

RANGE AND PASTURE WEED CONTROL

Joel Fields



Agenda

- Rejuvra for annual grass control
- Milestone
- Opensight
- Highnoon
- Transline/Sonora
- Syltac
- Noxious weed pictures and control options



**Invasive annual
grasses continue to
devastate our western
rangelands**

**at a huge cost to
ranchers, wildlife,
taxpayers, and more.**

Western US Invasive Annual Grass “Most Wanted” List!

Cheatgrass/
Japanese Brome



WANTED

Ventenata



WANTED

Medusahead



WANTED

Bulbous
Bluegrass



WANTED

Invasive Annual Grasses



Typically germinate in fall but can also germinate throughout the spring

Deplete valuable resources before native species break dormancy

Age by late spring/early summer

Prolific seed producers





Greatly decrease the quality and amount of forage available for livestock grazing



Decrease ecosystem diversity and productivity as well as displace and decrease pollinator and wildlife habitat



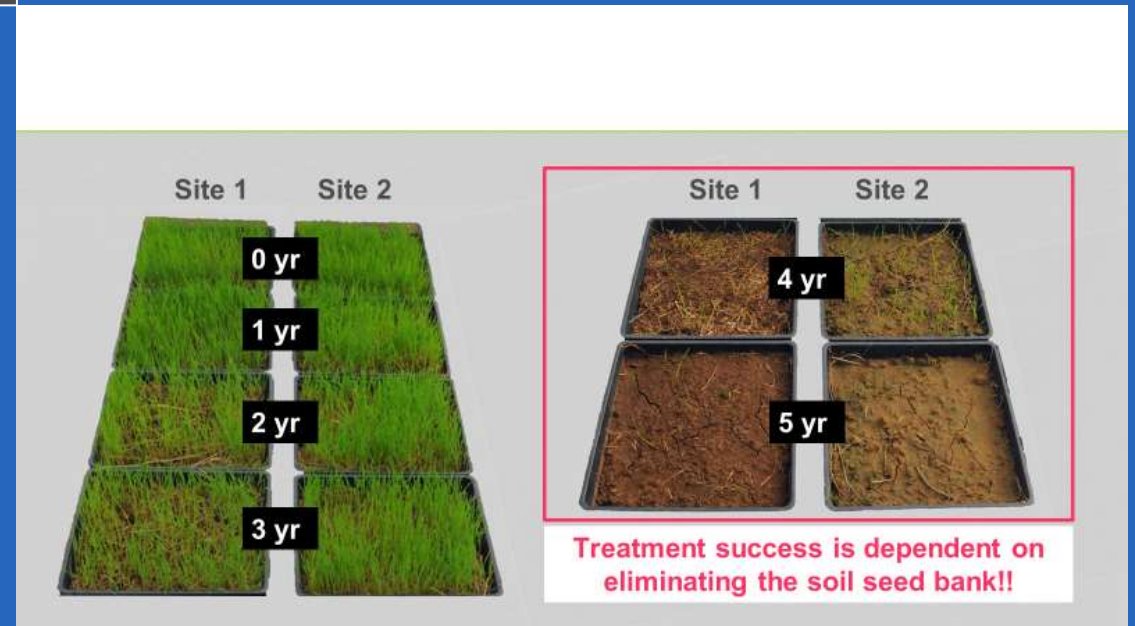
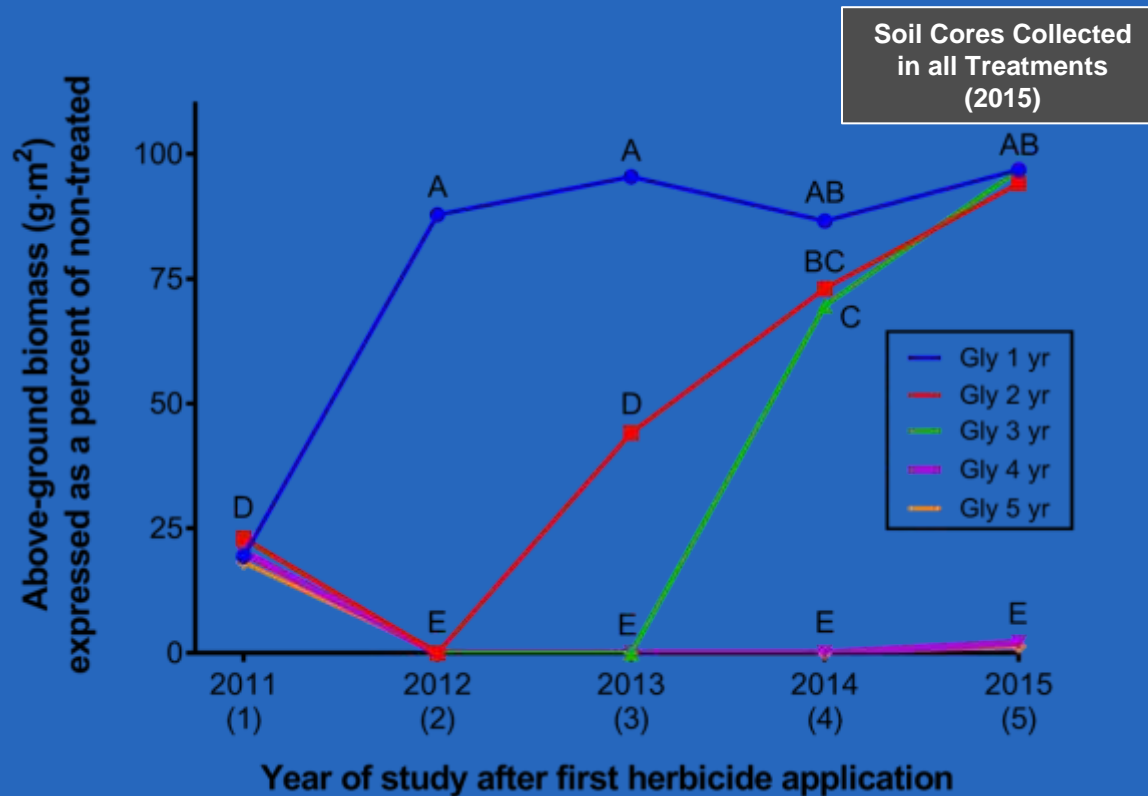
Increase the risk of wildfire frequency due to the abundance of fine fuels



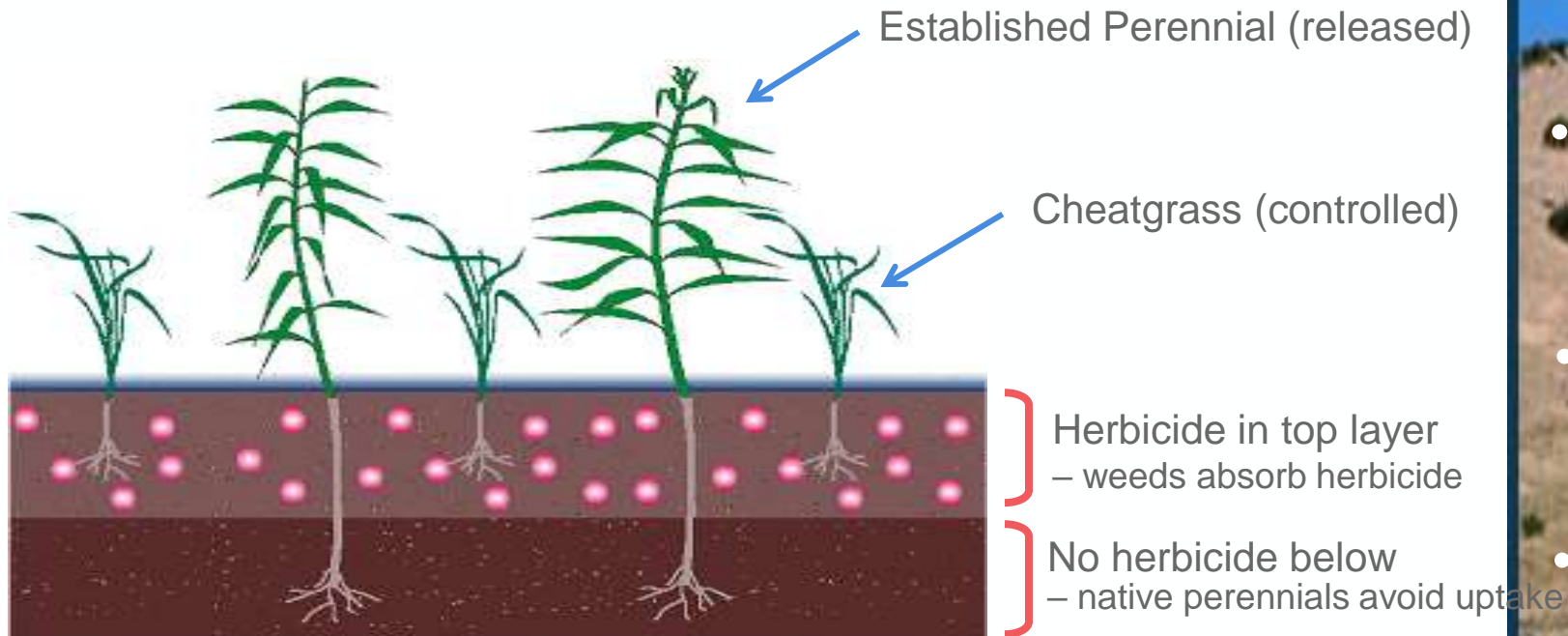
Near monocultures of cheatgrass have developed in areas impacted by fires and vast areas of the west are threatened by elimination of the native perennial population

How Long Does Cheatgrass Persist in the Seedbank?

