

Medusahead - Chemical Control

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Medusahead Impacts

Numerous negative impacts to plant communities, wildlife, livestock, and economics

Reduced native herbaceous functional groups, large perennial grass and sagebrush cover, species richness and diversity

High silica content discourages grazing (80%) and allows heavy thatch buildup

Awns can injure livestock

Increases fire cycle

Invades native communities, even displaces downy brome

Huge potential range for expansion



Medusahead Detection

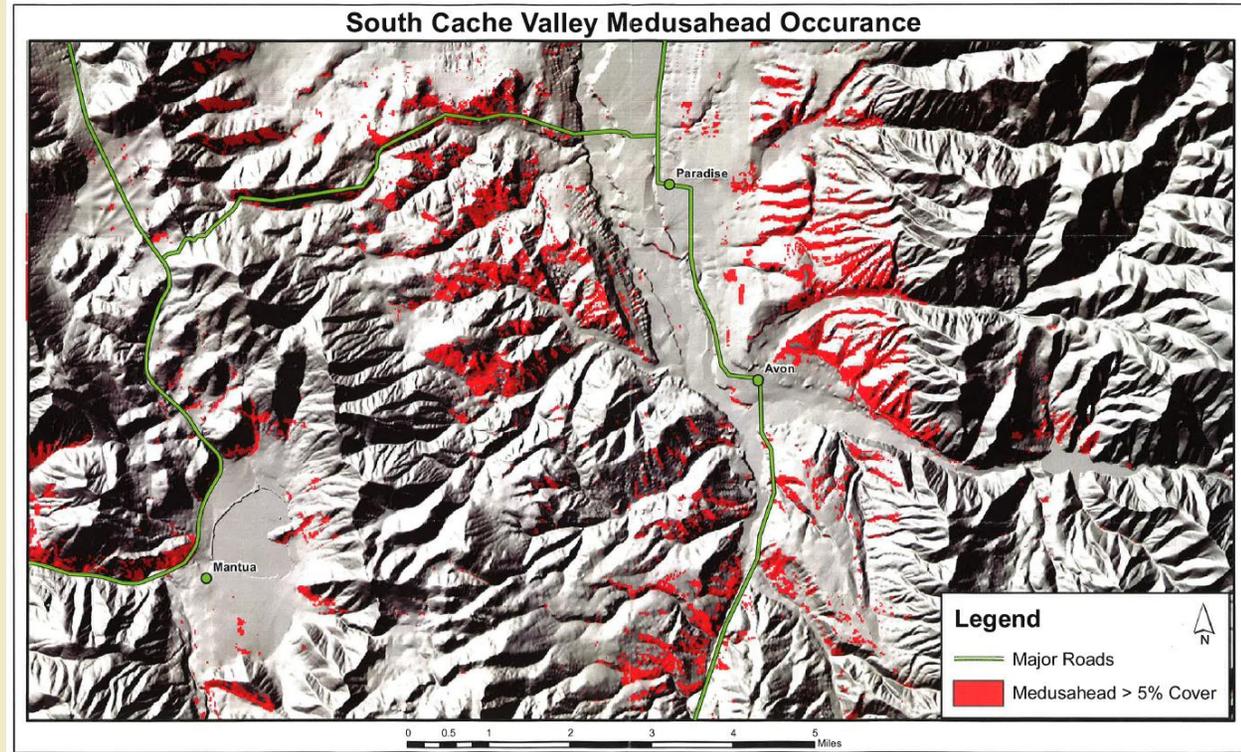
In Cache and Morgan Counties found mainly on south facing slopes.

Patches appear lime green during early spring and summer.

At maturity patches also have unique color and reflectance.

Unique color plus preferred habitat has been used to look for new infestations

Species with similar signature is feral rye.



Map generated by Eric Sant, funded by the South Cache Weed Prevention Area and the Blacksmith Fork Conservation District.

