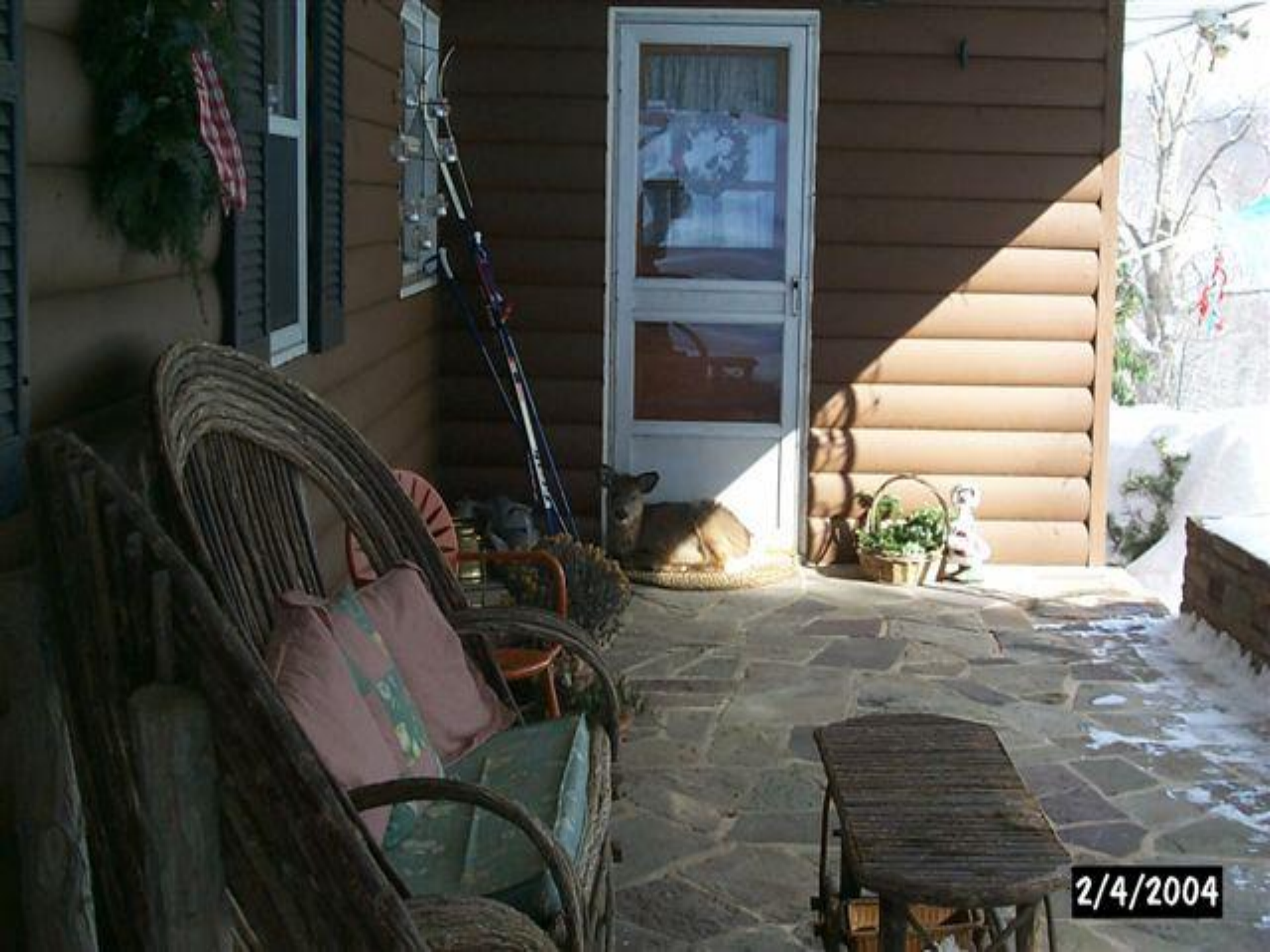
- Surflan (Small seedling hazard)
  - Oryzalin
- Pendulum
- Barricade
- Pennant