Greenhouse study utilized annual glyphosate applications to determine seedbank longevity



Targeting the weed seed bank: a new tool for rangeland success



- Pre-germination herbicide
- Eliminates weeds germinating in the topsoil profile
- Leaves deeper rooted perennial species unaffected
- Safe on perennial grasses, forbs, and shrubs
- Full grazing label

Rejuvra® Selectively Controls Annual Grasses While Releasing Desirable Perennials (grasses, forbs, shrubs)



No Treatment

Rejuvra®



No Treatment

Rejuvra®



**Before Treatment
(Cheatgrass Infested)**

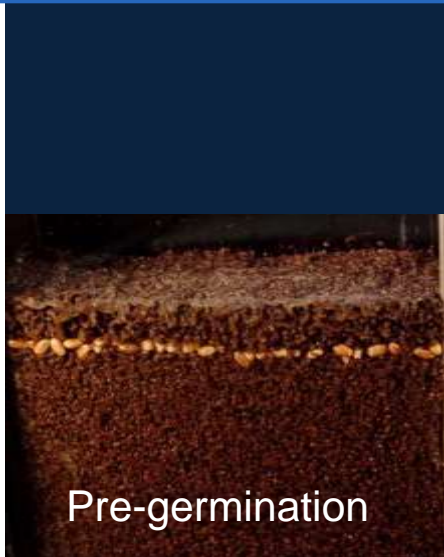


**After Rejuvra® Treatment
(Desirable Perennials Released)**

Application Timings and Tank-Mixes

April/May - July

Pre-germination



Pre-germination

Rejuvra

August - November

1-month before first germination to early post-emergence



Germination

Emergence starts after germination

Rejuvra + Plateau®

Adds post-germination and early post-emergence control, plus a second mode of action for resistance management

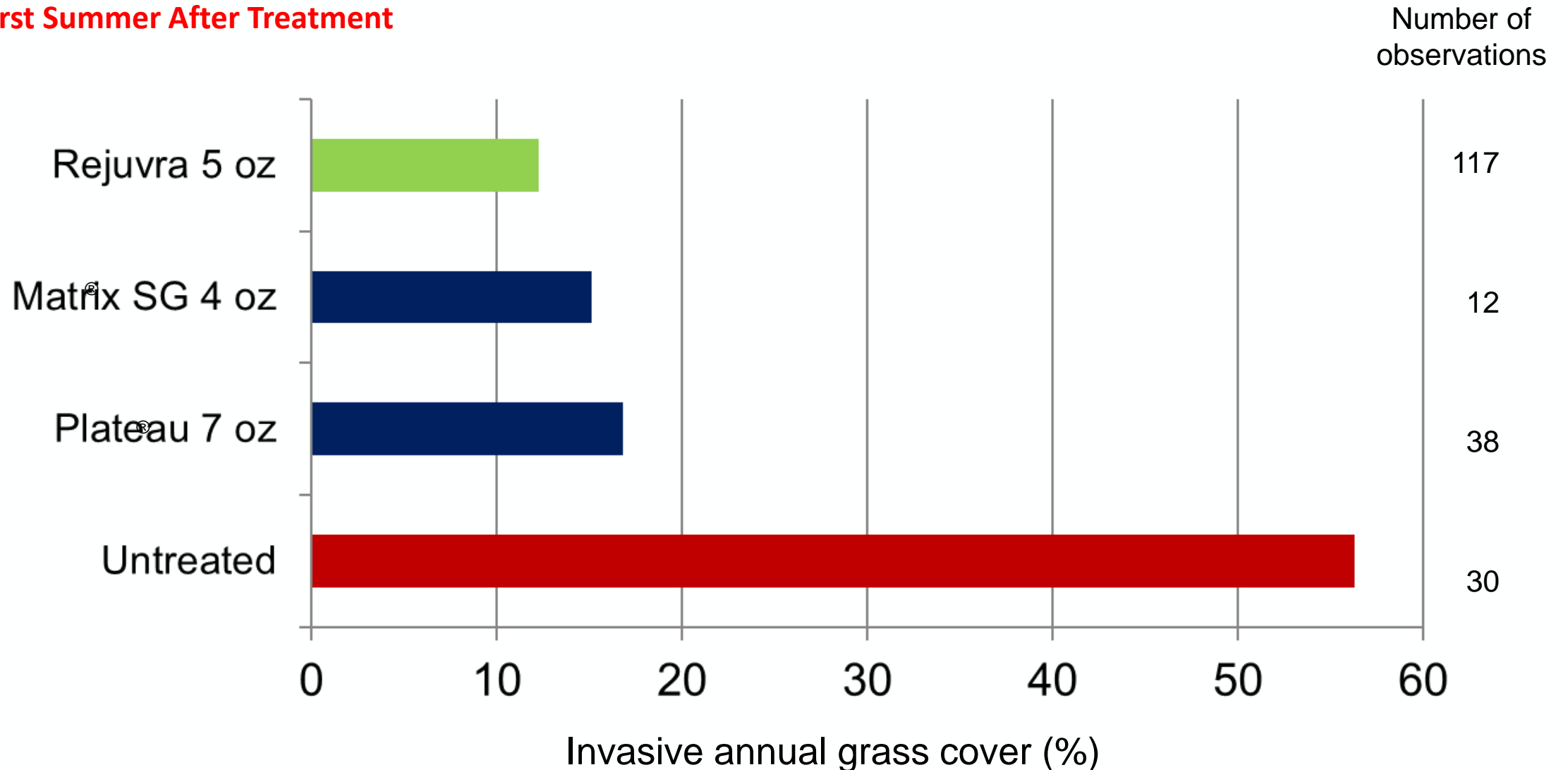
← Seed bank →

*Germination timings vary by year and are influenced by factors such as rainfall, temperature, altitude, aspect and annual grass species



Provides multi-year control of invasive annual grasses

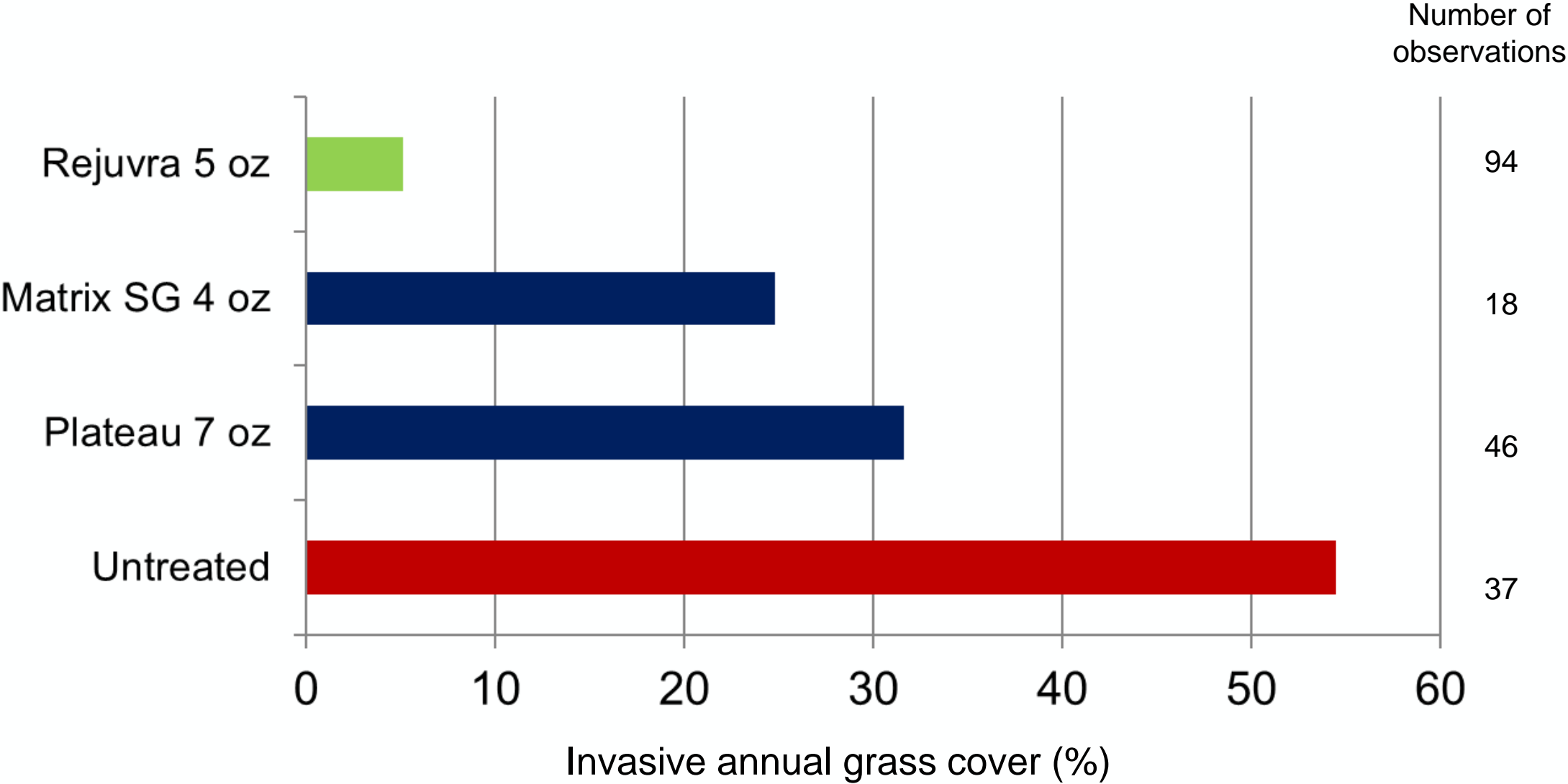
First Summer After Treatment



Data combined across all application timings and target invasive grass species. Rejuvra treatments include straight Rejuvra and tank mixes. Results for operational treatments depend on good coverage at treatment and other factors e.g. intercepting canopies, rainfall, thatch, terrain, livestock impacts and rate.