Medusahead Biology

Taeniatherum caput-medusae
= *Elymus caput-medusae*

Winter annual grass - up to 2 ft

Densities upward of 500/ft²

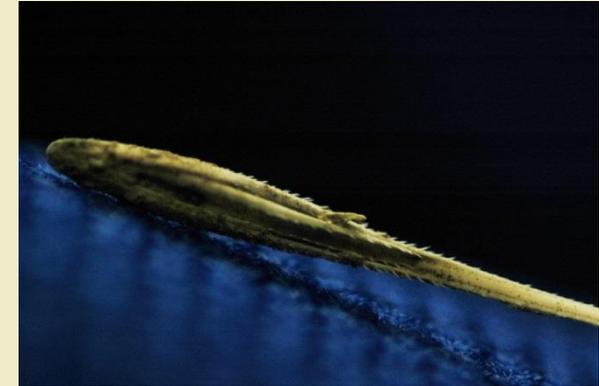
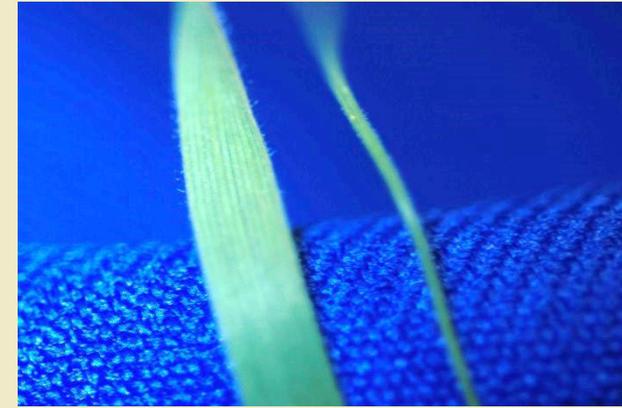
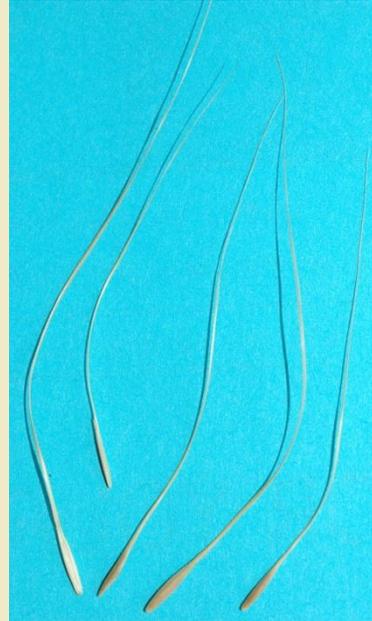
Narrow leaves (1 to 3 mm), with fine hairs

Light green color, especially with seed heads

Flower head 0.6 to 2 inch long producing 8 to 15 seeds per spike

Awns 1 to 3 inch, straight when green and twisting as they dry, barbed

Stiff florets remain attached to head after seed shatter



Medusahead Biology and Ecology

Most seed shatters by mid-summer

Forms dense persistent thatch layer

Germinates in fall dependent on moisture - early as September, delayed until spring in dry fall?

Can survive dry cycles after germination – adventitious roots

Root development occurs during cold winter months

Research suggest seed longevity is fairly short



Considerations of Chemical Control of Medusahead

Two points of attack:

- Seed production
- Plant germination and establishment

Herbicides:

- Non-residual
- Residual

Herbicide Use Pattern:

- Knock out seed production
- Prevent seed germination
- Both

Site Condition:

Protection vs. Revegetation





Past Work on Medusahead Management

**Effects of Herbicides and
Burning on Medusahead
Control and Establishment
of Desirable Forages on
Upland Ranges**

M.S. Thesis

John M. Squire

1993



Evaluated combinations of burning, seeding crested wheatgrass or pubescent wheatgrass, and herbicides.

Herbicides available were Roundup and Escort applied spring or fall.

Past Work on Medusahead Management

What John found:

Spring or fall Roundup controlled medusahead

Burning did not improve control.

Without residual herbicides, broadleaf weeds became prevalent.

Burning enhanced perennial grass establishment in one trial and had the opposite effect in the other.



Past Work on Medusahead Management

**Effects of Herbicides,
Burning and Reseeding
Desirable Forages for
Control of Medusahead**

M.S. Thesis

Travis M. Osmond

2003



All plots were burned. Seedings included: Hycrest wheatgrass, pubescent wheatgrass, a three species mix, forage kochia, and a combination of two grasses with alfalfa.

Herbicides used were Roundup + Escort, Oust, and Plateau applied spring or fall.

Past Work on Medusahead Management

What Travis found:

Oust had the highest control in one year.

Spring Plateau had the highest control the second year.

All herbicides decreased existing perennial grass cover.

Dry conditions prevented seeded perennial grass establishment.



Past Work on Medusahead Management

My Work in Oregon:

Plateau (8 oz) was extremely effective in controlling Medusahead.

Fall applications were better for lower rates of Oasis.

Deep soils and limited rainfall.

