Herbicide Prescriptions

For Forest Vegetation Control

December 14, 2017

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Vegetation Management Treatments

Treatment	Save Regen	Reduce Comp
Burning		x
Herbicide	X	X
Mechanical	x	X
Hand scalp	X	x

Management Objective

- *Stand establishment*
  - *Planting or natural seeding*
  - *Site preparation*
- *Improve existing seedling & sapling growth*
  - *Reducing competition for light & moisture*
  - *Conifer release*

Site Preparation (Pre-plant)

- Treatment applied **PRIOR** to or at planting – not over seedlings
- Reduces competition for water, light and nutrients
- Injury to existing conifers not important

Conifer Release
(Post-planting or Over-the-top)

- Treatment applied **AFTER** planting or **over existing trees**

- Treatment designed to:
  - Reduce the growth impact of competing vegetation
  - **Minimize injury to existing conifers**

Save Existing Regeneration?

- Species present –
  the ones we want?
- Numbers and distribution?
- Tree vigor?
- Value – size & species?

Save Existing Regeneration?

- Yes? = limits on
  - Herbicides used
  - Herbicide rates
  - Treatment timing
  - Vegetation control?

Basic Vegetation Management Problems

- Grass & forb competition on drier sites
- Shrub competition on moister sites
- Sometimes both grass & shrubs

Grasses and Forbs

- Primarily problems on drier sites & CRP
  - Lower precipitation – longer summer drought
  - Poorer soils - low moisture holding capacity?
- Affect survival and growth
- Require site preparation (pre-plant or at-plant) treatments for successful regeneration
- Grass controlled prior to planting is preferred

Shrub Competition

- Primarily on moister sites

- Site preparation on old partial cuts or if reclaiming non-stocked shrub fields

or:

- Save existing regen. - interplant
- Release to keep established trees growing rapidly

Sometimes Both Grass & Shrubs

Do we have a problem?

- How vegetation much is too much?
- Threshold levels needed
  - Above this level we need to treat
  - Below this level everything is OK (for now)

Thresholds

- Problem - not a lot of conifer / competition data available for our area
- We can however draw some general conclusions from existing data
- Often expressed as % cover of problem vegetation – present at planting or will be within a year or two.

What is Cover?

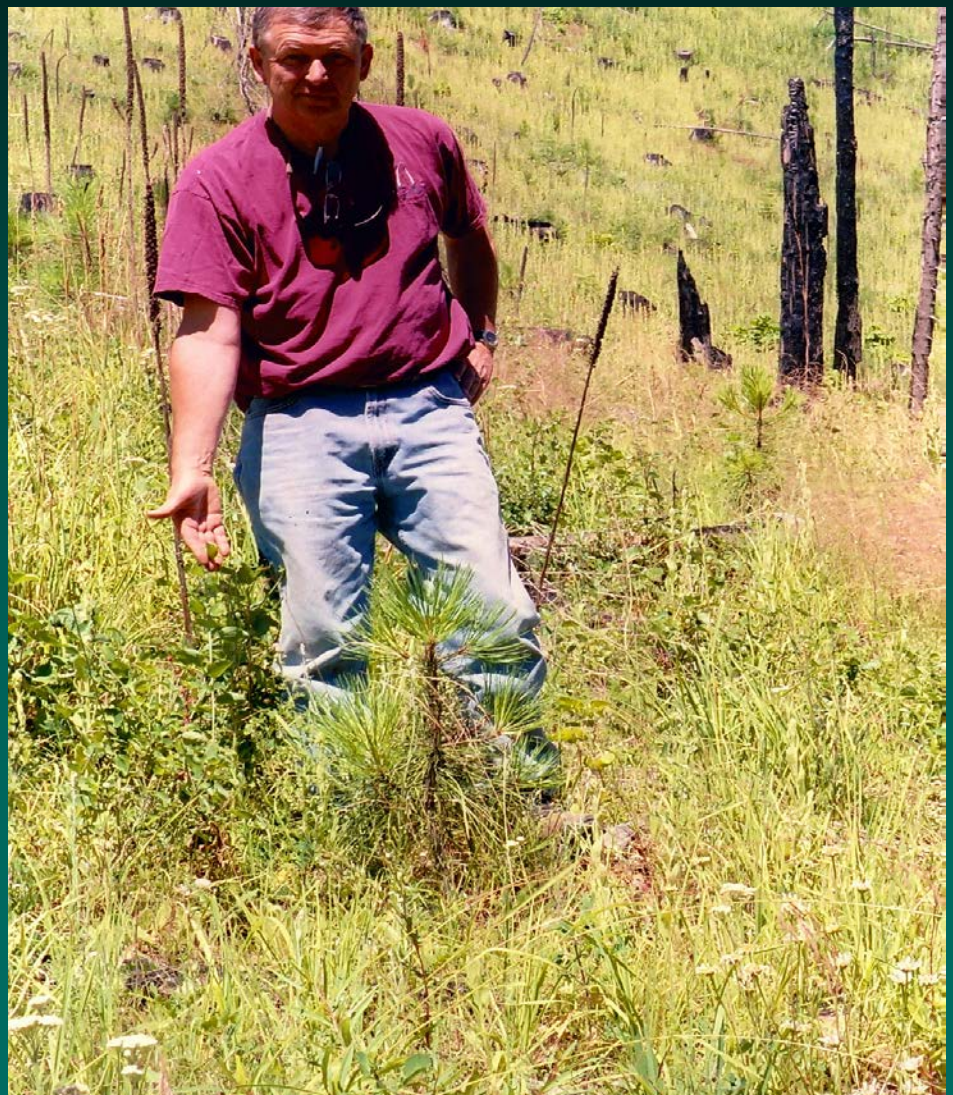
- The amount of shade a species or vegetation type casts on the ground
- If the sun is assumed to be directly overhead
- Expressed as a percentage of the sample area (plot)