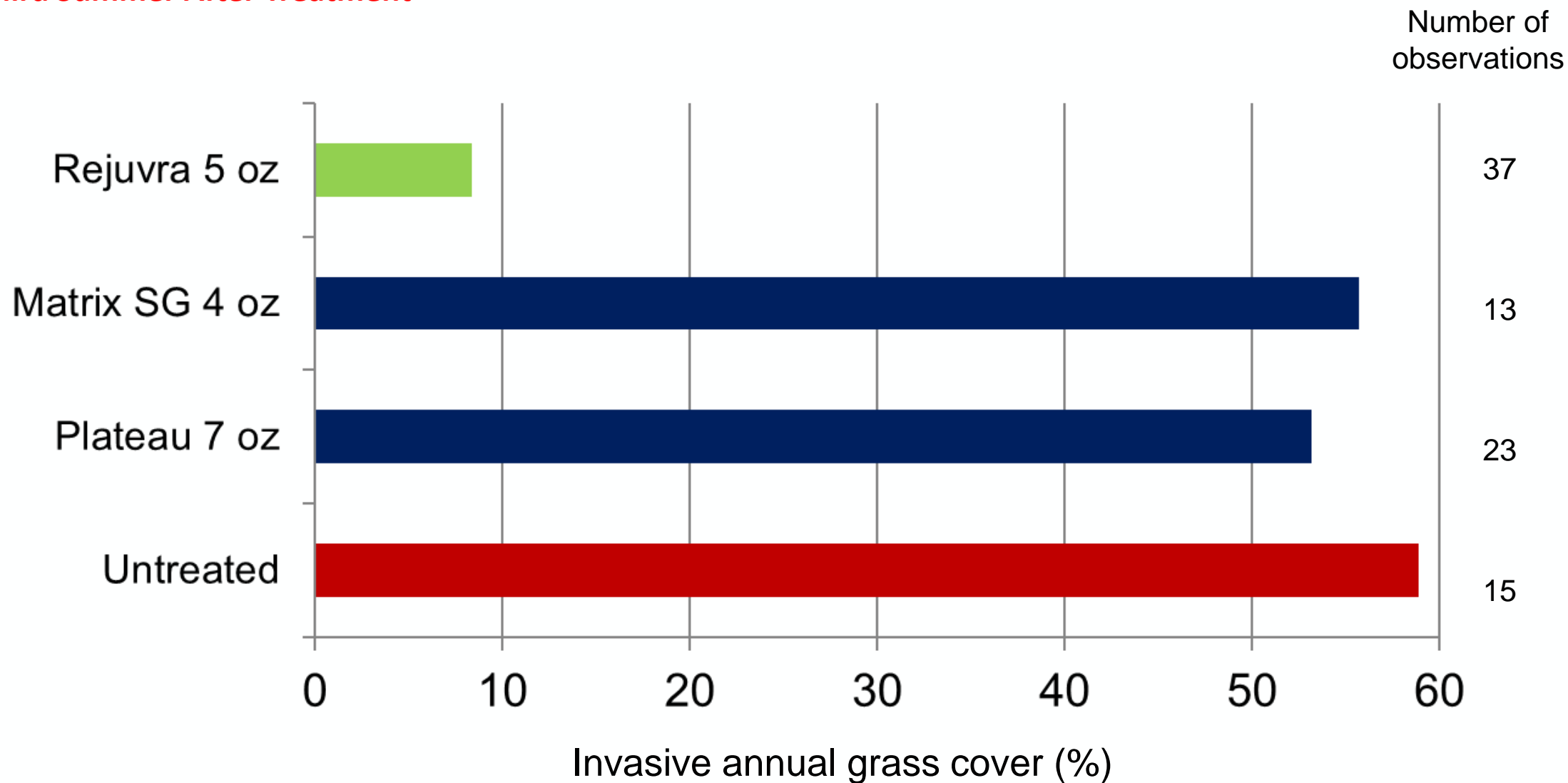
Second Summer After Treatment



Data combined across all application timings and target invasive grass species. Rejuvra treatments include straight Rejuvra and tank mixes. Results for operational treatments depend on good coverage at treatment and other factors e.g. intercepting canopies, rainfall, thatch, terrain, livestock impacts and rate.



Third Summer After Treatment

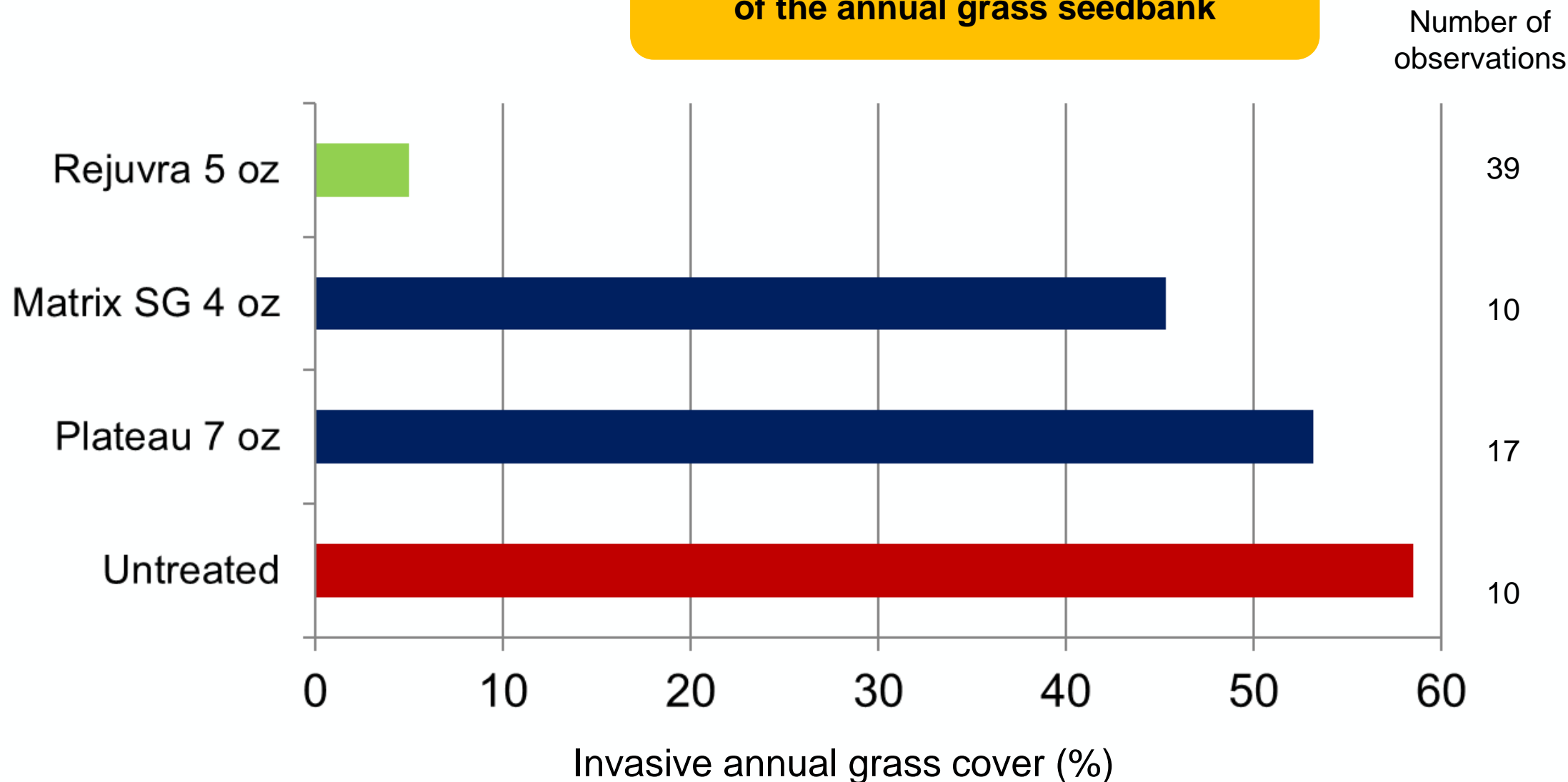


Data combined across all application timings and target invasive grass species. Rejuvra treatments include straight Rejuvra and tank mixes. Results for operational treatments depend on good coverage at treatment and other factors e.g. intercepting canopies, rainfall, thatch, terrain, livestock impacts and rate.