Spring Roundup allowed downy brome to invade the medusahead the following year.



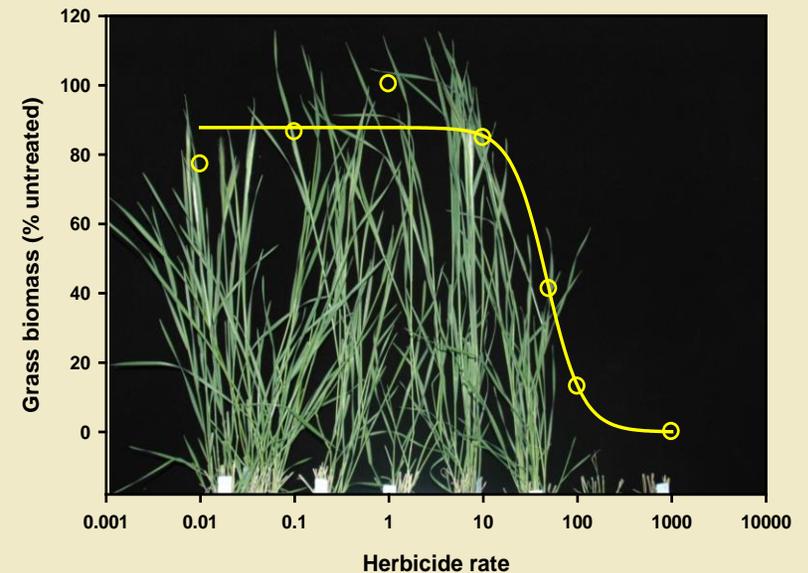
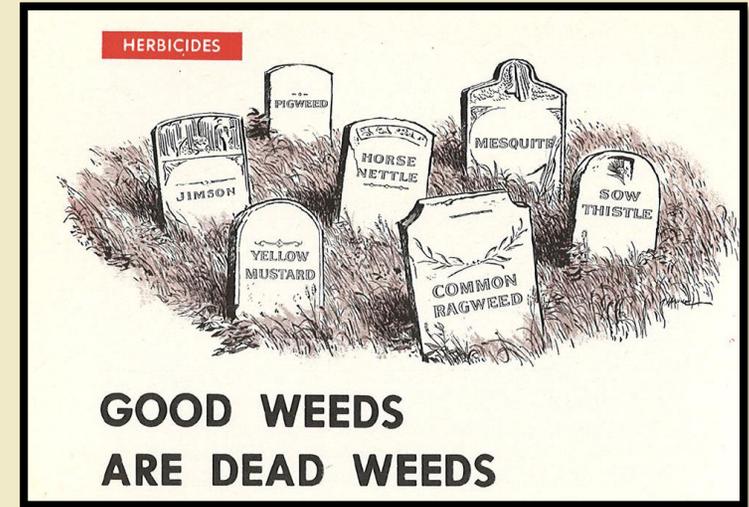
Many Questions Still Unanswered

Which herbicides are most effective?

How do different herbicides interact with other management?

How selective are the herbicides to desirable species, persistent and seeded?

What is the best use pattern both in time and in sequence to use herbicides?