Cover

Site Preparation for Grass

- Seedling survival is reduced when grass and forb cover exceeds or will soon exceed about 50% - less on very dry sites.
- Grass and forb cover should be reduced to less than 40% cover to insure adequate survival and growth.
- Less is always better!

About 40% Cover



Effect of Grass Control

About 50% cover

Effect of control

Site Preparation for Shrubs

- Survival and growth decreases when shrub cover exceeds 30%

Overtopping /Crowding

- Diameter growth slows significantly when encroaching shrubs exceed 60% of tree height.
- All growth affected when trees are overtopped
  - Growth slows
  - Rotations lengthened

Overtopping /Crowding

Dominance Potential

- Shrubs that have height growth rates that permit them to outgrow young conifers
  - Maple
  - Willow
  - Cherry
  - Ceanothus – both species, esp. redstem
  - Serviceberry
  - Elderberry

Treatment Development

- Prioritize species (species groups) for control
- Prioritize by:
  - Dominance potential - get the tall ones
  - Competitive advantage for soil moisture - grasses
  - Amount - how much of the stuff is there?
- Rank species in order of desired control
  - No one treatment will control all species
  - Target the top 3-5 most important species
  - On drier sites, killing shrubs releases the grass!

Application Method

- Aerial broadcast
- Ground-applied broadcast
- Ground-applied spot

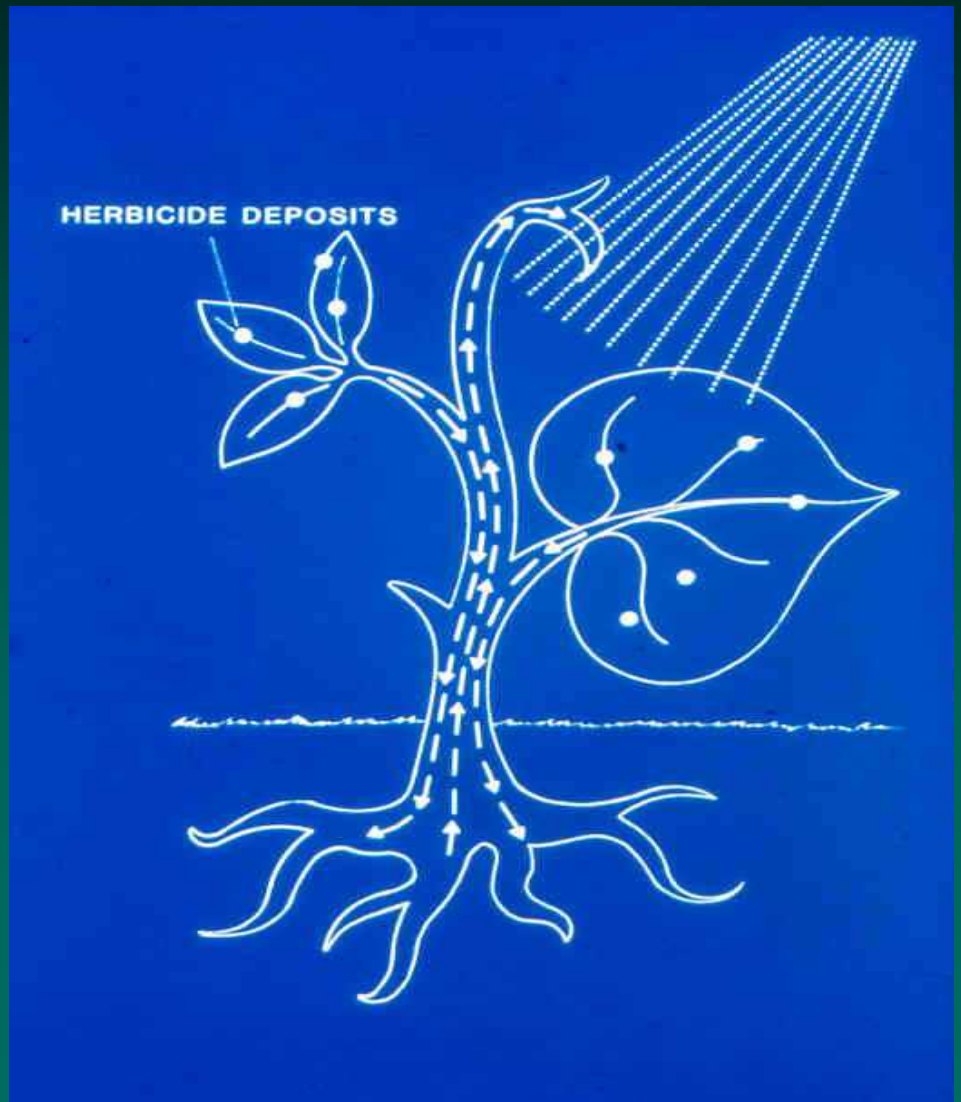
Spot vs. Broadcast Cost?

- Data from 2002 – percentages should still be relevant
- Herbicide + application:
  - Spot about 54% of broadcast cost
- Other factors:
  - Broadcast survival higher (16%)
  - Broadcast shorter rotation (1 year)
- Total cost difference =$4/acre
  - Broadcast cheaper by 2%