  -Best for Yellow Nutsedge

- Devrinol

# Douglas Fir
# No Cover vs Sod Cover

# Douglas & Fraser Fir in Sod Cover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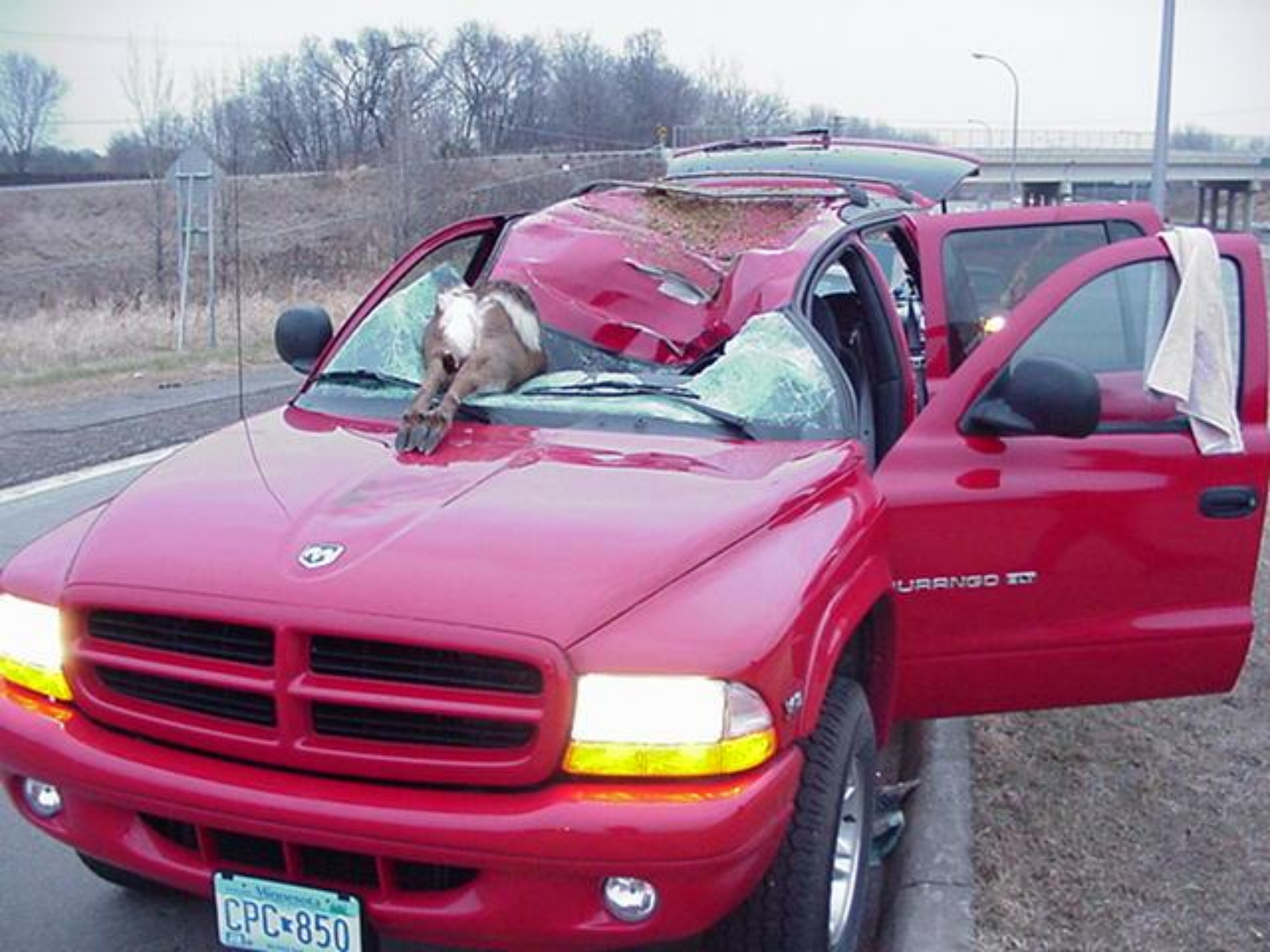
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# The Surfactants in Roundup
# Original vs Roundup Pro

1. The surfactant in Roundup Original was not as effective as the surfactant in Roundup Pro.
2. Because of #1, Roundup Pro controls weeds better, but has a greater potential to injure ornamental plants.
3. The surfactant in Roundup Original was more toxic to aquatic life and could not be used around water. Roundup Pro can be used around bodies of water.