Improving Herbicide Control of Medusahead

Herbicides

- Roundup
- Plateau
- Matrix
- Oust
- Landmark
- Milestone

Timings

- PRE or POST
- Spring or Fall

Long Term Control

- Existing vegetation
- Site management



Improving Herbicide Control of Medusahead

Herbicides

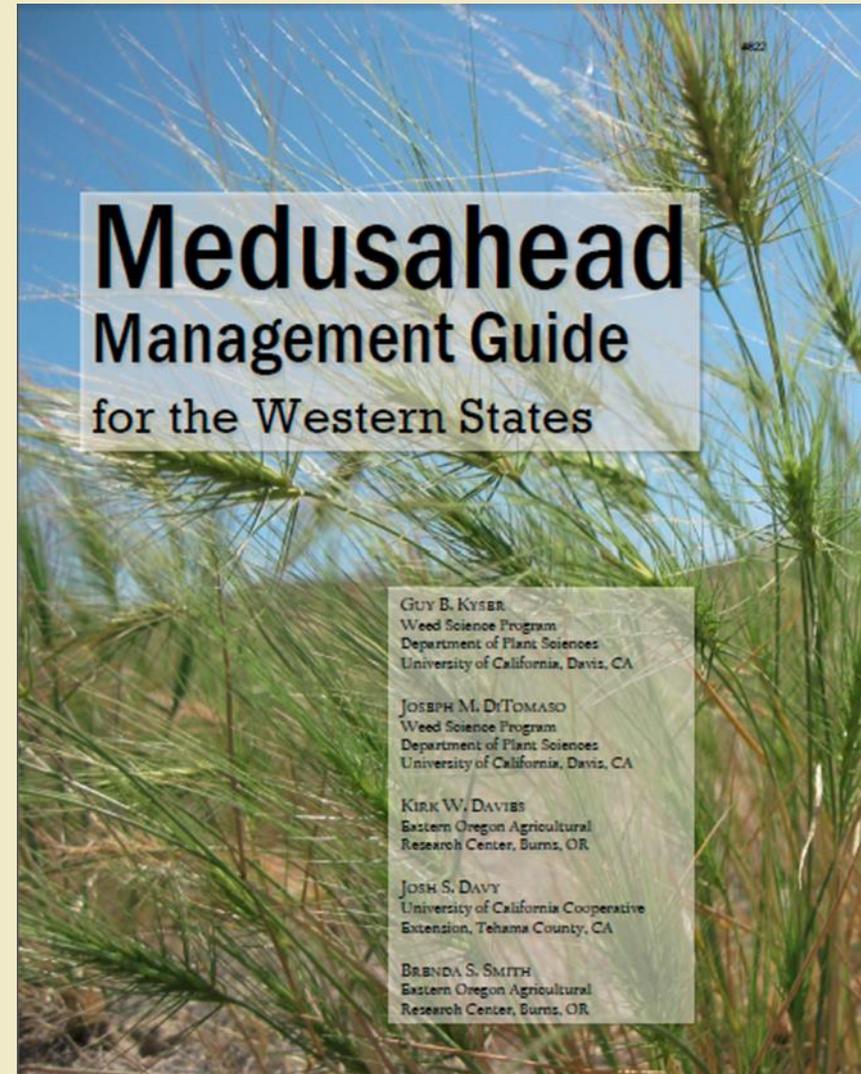
- Roundup
- Plateau
- Matrix
- Oust
- Landmark
- Milestone