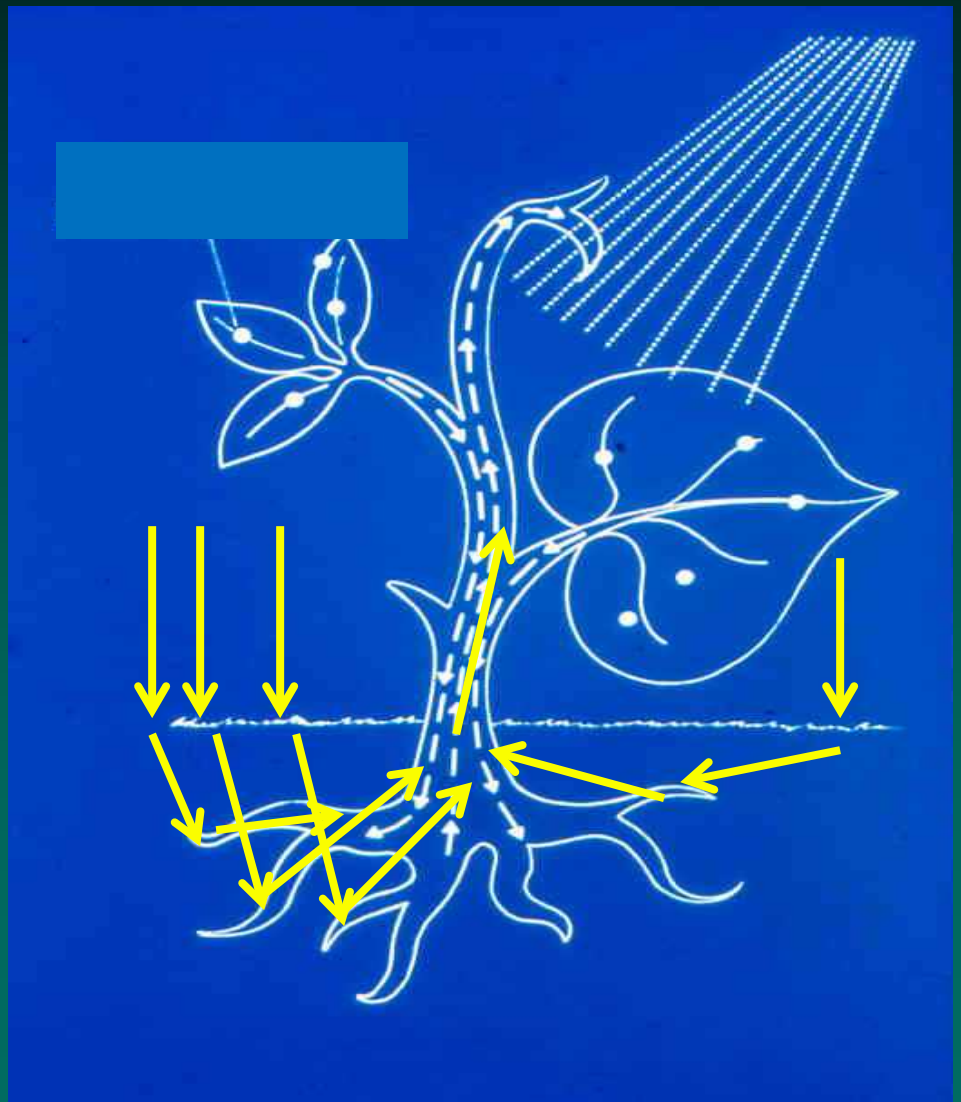
Herbicideology

- Basic terminology
  - Activity type
  - Season of application
  - Application rates
  - Adjuvants

Foliar-active Herbicides



Soil-active Herbicides



- Foliar-active herbicides
  - Applied after green up
    - Previous growing season
    - Current year –
      - Pre-plant - may delay planting
      - Post-plant - may require seedling protection
  - Often faster acting – glyphosate
  - Usually requires dry weather for application
- Soil-active herbicides
  - Can be applied as a dormant treatment
    - Current or previous year
    - Pre-plant = no seedling protection
  - May be slower acting (current year)
  - Requires rainfall to activate

Application Season

- Spring Dormant
  - Conifers and vegetation dormant
- Early Foliar – site prep
  - Conifers growing
  - Shrubs and grasses growing
  - Usually best vegetation control - except Accord
- Late Foliar /Late Summer - release
  - Conifers hardened off
  - Shrubs active
- Fall Dormant
  - Conifers and vegetation dormant