Fourth Summer After Treatment

**Multi-year control results in depletion
of the annual grass seedbank**



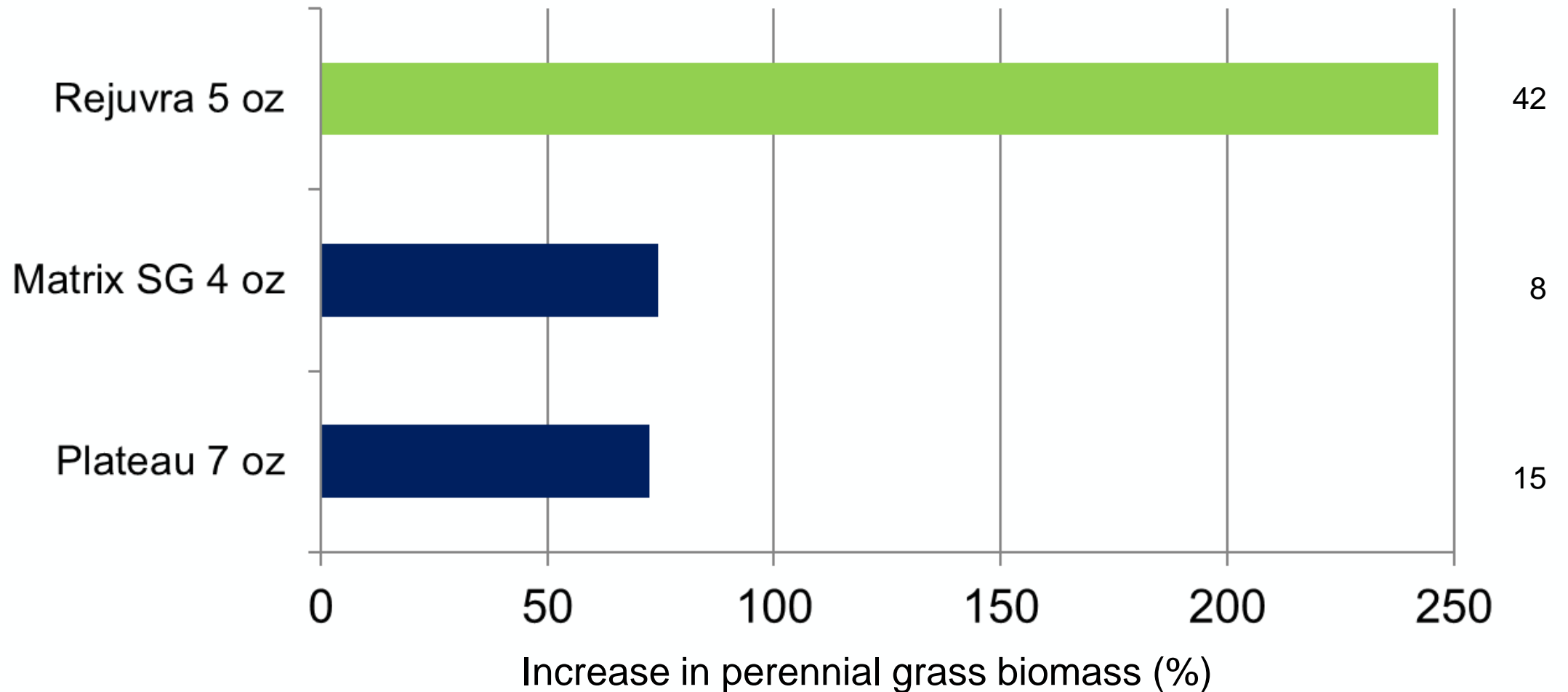
Data combined across all application timings and target invasive grass species. Rejuvra treatments include straight Rejuvra and tank mixes. Results for operational treatments depend on good coverage at treatment and other factors e.g. intercepting canopies, rainfall, thatch, terrain, livestock impacts and rate.



Increases perennial grass production

2.5 X increase in perennial grass production

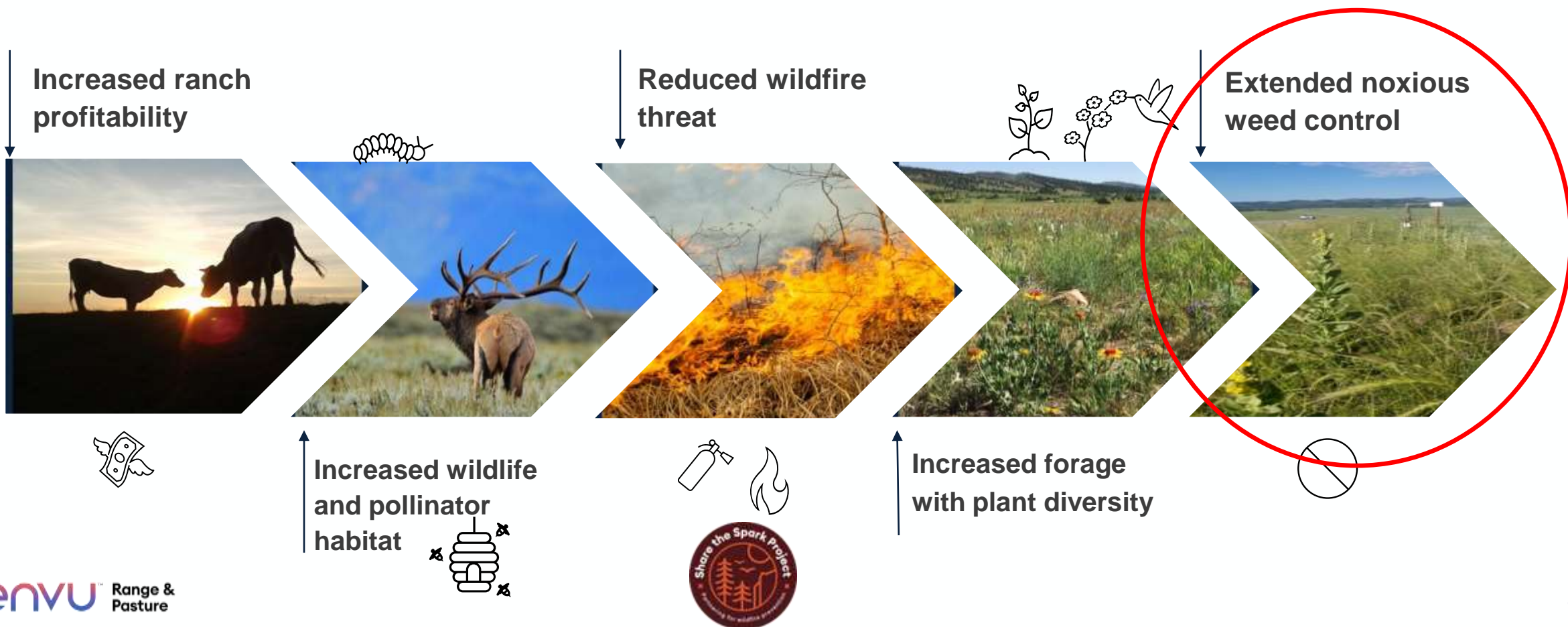
Number of observations



Second summer after treatment. Data combined across all application timings and target invasive grass species.

Rejuvra treatments include straight Rejuvra and tank mixes. Perennial grass response is variable and dependent on individual site conditions.

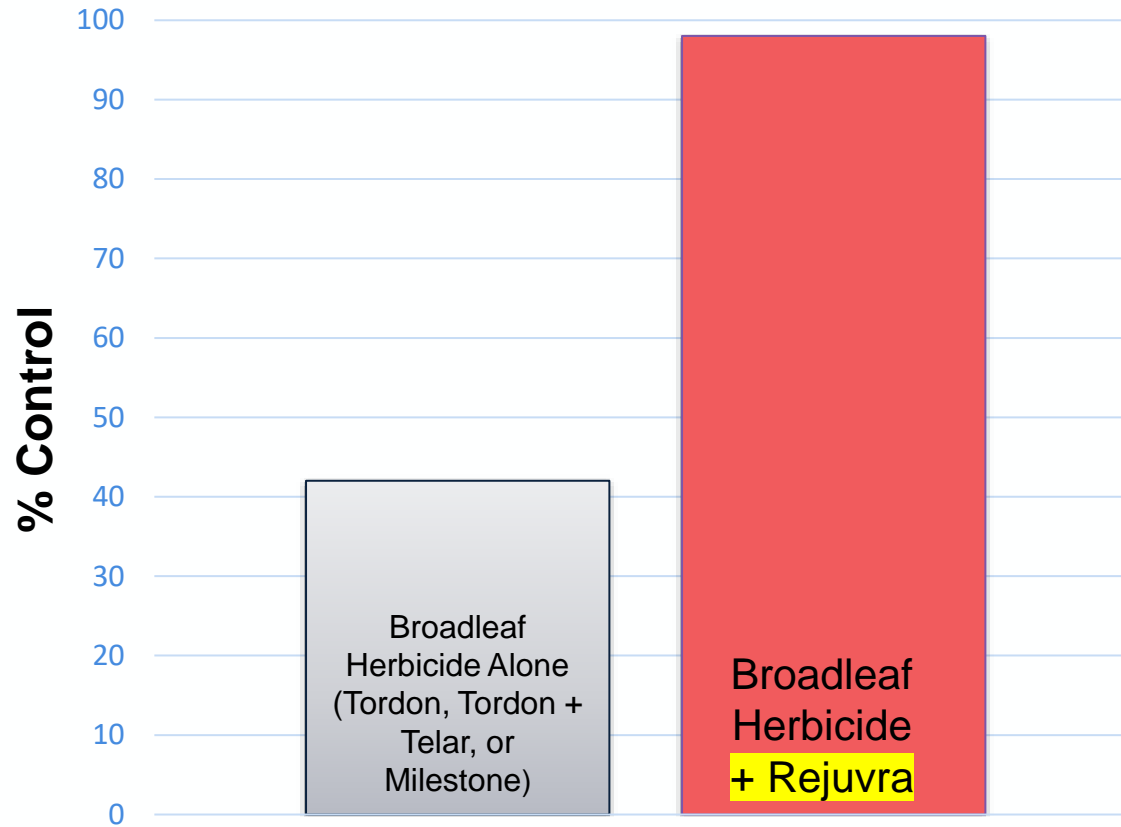
REJUVRA[®]....