# Surfactants, Glyphosate, and Bodies of Water

There are formulations of glyphosate that contain no surfactant. There are surfactants that are formulated specifically to be safe for use in bodies of water.

These can be mixed to be used to control weeds growing in water, like cattails or water lilies, or for controlling weeds on the water's edge.

# Looking at Labels

## I'm Sorry, but It's Not My Fault

Active ingredient – glyphosate

Standard formulation: 41% glyphosate

4 lbs/gal of the isopropylamine salt

3 lbs/gal of the acid, glyphosate

# Looking at Labels

Does the product include a surfactant? If it contains one, it is almost impossible to find out anything about it. Companies consider it to be proprietary information.

# Looking at Labels

## Active ingredient – glyphosate

Roundup Original

Roundup Pro

Ranger Pro

Glyphomax

Glypro Plus

All contain surfactants and 4lbs/gal of the ipa salt of glyphosate (3 lbs/gal of the acid)

# Looking at Labels

Active ingredient – glyphosate

Roundup Pro Concentrate

-50.2% of the ipa salt of glyphosate

-5 lbs/gal of the ipa salt of glyphosate

-3.7 lbs/gal of glyphosate acid

-Contains surfactant

-Labeled for nurseries and Xmas trees

# Looking at Labels

Active ingredient – glyphosate

Roundup Original Max

Roundup Power Max

Roundup Pro Max

Roundup Weather Max

-48.7% of the potassium salt of glyphosate

-5.5 lbs/gal glyphosate, potassium salt

-4.5 lbs/gal of glyphosate acid

-Contain surfactant

# Looking at Labels

Active ingredient – glyphosate

Accord XRT

-53.6%

-5.4 lbs/gal ipa salt

-4lbs/gal of the acid

-Surfactant included

-Labeled for nursery and landscape use

# Looking at Labels

Active ingredient – glyphosate

Aquamaster

-53.8% / 5.4 lbs/gal ipa salt

-4lbs/gal of the acid

-Same as Accord XRT, except:

*No surfactant included

-Labeled for use in bodies of water

# Looking at Labels

## Active ingredient – glyphosate

Touchdown Pro(28.3% Glyphosate)