Timings

- PRE or POST
- Spring or Fall

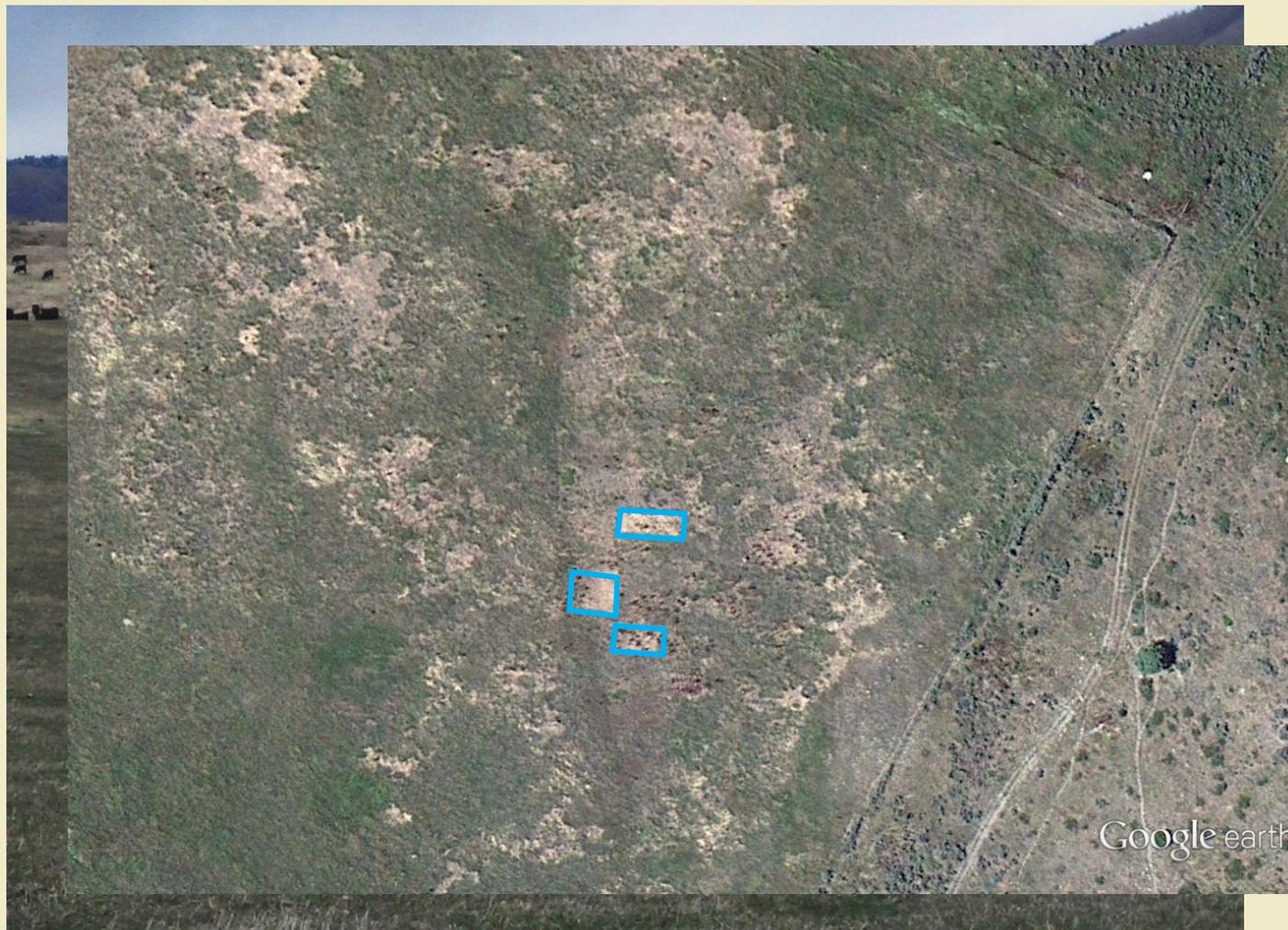
Long Term Control

- Existing vegetation
- Site management





Long Term Control, 2009-2013



Early Management is Critical



Medusahead Herbicide Trials in 2009

Two Trials in Cache Valley

Fall treatments: September 1, 2009

Spring treatment: June 2, 2010

Evaluations: July 9, 2010

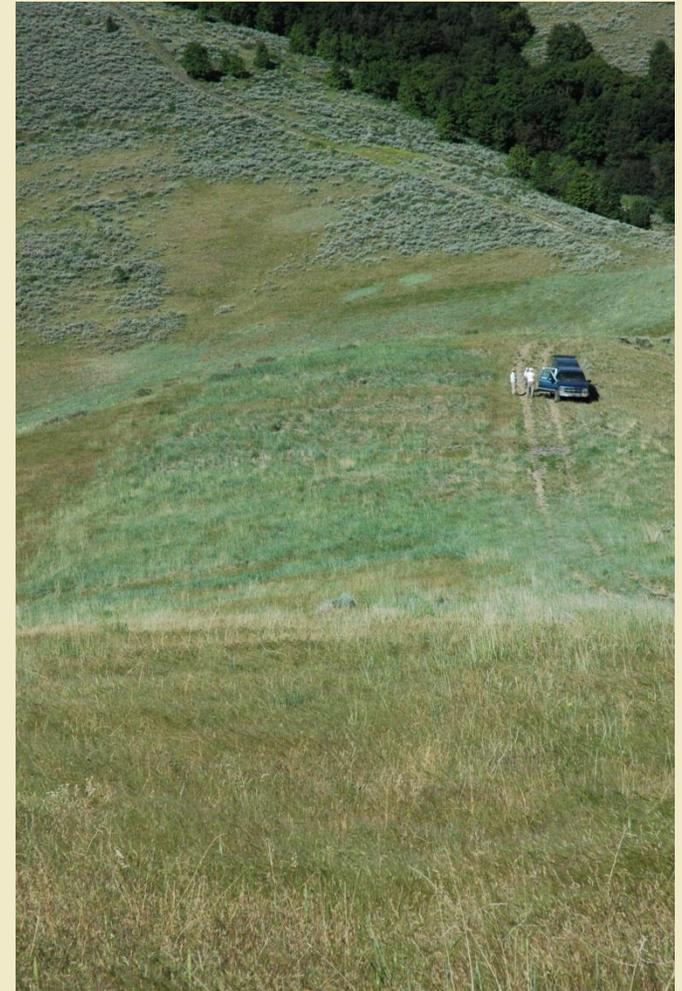
Treatments:

Plateau at 4.0, 6.0, 8.0, 10.0 fl oz

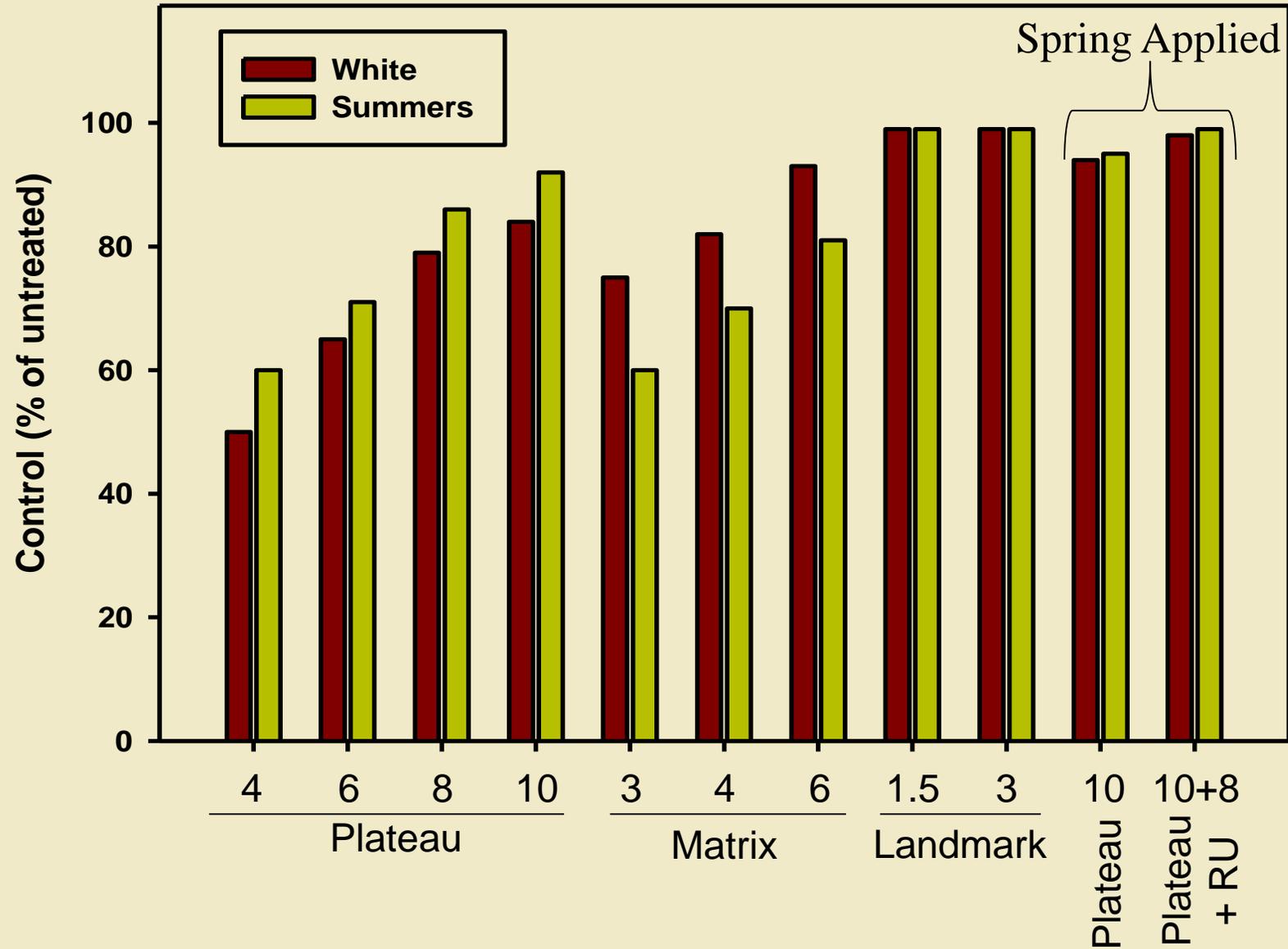
Matrix at 3.0, 4.0 and 6.0 oz

Landmark at 1.5 and 3.0 oz

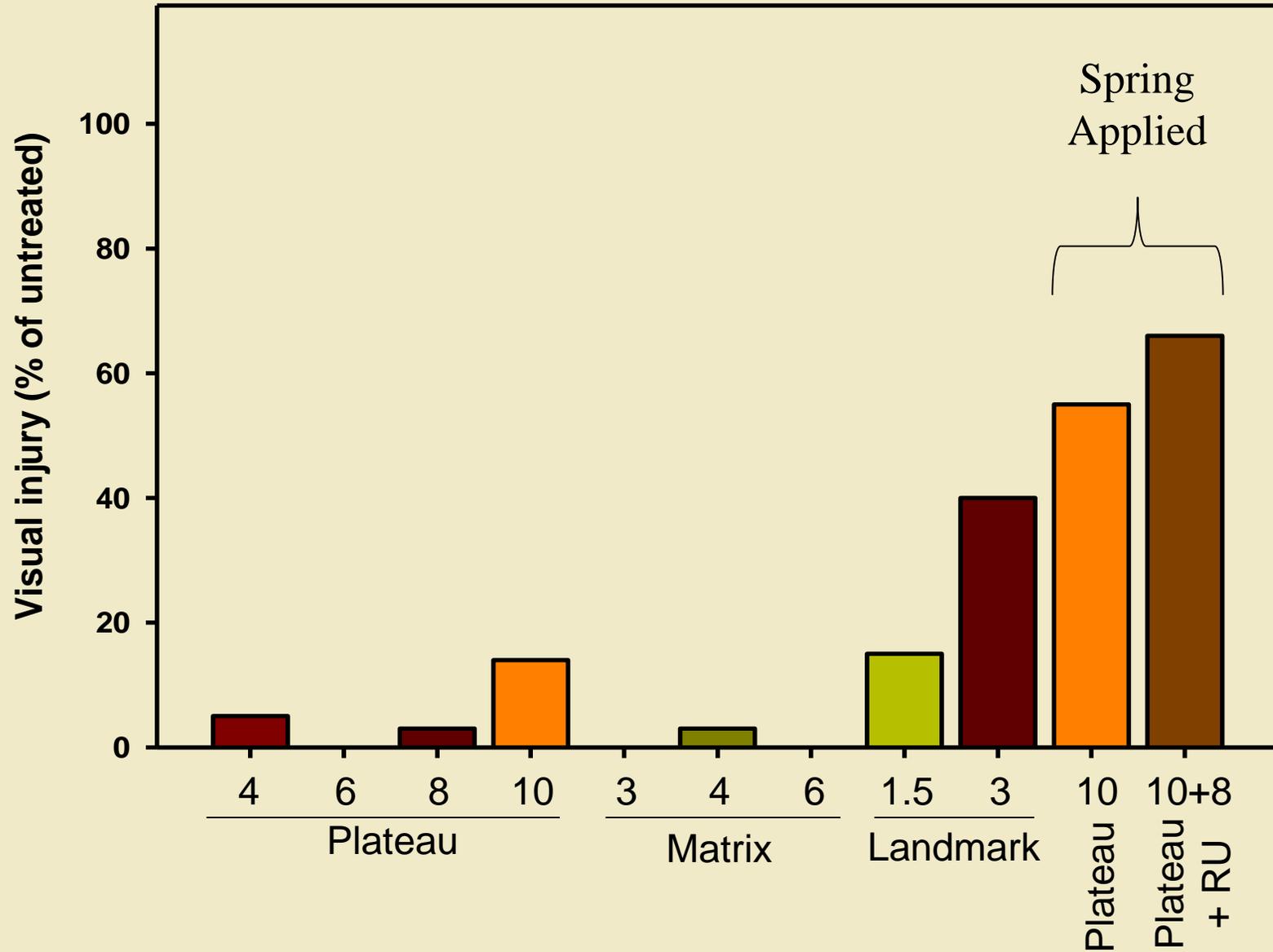
Spring Plateau 10.0 oz with and without RU



Trial Results, Medusahead Control, July 2010



Trial Results, Grass Injury, July 2010



Evaluation of Different Soils on Herbicide Efficacy

Table 1. Location and properties of soils used in greenhouse trials.

Identification	pH	Salinity dS/m	O. M. —%—	Texture	Composition		
					Sand	Silt %	Clay
Hardware	6.7	0.3	2.5	Loam	42	49	9
Summers	7.8	0.7	1.6	Loam	30	48	22
Plymouth	6.6	0.3	2.8	Loam	27	48	24
Newton	7.9	0.3	5.9	Loam	43	40	17
Sand	7.8	0.2	0.4	Sand	93	4	3