Extended Noxious Broadleaf Control with Rejuvra Tank-Mixes

Control ratings 3rd summer after treatment, averaged over 9 studies (CO, WY, MT)

Species: Common mullein, Dalmatian toadflax, spotted knapweed



1. Broadleaf Herbicide - eliminates the actively growing weeds to stop seed production
2. Rejuvra Tank-Mix - minimizes reinfestation from the seed by eliminating the seed bank

Extending Control of Biennial and Perennial Seedlings

Species such as common mullein, Dalmatian toadflax, diffuse knapweed ...

3 Years after treatment



Tordon 1 qt/A +
Rejuvra 7 oz/A

Tordon 1 qt/A



Non-treated
(Diffuse knapweed, mullein,
Dalmatian, thistles)

Rejuvra® + Milestone + Telar
(3rd Season After Treatment)



Tordon
2 years after treatment



Tordon + Rejuvra
2 years after treatment



- Clopyralid
 - > 3.0 lb ae/gal
 - > Water soluble amine
 - > Non-volatile
 - > MOA: Growth regulator
- Signal word: Caution
- Use sites include:
 - > Non-Cropland Areas
 - > **Conifer and Tree Plantations**
 - > **Christmas trees**
 - > Range and Pasture, Hay
 - > Natural Areas
- Use rates 6-21 fl oz/A
- No grazing restrictions



Dow AgroSciences

Solutions for the Growing World

Noxious Weed Applications



- Transline or Sonora
- We have some Generic Sonora in 1 gallon jugs

Transline conifer release non treated



Transline conifer release 16 oz/a over growing conifers



Aminopyralid

Weeds / Forbs

- Milestone
- Use sites
- Pasture rangeland
- Natural areas, open spaces
- Recreation areas, trails, trailheads
- Wildlife areas, and openings



Milestone[®] Herbicide

Canada thistle control – 1 year after treatment



Milestone 7 fl oz/A

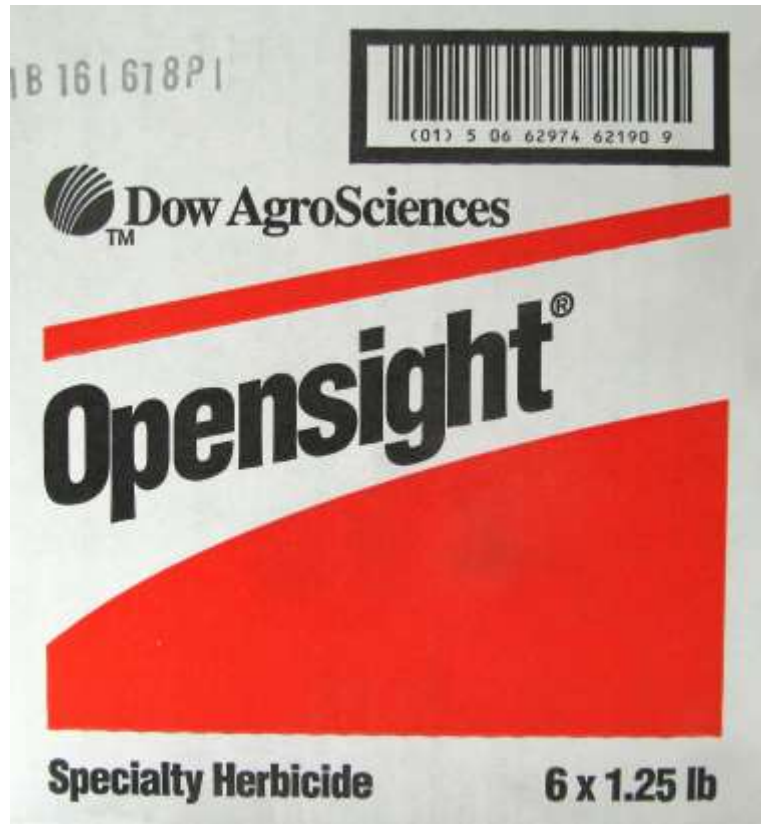
Why has Milestone worked so well?

Moves in the xylem and phloem



Roots of Canada thistle after growing in root box from 1 six-inch cutting for one summer— courtesy of Dr. Phil Westra, Colorado State University

Aminopyralid + Metsulfuron methyl Weeds & Brush



Species Controlled



- **Over 160 weeds listed on label**
- **General weeds**
 - Horsenettle, bedstraw, ragweed's, horseweed (maretail), goldenrods, spiny amaranth, dandelion, wild carrot, ironweed, annual broomweed, biennial thistles
- **Noxious weeds**
 - Bull thistle, Canada thistle, Italian thistle, Scotch thistle, buttercup, sulfur cinquefoil, hawkweeds, knapweeds, common tansy, tansy ragwort, poison hemlock, pigweed, hoary cress (whiteweed), houndstongue, common mullein, *Sericea lespedeza*
- **Brush**
 - Buckbrush, locust (black and honey), blackberry, gorse, hawthorn, poplar, salmonberry, Scotch broom, thimbleberry, dewberry, rose spp., wisteria, tree of heaven and mimosa.



Untreated Plot – Mix of houndstongue
and Canada thistle



Opensight 2.5 oz/A applied at mid-
bolt early bud

HighNoonTM

HERBICIDE



A Closer Look at HighNoonTM herbicide



Lose a Pound of Weeds, Grow a Pound+ of Grass



- ✓ **Extend the Grazing Season**
 - Shorten hay-feeding season.
- ✓ **Reduce Reliance on Purchased Feed**
 - Grazed forage is the cattle producer's lowest-cost feed source.
- ✓ **Increase Rest Periods in Rotational Grazing Programs**
 - Enhance the land resource long term.

Product Attributes

Flexible Use Sites

Use in a Broad Range of Sites:

- ✓ Rangeland
- ✓ Permanent Grass Pastures
- ✓ Non-crop areas
- ✓ Natural Areas

Product Attributes

HighNoon™
HERBICIDE

Flexible Use Rates

Broadcast (R&P):

16-20 fl. oz rate Controls Most Weeds

Broadcast (TVC):

20-40 fl. oz rate Controls Most Weeds

Non-Restricted

- ✓ Favorable Environmental profile
- ✓ Also, does Not contain 2,4-D or Dicamba

Product Attributes

Peace of Mind

- Practically Non-Volatile
- Low Odor 😊
- Safe on Grass
 - Above & Below Ground

Common Name				
	daisy, oxeye ^{a, b}	knapweed, spotted ^{a, b}	thistle, plumeless ^{a, b}	lespedeza, annual
	dandelion, common ^a	lady's thumb	thistle, woolly distaff ^{a, b}	loosestrife, purple ^{a, b, c, e}
	dock, broadleaf ^a	lambsquarters, common ^a	tickclover	licorice, wild
	dock, curly ^{a, b}	lettuce, prickly ^a	vervain, blue ^a	marijuana ^{a, b}
actinomeris, wingstem	evening primrose, cutleaf ^a	marshelder, annual ^a	vervain, hoary ^a	mayweed, stinking ^{a, b}
amaranth, spiny ^a	falsedandelion, Carolina ^a	mayweed, scentless	vetch, common ^a	medic, black ^a
amaranth, palmer	fiddleneck, common	mint, perilla	Rat	Mexican-tea
bedstraw	fleabane, annual ^a	nightshade, silverleaf ^f		mimosa
beggarticks	fleabane, hairy	parsnip, wild ^{a, b}	beebalm, pony ^{a, b} (horse mint)	mugwort
broomweed, annual ^a	gumweed, curlycup	pepperweed, Virginia	blackbrush ^{a, f}	mullein ^e
burdock, common ^{a, b}	hawkweed, orange ^{a, b}	plantain, broadleaf ^a	buffalo bur	oxtongue, bristly
buttercup, hairy ^a	hawkweed, yellow ^{a, b}	plantain, buckhorn ^a	bullnettle, Texas ^f	partridgepea ^a
buttercup, tall ^{a, b}	hemlock, poison	ragweed, common ^{a, b}	camelthorn	pea, swainson
chamomile, scentless	henbit ^a	ragweed, lanceleaf	cat's ear	pokeweed, common
caraway ^{a, b}	horsenettle, Carolina ^{a, b}	ragweed, western	camphorweed ^a	povertyweed
carrot, wild ^{a, b}	horsenettle, western	sicklepod ^a	coneflower, upright prairie ^a	pricklyash, lime [†]
cinquefoil, hoary	horseweed ^a	smartweed, Pennsylvania	fireweed	puncturevine
cinquefoil, sulfur ^{a, b}	ironweed, tall	sneezeweed, bitter ^a	geranium, Carolina	redbud
chicory ^{a, b}	ironweed, western	speedwell, heath	henbane, black	ragweed, false
chickweed, common ^a	jimsonweed ^{a, b}	Spanish needles	hogweed, giant ^{a, b}	ragwort, tansy ^{a, c}
clover, sweet	knapweed ^{a, b}	starthistle, yellow ^{a, b, c}	horehound [†]	rush skeletonweed
clover, white	knapweed, brown ^{a, b}	sunflower, common ^a	indigo, blue	trefoil, birdsfoot
cocklebur ^a	knapweed, diffuse ^{a, b}	teasel ^a	kudzu ^{a, b}	sida, prickly [†]
croton, woolly ^{a, b}	knapweed, Russian ^{a, b}	thistle, blessed milk	lespedeza, annual	sowthistle, annual
croton, Texas		thistle, bull ^{a, b}		sowthistle, perennial ^{a, b}
croton, tropic		thistle, musk ^{a, b}		sowthistle, prickly ^a
crownvetch ^a		thistle, Canada ^{a, b}		St. Johnswort, common ^{a, b}
cudweed, purple		thistle, Italian ^{a, b}		
		thistle, Scotch		
		soda apple, tropical ^{a, b}		
		wisteria		
		wormwood, absinth ^{a, b}		
		yarrow, common ^a		