-3 lbs/gal of the acid

- formulated as a diammonium salt

-Equivalent to 4 lbs/gal of the ipa salt

-Surfactant included

-Labeled for nursery and landscape use

-Labeled for use in bodies of water

# Looking at Labels

Active ingredient – glyphosate

Quik Pro – A water soluble granule

73.3% Glyphosate, ammonium salt PLUS

2.9% Diquat dibromide

-Disrupts cell membranes

-Surfactant included

-Labeled for landscape use

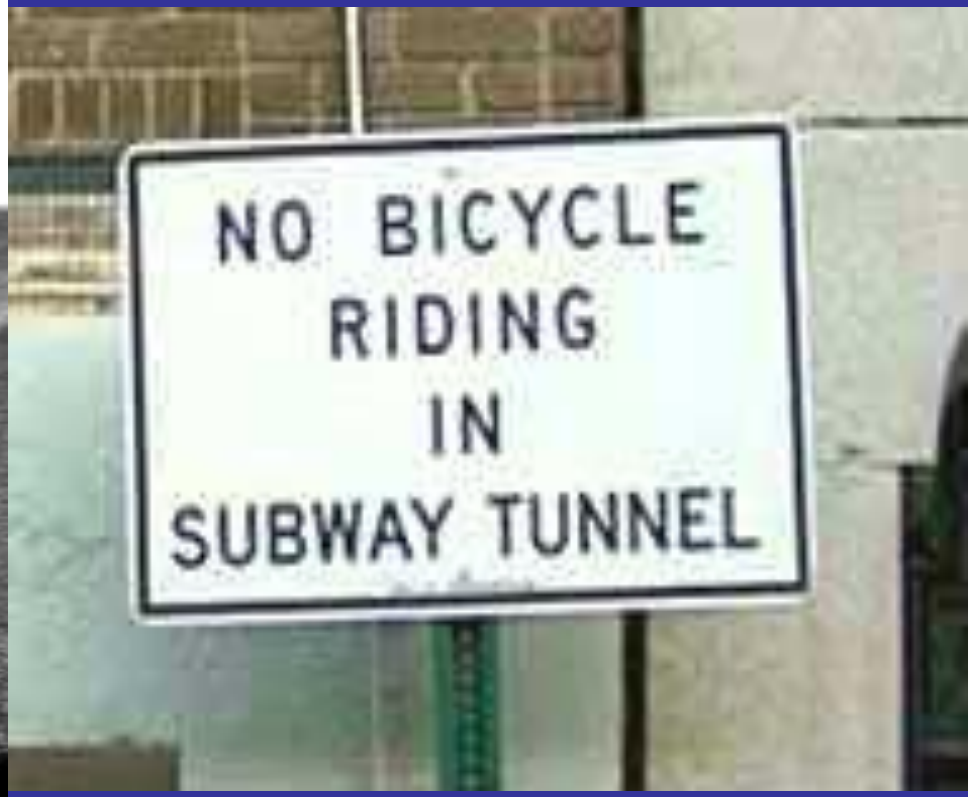
# Chemical Control Options
# Site Preparation

- Glyphosate / Roundup
- Garlon 4E or 3A
- 2,4-D  Ester or Amine
- Dicamba – Probably Not, but only if used at least 6 months prior to planting.
    - Soil residual issue

# Chemical Control Options

- Glyphosate / Roundup
- Garlon 4E or 3A
- 2,4-D  Ester or Amine
- Dicamba, but only if used at least 6 months prior to planting
- DO NOT USE other products with residual activity, like Arsenal or Oust