Ray Boyd's Foliage Color Rule

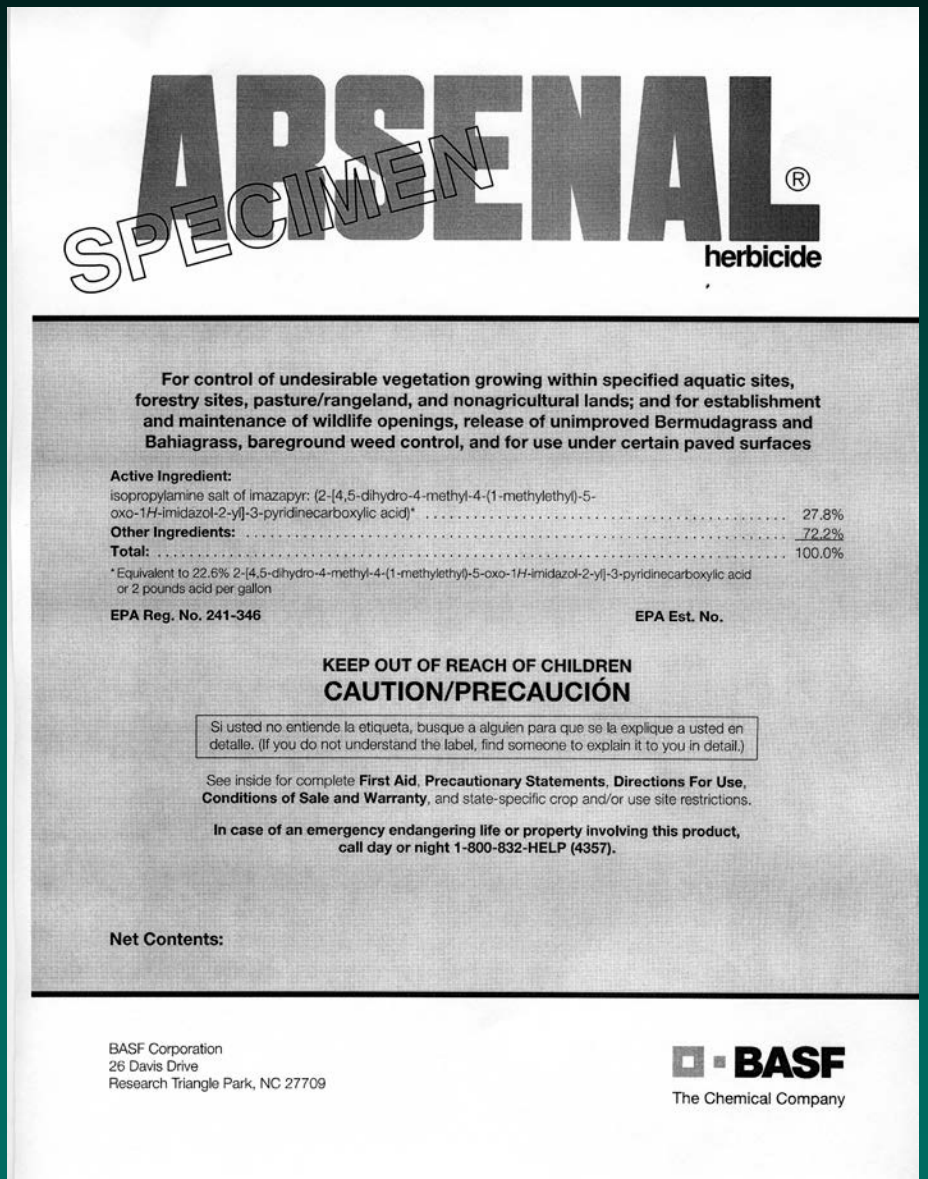
Immature coloration

Mature coloration

Amount of Product or Active Ingredient

- Product = the name on the label – Arsenal herbicide
- Active ingredient (a.i.) = imazapyr
- Similar names but different concentrations
  - Arsenal herbicide 27.8% a.i. = 2 lb. a.i. / gallon
  - Arsenal Applicators Concentrate = 51.3% a.i. = 4 lb a.i./gal
- Label rates may specify product (pints) &/or pounds of active ingredient (a.i.)
- Rates specified on label - READ IT !

Always Read the Label



ARSENAL®
herbicide

SPECIMEN

For control of undesirable vegetation growing within specified aquatic sites, forestry sites, pasture/rangeland, and nonagricultural lands; and for establishment and maintenance of wildlife openings, release of unimproved Bermudagrass and Bahiagrass, bareground weed control, and for use under certain paved surfaces

Active Ingredient:

isopropylamine salt of imazapyr: (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid)*	27.8%
Other Ingredients:	72.2%
Total:	100.0%

*Equivalent to 22.6% 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid or 2 pounds acid per gallon

EPA Reg. No. 241-346 **EPA Est. No.**

KEEP OUT OF REACH OF CHILDREN

CAUTION/PRECAUCIÓN

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.)

See inside for complete **First Aid**, **Precautionary Statements**, **Directions For Use**, **Conditions of Sale and Warranty**, and state-specific crop and/or use site restrictions.

In case of an emergency endangering life or property involving this product, call day or night 1-800-832-HELP (4357).

Net Contents:

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF
The Chemical Company

ARSENAL®

herbicide

SPECIMEN

For control of undesirable vegetation growing within specified aquatic sites, forestry sites, pasture/rangeland, and nonagricultural lands; and for establishment and maintenance of wildlife openings, release of unimproved Bermudagrass and Bahiagrass, bareground weed control, and for use under certain paved surfaces

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isopropylamine salt of imazapyr: (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid)*	27.8%
Other Ingredients:	72.2%
Total:	100.0%