Additional Weed Spectrum



Wild carrot
(*Daucus carota*)



Western Ironweed
(*Vernonia baldwinii*)



Tall ironweed
(*Vernonia gigantea*)



Buckhorn plantain
(*Plantago lanceolata*)



Common caraway
(*Carum carvi*)



Annual Marshelder
(*Iva annua*)



Poison Hemlock
(*Conium maculatum*)



Croton
(*Croton capitatus*)

COMMON MULLEIN CONTROL (30 DAYS AFTER TREATMENT)

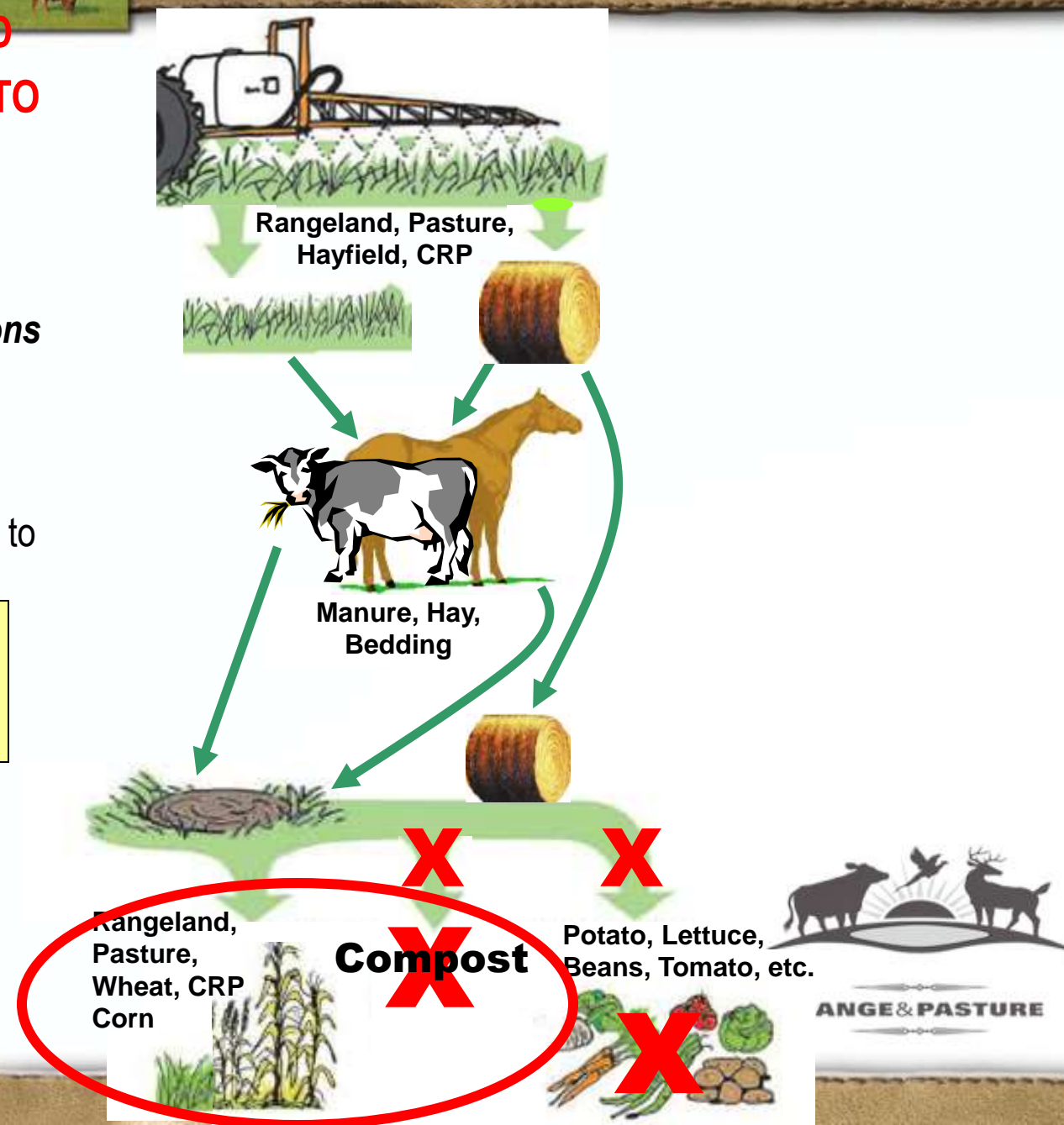


Recently Approved Label Pictogram

Forage and Manure Management

IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

- Carefully read the section “**Restrictions in Hay or Manure Use .**”
- It is mandatory to follow the “**Use Precautions and Restrictions**” section of this label.
- Manure and urine from animals consuming grass or hay treated with this product may contain enough aminopyralid to cause injury to sensitive broadleaf plants.
- Hay can only be used on the farm or ranch where product is applied unless allowed by supplemental labeling.
- Consult with a Dow AgroSciences representative if you do not understand the “Use Precautions and Restrictions”.
Call [1-(800) 263-1196] Customer Information Group.



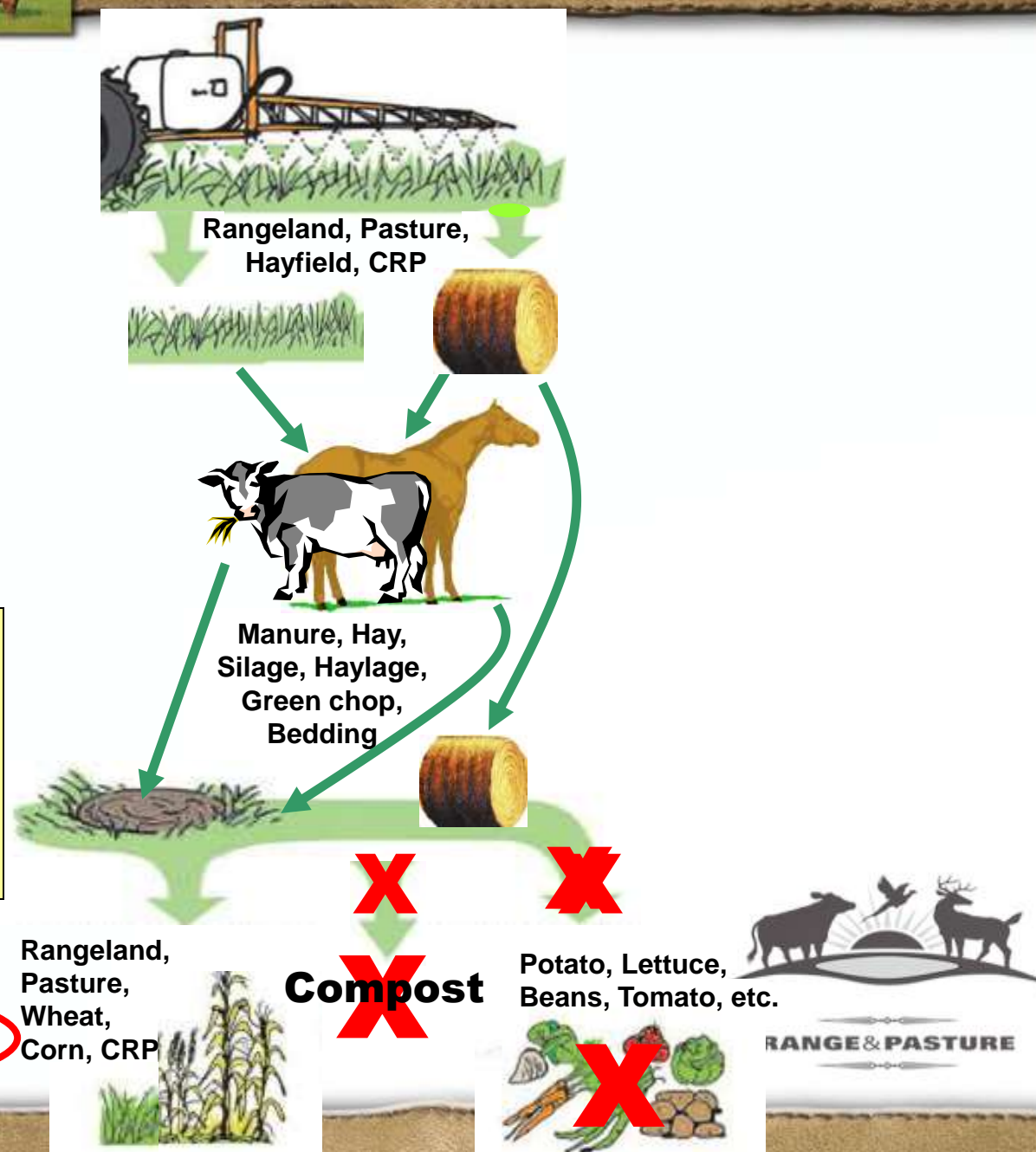


Approved Specimen Label – Emphasized Points

- **For 18 months following treatment:**
- Do not use on grasses grown for hay intended for export **outside the United States.***
- **Aminopyralid containing products are PROHIBITED from use on hay that will be distributed or made available for sale off the farm or ranch where harvested unless allowed by supplemental labeling.**
- **Aminopyralid containing products are PROHIBITED from use on silage, haylage, baylage and green chop unless allowed by supplemental labeling.**
- **Do not move hay made from grass treated with Aminopyralid off farm unless allowed by supplemental labeling.**
- Do not use hay or straw from areas treated with Milestone® or manure from animals feeding on hay treated with Milestone® in compost.
- Do not use on grasses grown for seed production.