# There are some things you just should not do

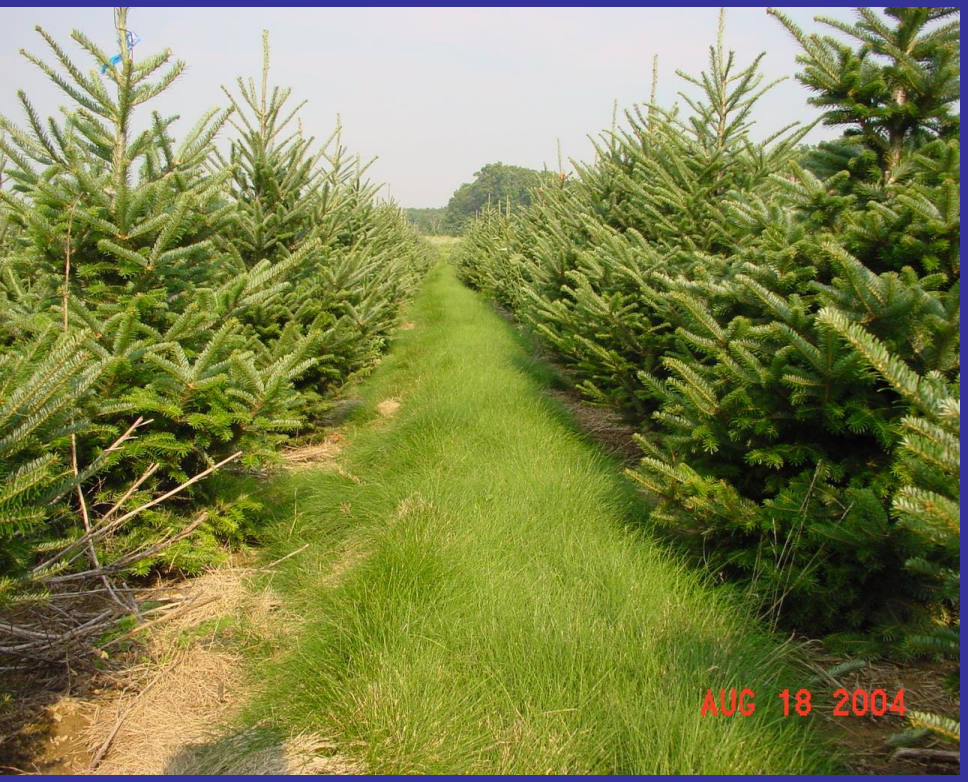



# DO NOT APPLY HERBICIDES WITHOUT CALIBRATING YOUR SPRAYER

# Atrazine 2.5 qts/A + Surflan 2 qts/A or Pendulum 2.5 qts/A


ptlonim

# Again – FF w & wo Sod Cover




# Cover Crop Bottom Line

- Do not use a grass cover without an herbicide-based weed control program in place
- Roads - Tall fescue
- Between rows - Hard fescue, or Mix of Hard and Red fescue

# Establishing the Cover Crop

- Kill all weeds
- Loosen soil
- Plant in September
- 20-80 lbs seed per acre

# RECOMMENDATION
## Site Preparation

- Glyphosate at 2-4 qts per acre
- OR
- Glyphosate at 2 qts per acre Plus Garlon 4E at 1-2 qts per acre

# Best on Broadleaved Weeds

- Atrazine
- Simazine
- Goal
- Sureguard
- Gallery
- Ronstar
- Marengo
- Westar

# Best on Broadleaved Weeds - Triazines

- Atrazine (4L, 90 WDG)
- Simazine (4L, 90 WDG)

# Best on Broadleaved Weeds

- Goal (2 XL, GoalTender 4E)
- Sureguard (51 WDG)
- Ronstar (2G, 50WP)
- Marengo

# Best on Broadleaved Weeds

- Westar – Combination Product
  - Oust (Sulfonylurea)
  - Velpar (Triazine)

# Best on Annual Grasses

- Surflan (Small seedling hazard)
  - Oryzalin
- Pendulum
  - 3.3EC vs water soluble (Aquacap)
- Pennant (Metolachlor)

  -Best for Yellow Nutsedge

# WESTAR

- Apply prior to budbreak, or after growth is hardened in the early fall
- Do not apply when growth is soft
- 6-12 oz per acre
  - Can add 0.5 to 2 pts of Velpar (I wouldn't)
- Controls a broad spectrum of weeds
- Has pre- and post-emergence activity
- Hazardous if misused. Don't apply to sandy or gravelly soils, to spruce, or 2 years in a row

| | | | |
|---|---|---|---|
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# Preemergence
# Best on Broadleaved Weeds

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| • Oxyfluorfen | Goal 2XL |
| • Flumioxazine | Sureguard |
| • Hexazinone | Velpar ??? |

# Preemergence
# Best on Grasses

- Pendimethalin — Prowl $H_2O$
- Dimethenamide — Frontier Max ???
- Napromapide — Devrinol
- Metolachor — Dual Magnum
- Hexazinone — Velpar ???
- Pronamide — Kerb
  - Propyzamide ???