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CAUTION/PRECAUCIÓN

Adjuvants = Additives

- Surfactants – surface active
- Water pH modifiers
- Drift control

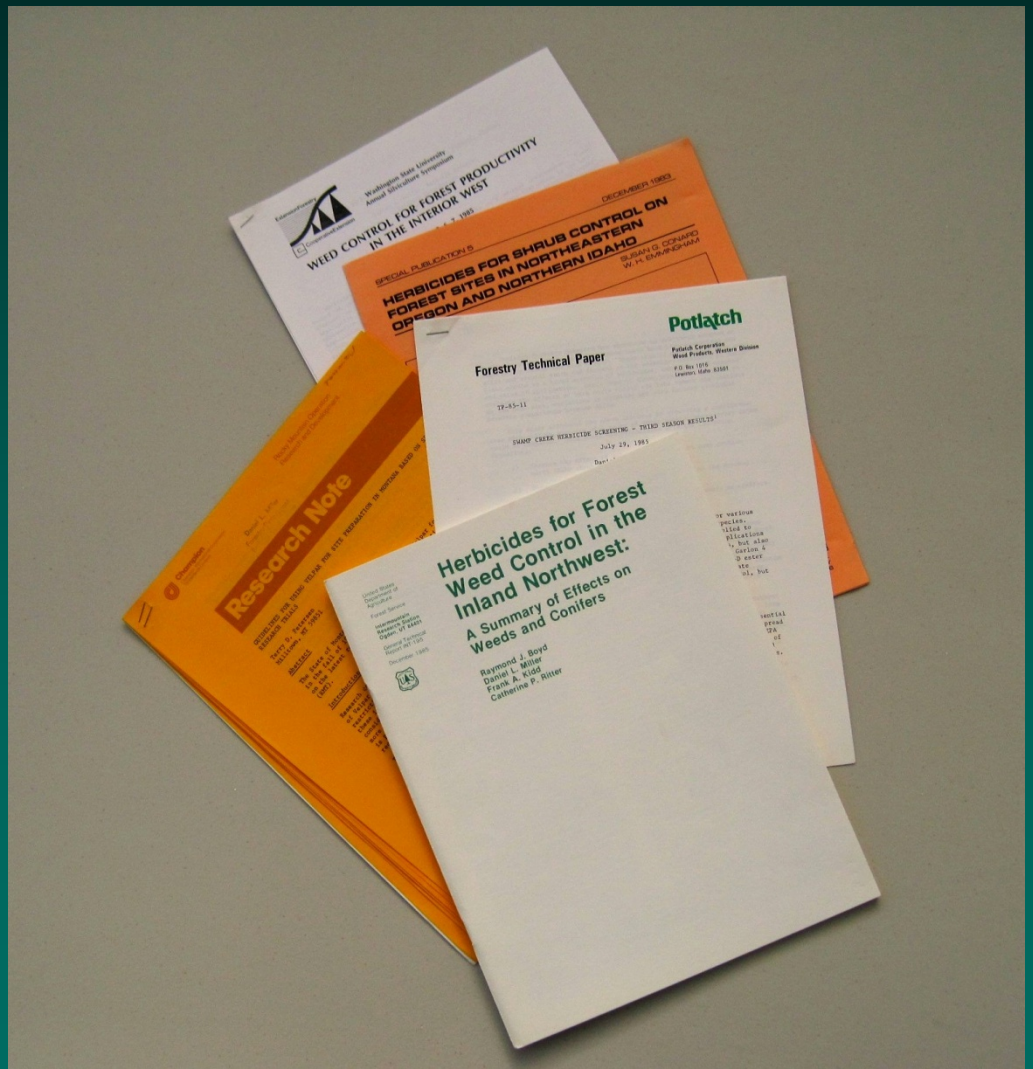
Herbicide Selection

- Choice depends on species to be controlled - usually 3-4 most dominant
- Site prep or release - Pick 1 - some herbicides not registered for both
- If release, conifer species may affect choice - larch easily injured
- Species to be planted - larch
- **Read the product label!**

Gather Up Control Information

- Experience
- Research reports
  - Boyd et al.1985. Herbicides for forest weed control in the Inland Northwest. USDA Forest Service Gen. Tech. Report INT- 195
- Company technical representatives
- Other foresters – Extension foresters
- Not a lot of data on newer products

Herbicide Publications



Field Reps

Vegetation Control Data

- % top kill = % cover reduction – good indicator of short term competition reduction
- %plant kill – better long term indicator
- Conifer injury – usually some numeric code

Common Site Prep Treatments

Grass

Hexazinone

(Velpar L, DF)

- 2 lb.ai. / acre
- Fall / Spring
- Soil active
- Photo degrades

- Injures larch
- Can injure

white & lodgepole pines

Grass

Atrazine

- 4 lb.ai.
- Summer/Fall
- Maybe best after burning
- Pre-germination on shrubs
- Check label for aerial application

Atrazine After 6+ Years

Grass

Sulphometuron methyl (SFM)

(Oust, Spyder)

- 2 dry oz. (75% a.i.)
- Summer /Fall / Spring

- PP restrictions on label

Shrub Control – Site Prep & Release

Glyphosate (Accord, Foresters, etc.)