IMPORTANT USE PRECAUTIONS AND RESTRICTIONS TO PREVENT INJURY TO DESIRABLE PLANTS

- It is mandatory to follow the “**Use Precautions and Restrictions**” section of this product label.
- Manure and urine from animals consuming treated grass or forage may contain enough aminopyralid to cause injury to sensitive broadleaf plants.
- The Applicator must provide the land manager with a copy of the Dow AgroSciences Stewardship instructions regarding uses of forage from areas treated with aminopyralid.
- A printable version of the stewardship instructions can be found at www.aminopyralidstewardshipinstructions.com





Price Per Acre

- Milestone 5 oz per acre \$12.85 plus 2,4-D cost if you add this
- Opensight 2.5 oz per acre \$15.31 includes . 4 oz Metsulfuron and 5 oz Milestone
- Highnoon 16 oz per acre \$11.75 includes .0062 lbs florpyrauxifen-benzyl(Rinskor) and 5 oz Milestone
- Add .5 oz Escort \$2.00 per acre to make a 3-way tankmix

Applications Under Trees Milestone, Opensight, Highnoon, Tordon 22K

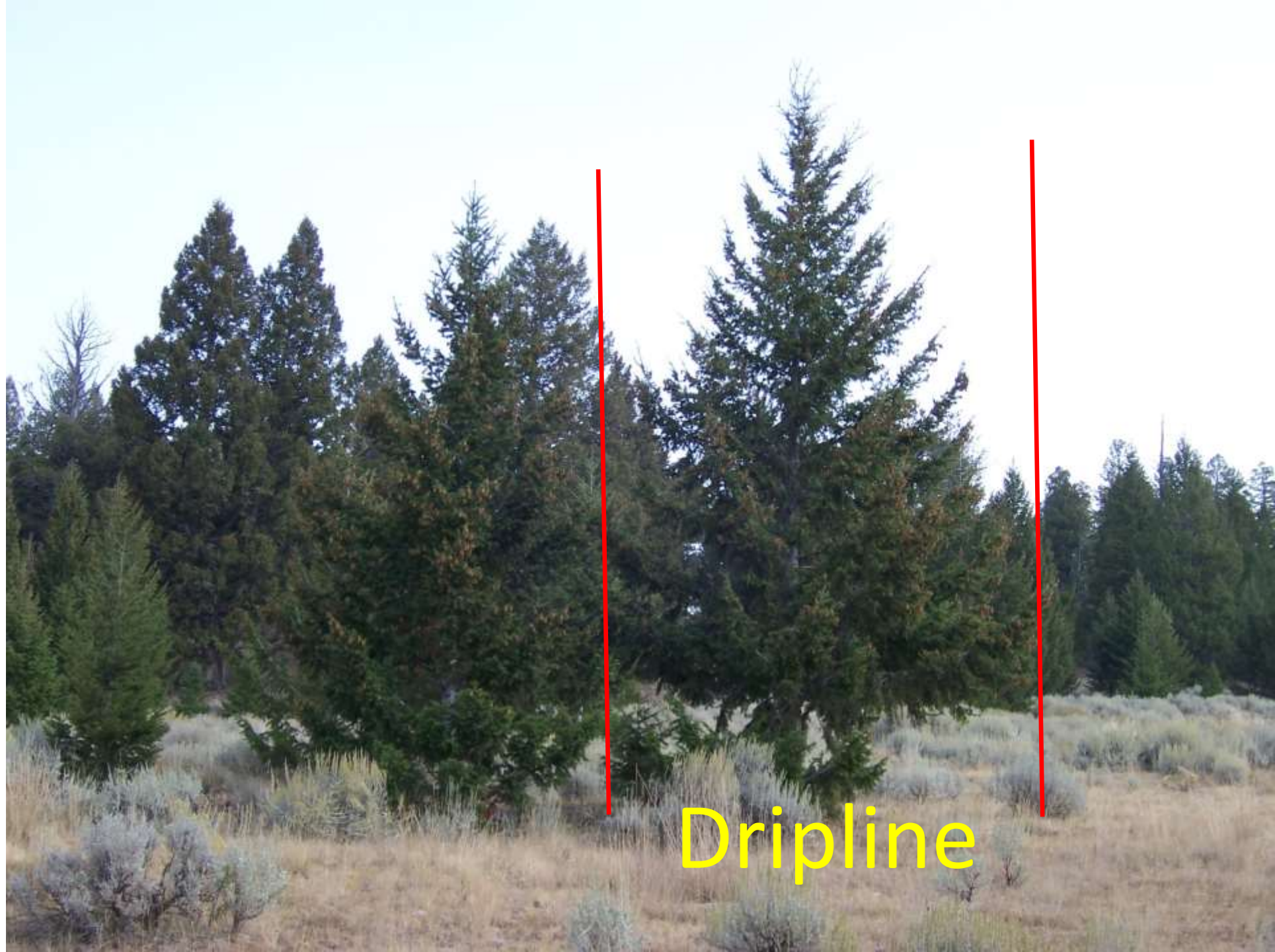


Opensite

3.3 dry OZ

Tordon 22K

32 oz.





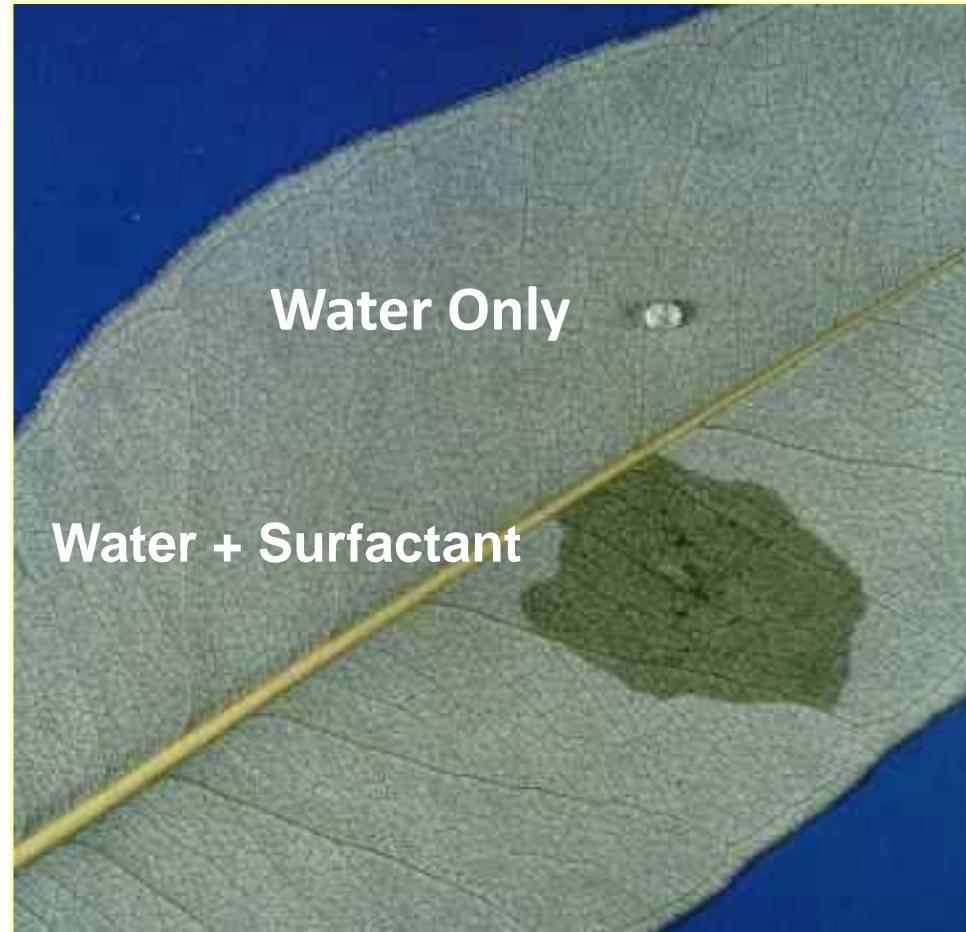
Too close?