# Postemergence Broadleaved Weed Control

| | |
|---|---|
| • 2,4-D amine | Many |
| • Triclopyr | Garlon XRT |
| • Clopyralid | Lontrel, GF-1966 |

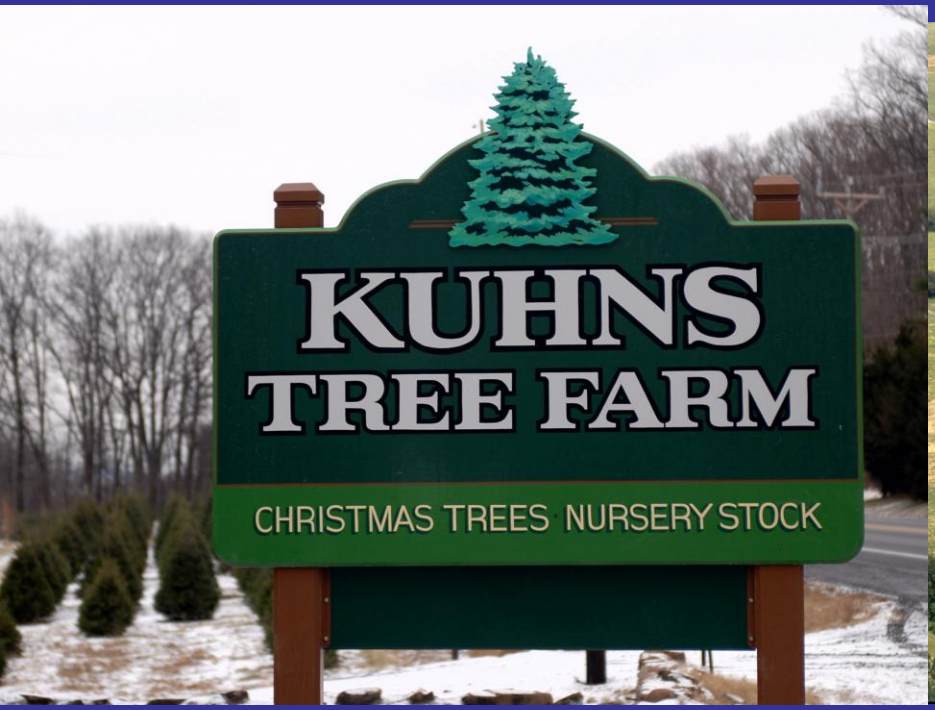
# Postemergence
# Best on Grasses

- Fluazifop-P-butyl Venture
- Propyzamide Kerb

# Total Vegetation Control

- Glyphosate – Roundup and many others

# KUHNS TREE FARM
# About 20 ha of Trees




# KUHNS TREE FARM

**WHOLESALE** **RETAIL**

# Kuhns Tree Farm
# Vegetation Management -
# I Practice What I Preach


# Herbicide Research - 30+ Years

**Efficacy**


**Crop Tolerance**

# Establish A Between-Row Cover Crop and Sod Roads For:

- Erosion control
- Add Organic Matter to the Soil
- Minimizes growth of weeds
- More Worker-Friendly Environment
- Cleaner Trees at Harvest
- More Beneficial Organisms in the Field