- 2 lb. a.i. /acre
- Site prep – mid July-late August
- Release – mid – late-August

Tall Shrubs

Tall Shrubs

Glyphosate + Arsenal AC (Imazapyr)

- 2 lb. a.i. + 8oz.(4# gal.) /acre

- Mid-August – earlier?

Tall Shrubs

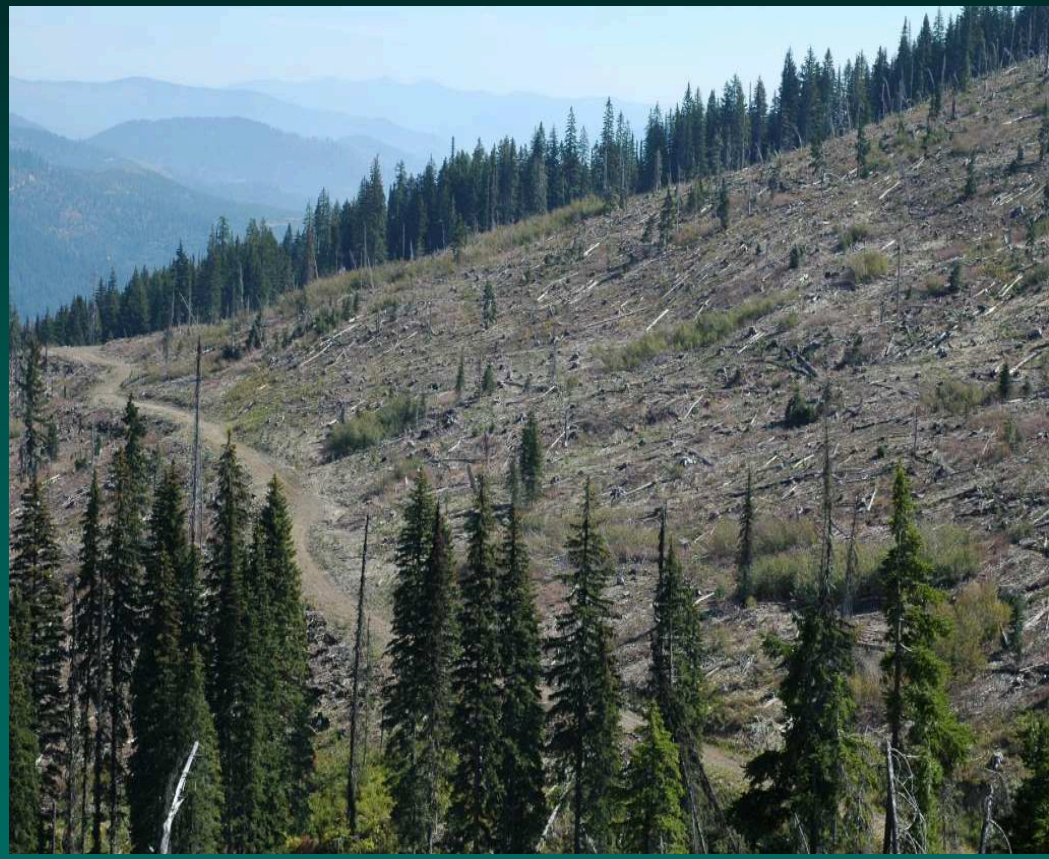
Grass & Shrubs

Glyphosate (Accord, Foresters, etc.)