Dripline Use Precaution \neq Tree safety
Max tree safety = height / radius distance

Surfactant Effects

- Surfactant reduces surface tension to 20-40 dynes/cm.
- Droplets spread over leaf, penetrate hairy surface
- Increased leaf contact
- Increased spray activity



Leaf Pubescence



Ideas to Grow With®

Droplet on Hairy Leaf

Without Surfactant



Droplet on Hairy Leaf

With Surfactant





SYL-TAC-EA®

Penetrant, Spreading, Wetting

Features

- For use with pesticides that benefit from the characteristics of an organosilicone
- Premium organosilicone surfactant plus ethylated seed oil blend
- Designed for use with herbicides, insecticides and/or fungicides
- Labeled for aquatic use
- NPE Free

Benefits

- Formulation provides excellent spreading, wetting and penetration characteristics
- Enhances insecticide, fungicide and herbicide uptake, including translaminar movement of certain active ingredients
- Reduces phytotoxicity potential because of lower solvency of the ESO (Kauri-butanol value)
- Results in increased efficacy of the pesticide
- Ability to use with aquatically labeled pesticides
- Excellent safety and handling characteristics

Conium maculatum



Bruce Barnes



POISON HEMLOCK

APIACEAE

- Escort- 1 oz acre
- Highnoon 16 oz per acre
- Opensight 3.3 oz per acre
- Surfactant – Syl-Tac



Centaurea diffusa



DIFFUSE, MEADOW, AND SPOTTED KNAPWEED

ASTERACEAE

- Highnoon 1 pt/AC
 - Use caution around trees
 - Best long term control where conditions allow
- Transline/Sonora- 1 pt acre—tree safe
- Milestone – 5-7 oz per acre
- Apply from rosette to mid-bolt

Tanacetum vulgare



Bruce Barnes



WA State Noxious Weed Control Board

COMMON TANSY

Asteraceae

- Escort 1 oz
- Opensight 3 oz per acre
- Be sure to add Syl-Tac

Add 1-2 qt 2,4-D for broad spectrum control



WSNWCB



photo by Bruce Barnes



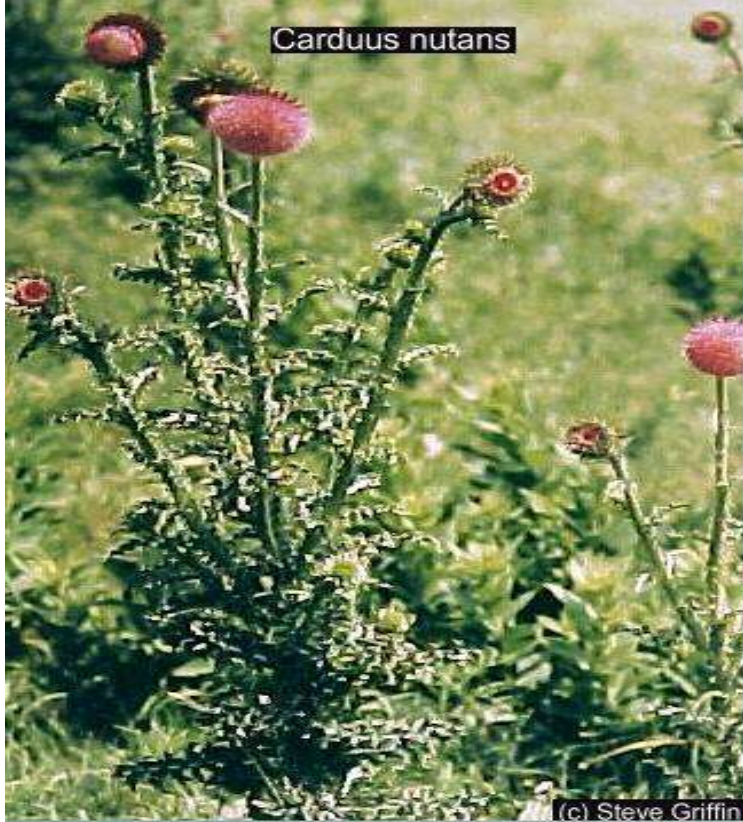
WA State Noxious Weed Control Board

CANADA THISTLE

ASTERACEAE

- Highnoon 16-20 oz per acre
 - Apply emergence to bud stage or fall regrowth
 - Transline/Sonora- 1 pint per acre Apply emergence to bud stage or fall regrowth
 - Better results without 2,4-D
- Milestone 5 – 7 oz per acre

Carduus nutans



(c) Steve Griffin



WA State Noxious Weed
Control Board

MUSK AND SCOTCH THISTLE

ASTERACEAE

- Highnoon 16-20 oz per acre Apply before bolting or in fall before freeze up
- Milestone – 5-7 oz per acre

Chondrilla juncea



WA State Noxious Weed
Control Board

RUSH

SKELETONWEED

ASTERACEAE

- Highnoon 16 -20 oz per acre
 - Apply late fall or spring from full emergence to 4" bolt (don't wait too long)
 - Great results from fall applications
 - Provides good residual
- Transline/Sonora- 1 pt per acre
 - Same timing as above (watch rosette leaves)
- Milestone – 7 oz per acre fall or spring

Yellow Hawkweed



MEADOW, ORANGE HAWKWEED

ASTERACEAE

- Highnoon 16 oz per acre
 - Apply full emergence to early bloom
- Milestone – 5-7 oz per acre
- Transline- 16 oz per acre

Addition of ammonium sulfate
has helped above 2-4 qts
per 100 Bronc Max

Cynoglossum officinale



(c) Steve Watts



Bruce Barnes



WA State Noxious Weed Control Board

HOUNDSTONGUE

Boraginaceae

- Escort 1 oz per acre
 - Add Weedmaster @ 1-2 qts per acre
- Opensight 3 oz per acre
- Syl-Tac surfactant as leaf is very hairy!

Cardaria draba



Perennial Whitetop/Hoary Cress

WA State Noxious Weed Control Board

HOARY CRESS

BRASSICACEAE

- “Easy” recommendation with S.U.’s
- Escort
 - Apply rosette to bloom stage
 - 1 oz/AC on Hoary Cress
 - Use silicone/blend surfactant (very waxy)
- Escort more consistent than 2,4-D (less AI)
- Opensight 3.3 oz per acre
- Use Syl-Tac

Hypericum perforatum



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ST JOHNSWORT

Clusiaceae

- Escort 1 oz + 1-2 qt Weedmaster + surfactant
- Opensight 3.3 oz per acre
- Use Syl-Tac

Equisetum arvense



photo by Karl Urban

FIELD HORSETAIL

Equisetaceae

- Telar DF 2 oz per acre
 - Apply in spring prior to 6 inch bolt
 - Rainfall needed to activate
 - Use Syl-Tac surfactant

LEAFY SPURGE

EUPHORBIACEAE

- Plateau/Panoramic- 8-12 oz acre
 - Higher rates increase grass damage
 - Use MSO plus nitrogen fertilizer source
 - Apply after light fall frost (Early Sept.- Early Oct.)
- Tordon 22K- 1-3qt acre or 1qt plus 1qt 2,4D
 - Apply at bloom stage



WA State Noxious Weed Control Board

(c) Robert A. Nicholson

Bruce Barnes

COMMON MULLEIN

Scrophulariaceae

- Escort 1 oz per acre Biennial weed, spray 1st years growth (rosette)
- Add 2,4-D for broad spectrum control
- Chaparral 3.3 oz per acre
- Use Syl-Tac surfactant

Linaria vulgaris



Bruce Barnes



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DALMATION, YELLOW TOADFLAX

SCROPHULARIACEAE

- Tordon 22K- 2 qt acre
 - Apply at bud to bloom stage
 - Use silicone/blend surfactant (waxy leaves)
- Telar- 2 oz acre
 - Apply bud to bloom or fall rosette stage
 - Surfactant use is critical
- Telar + Tordon 22K = TNT
- E-2 3-4 pints per acre has looked good too

READ AND FOLLOW ALL LABEL INSTRUCTIONS!

- The label is t

formative!


Personal Protective Equipment

Use Site

Active Ingredient

Signal Word

Specimen Label

 **Dow AgroSciences**

Dimension[®] 2EW

Specialty Herbicide

*Trademark of Dow AgroSciences LLC

Provides control of listed annual grasses and broadleaf weeds in established lawns, commercial sod farms, non-cropland and industrial sites, ornamental turf (including golf course fairways, roughs, tee boxes), field-grown nursery ornamentals and landscape ornamentals.

In the State of New York, this product may be used by commercial applicators only at a maximum rate of 9.0 pounds (active ingredient) per acre per year. In Nassau and Suffolk counties of New York, do not exceed 1 pint per acre (active ingredient) or 0.25 lb of active ingredient per acre.

Active Ingredient	
dithiopyr: 9,9'-dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinedicarbothioate	24%
Inert Ingredients	76%

Contains petroleum distillates
Contains 240 grams per liter or 2 lb active ingredient per U.S. gallon.
Product protected by U.S. Patent No. 4,692,164. Other patents pending.

EPA Reg. No. 62719-542

Keep Out of Reach of Children
WARNING AVISO

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

Do not get on skin or on clothing. Avoid contact with eyes. Wear protective clothing and gloves. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

Personal Protective Equipment (PPE):
Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category on an EPA chemical-resistance category selection chart.

WPS Uses: Applicators and other handlers who handle this product for any use covered by the Worker Protection Standard (40 CFR Part 170) – in general, agricultural plant uses are covered – must wear:

- Coveralls over short-sleeved shirt and short pants
- Chemical-resistant gloves ≥14 mils such as barrier laminate or butyl rubber
- Chemical-resistant footwear plus socks

WPS Uses: Mixers and loaders must wear:

- Coveralls over short-sleeved shirt and short pants
- Chemical-resistant gloves ≥14 mils such as barrier laminate or butyl rubber
- Chemical-resistant footwear plus socks
- Chemical-resistant apron

Non-WPS Uses: Mixers and loaders who handle this product for any use NOT covered by the Worker Protection Standard (40 CFR Part 170) – in general, agricultural plant uses are covered – must wear:

- Chemical-resistant gloves ≥14 mils such as barrier laminate or butyl rubber

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them. 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.

Engineering Controls
When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the 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:

The background of the slide is a photograph of a dense evergreen forest. In the foreground, several tall, green coniferous trees are visible. The middle ground and background consist of rolling hills and mountains covered in a thick forest, with some peaks appearing hazy due to atmospheric perspective.

Questions?
jfields@wilburellis.com