# Glyphosate Formulations - Things **Not** to Do

***Do not add Surfactant to sprays that will contact Christmas trees**

***Do not use Roundup QuikPro Glyphosate + Diquat formulation**

# Glyphosate and Surfactants

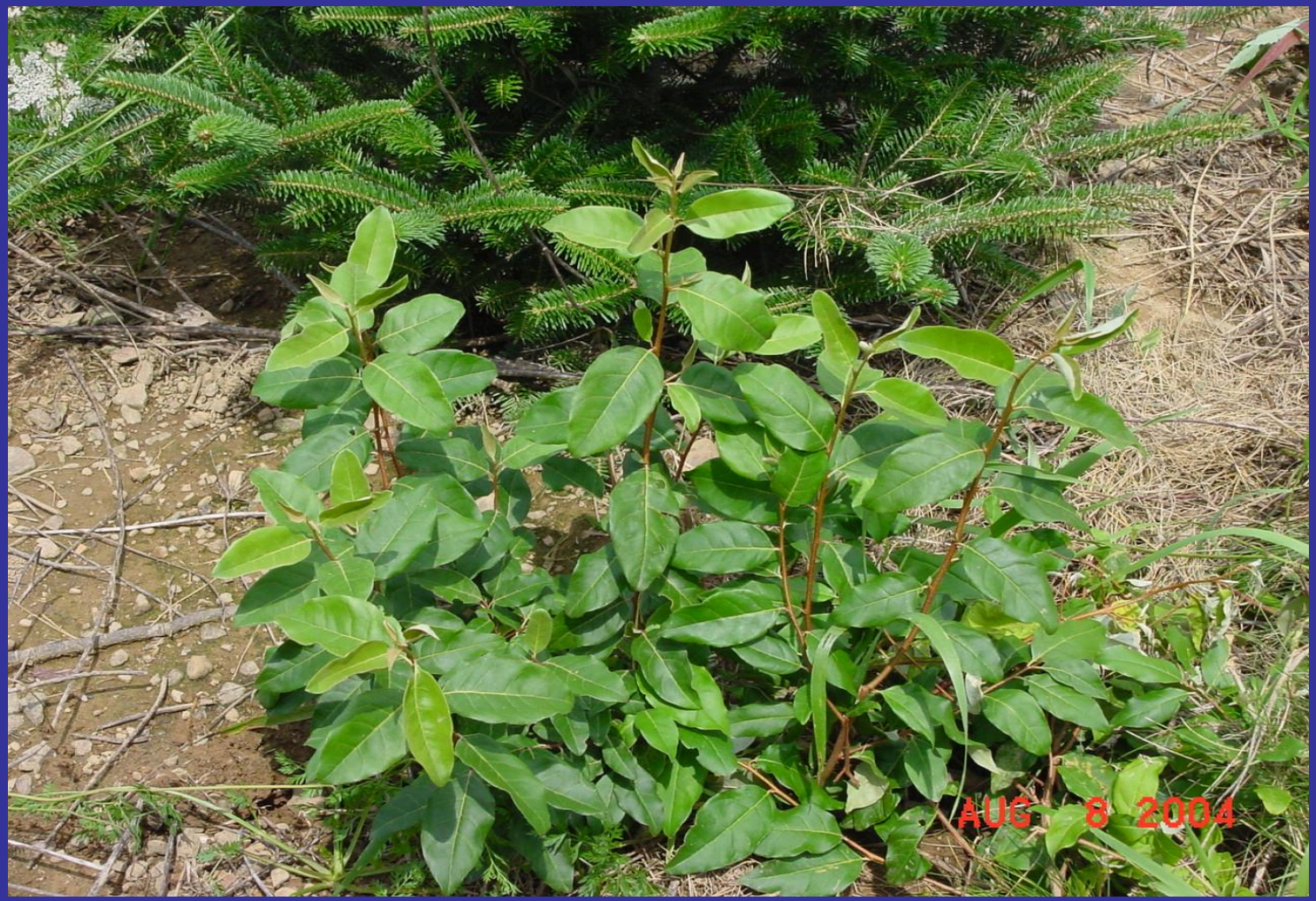
- Surfactant is short for “surface active agent”

- Wetting agents ( Spreaders ) reduce the surface tension of water and cause spray droplets to spread rather than ‘bead up’ on waxy leaves. They may intensify the toxicity of glyphosate.

- *Spreader-stickers* help hold chemicals on the leaf surface for extended periods of time, and are usually used only with insecticides and fungicides, *not* herbicides.

- *Crop oil concentrates* not only act as spreaders but, more important, they also help chemicals penetrate the waxy coatings of leaves. This results in improved weed control, but also increases the risk of injury to the ornamentals.  Do not use these with glyphosate in Christmas trees.

# AUTUMN OLIVE



# COMBINATIONS (per acre)

- Glyphosate at 1.5 pts to 1.5 qts +
- Simazine at 1 qt

# Westar in the Fall

- 6 oz per acre
- Depending on weed population, add

1qt Roundup-type product (glyphosate)

If planting a cover crop in the fall, eliminate the preemergence herbicide from the mix

# Vantage on Foxtail, 2 WAT

# Vantage on Foxtail, 2 WAT

# Factors Affecting Glyphosate Activity

- Surfactant
- Rate (Site Prep vs Trees in Field)
- Timing of application
- Weed density