- 2 lb. a.i. / acre
- + Atrazine, imazapyr, or sulphometuron methyl

- August

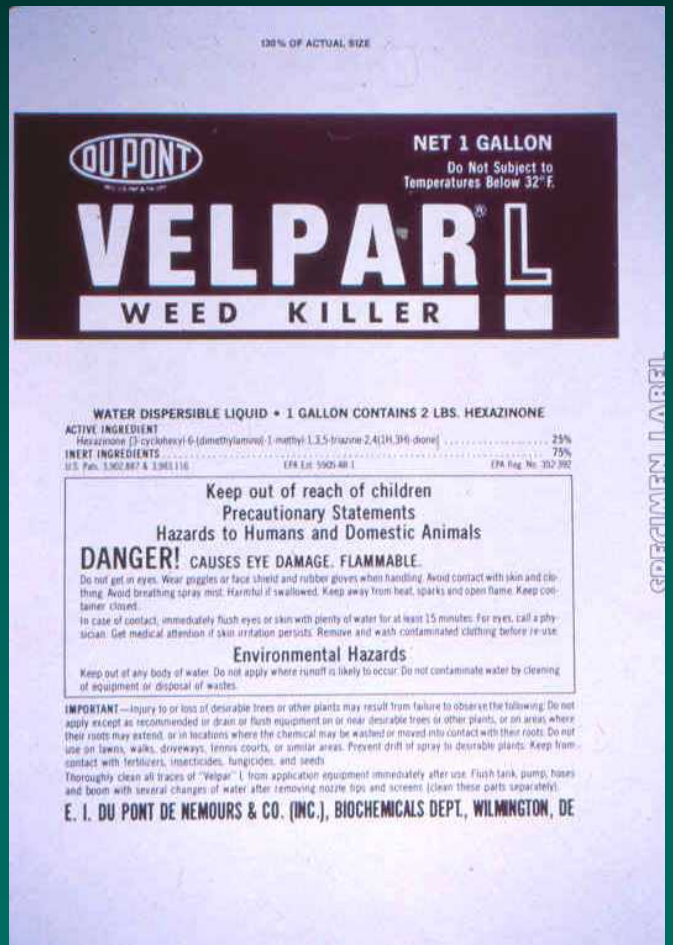
- Glyphosate won't get the dormant grass in August.




FOLLOW-UP

Questions?

Answer – Always read the label!



Make the Decision

- Build yourself a spreadsheet that lists the species you want to control with spaces to enter the control estimates you just gathered up.
- Pick the winner!

SPECIES	CROWN VOL.	TREATMENTS		
		ROUNDUP	TORDON 101	GARLON 4
MAPLE	24,420	61	50	73
CEANOTHUS	9,928	0	85	99
WILLOW	9,043	49	95	85
NINEBARK	6,634	80	40	64
CHERRY	3,782	100	100	72

Grass

Imazapyr (Polaris)

- 24 oz. of 2 lb.ai. product

- Summer /Fall

Define Treatment Objective

Treatment	Save Regen	Reduce Comp
Broadcast burn		
Pile & burn	?	X
Herbicide	X	X
Spray & burn		X
Mechanical scarification	?	X
Hand scalp	X	x

United States
Department of
Agriculture

Forest Service

**Intermountain
Research Station
Ogden, UT 84401**

General Technical
Report INT-195

December 1985

Herbicides for Forest Weed Control in the Inland Northwest:

A Summary of Effects on Weeds and Conifers

**Raymond J. Boyd
Daniel L. Miller
Frank A. Kidd
Catherine P. Ritter**

Always Read the Label!

Specimen Label

Dow AgroSciences

Accord® Concentrate

Herbicide

For control of annual and perennial weeds and woody plants in forests, non-crop sites, and in and around aquatic sites; also for use in wildlife habitat areas, for perennial grass release, and grass growth suppression and grazed areas on these sites.

Avoid contact of herbicide with foliage, green stems, exposed non-woody roots or fruit of crops, desirable plants and trees, because severe injury or destruction may result.

Active Ingredient(s):	
glyphosate[1] N-(phosphonomethyl)glycine, isopropylamine salt	53.8%
Other Ingredients	46.2%
Total Ingredients	100.0%

[1] Contains 5.4 pounds per gallon glyphosate, isopropylamine salt (4 pounds per gallon glyphosate acid).

EPA Reg. No. 62719-324

Keep Out of Reach of Children

CAUTION PRECAUCION

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Precautionary Statements

Hazards to Humans and Domestic Animals

Harmful If Inhaled

Avoid breathing spray mist. Remove contaminated clothing and wash before reuse. Wash thoroughly with soap and water after handling.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE (Personal Protective Equipment). If no such instructions for washables, 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 Worker Protection Standard (WPS) for agricultural pesticides [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.

First Aid

If inhaled: Move 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.

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 contaminate water when cleaning equipment or disposing of equipment washwaters. Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

In case of leak or spill, soak up and remove to a landfill.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas, which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Terms and Conditions of Use, Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies elsewhere on this label. If terms are unacceptable, return at once unopened.**