Soil Traits Affect Herbicide Efficacy

Herbicide	Rate oz/acre	Medusahead biomass				
		Hardware	Summers	Plymouth	Newton	Sand
		% of untreated				
Plateau	2.0	34	50	38	52	112
Plateau	4.0	44	32	34	31	141
Plateau	6.0	25	24	17	27	147
Plateau	8.0	23	24	19	18	129
Plateau	10.0	18	35	21	19	111
Plateau	12.0	26	38	21	21	146
Matrix	3.0	19	36	15	36	125
Matrix	4.0	21	33	18	26	92
Landmark	0.75	23	52	13	20	133
Landmark	1.0	15	32	14	26	101
Landmark	1.5	15	6	6	6	79
Untreated	-	100	100	100	100	100
LSD (0.05)				27.2		

Medusahead Herbicide Timing Trials, 2012-13

Two Trials in Cache Valley

Applications: September, October, November, April, May/June of 2012-13

Treatments:

Plateau at 10.0 fl oz

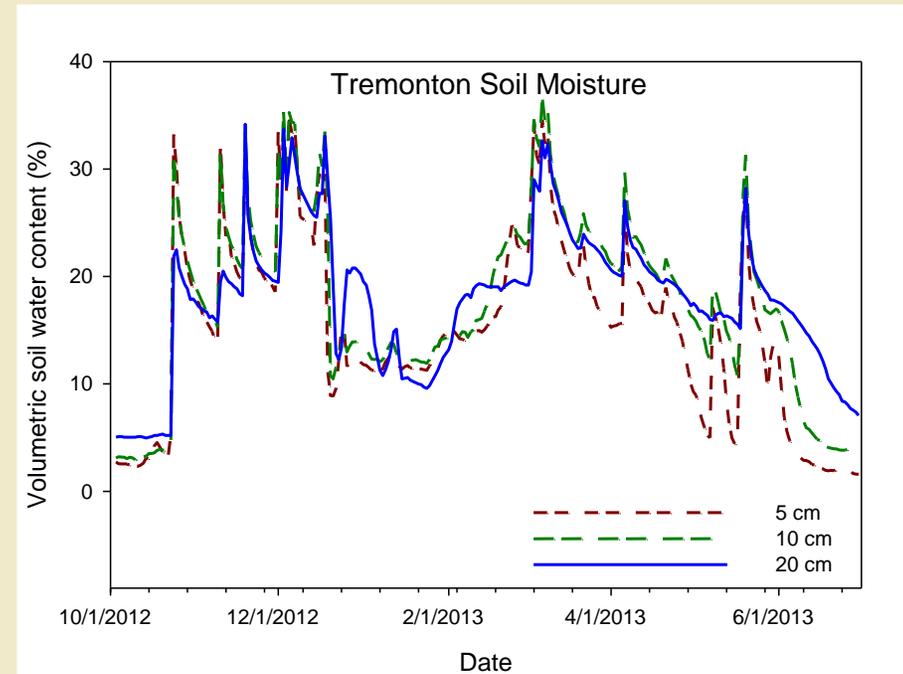
Matrix at 4.0 oz

Plateau + Roundup at 10 + 6 oz

Matrix + Roundup at 4 + 6 oz

Roundup ProMax at 6 oz

Recorded environmental conditions, thatch depth, seedling numbers, seedling height, seed location and stage



Medusahead Densities, Heights, and Thatch Depths

		Medusahead				
Measurement*	Unit	Sept	Oct	Nov	April	May/June
		<u>Avon</u>				
Seedling density	no/ ft ²	32	24	644	407	107
Height	inches	3	0.2	1.8	3.25	5.4
Thatch depth	inches	-	4.8	1.5	0.375	0
		<u>Tremonton</u>				
Seedling density	no/ ft ²	0	24	533	125	86
Height	inches	0	0.4	3.4	3.125	6.5
Thatch depth	inches	7.3	6.9	4.4	1.5	0

*When seedling densities were extremely high, counts were made on a 4" quadrat and adjusted to density per square foot.

Medusahead Seed and Seedling Numbers from Small Soil Cores

	Medusahead seed or seedlings				
Date	Seed	Roots	Seedlings	Dead	Total
	-----number-----				
	<u>Avon</u>				
September	249	2	1	0	252
October	38	77	128	0	243
November	23	5	68	0	96
April	20	0	21	65	106
May/June	24	0	48	113	185
	<u>Tremonton</u>				
September	282	18	2	0	302
October	98	35	55	0	188
November	83	1	63	0	147
April	20	0	14	102	136
May/June	14	0	25	117	156



Medusahead Control in Response to Herbicides and Application Dates

		Medusahead control				
Treatment*	Rate	Sept	Oct	Nov	April	May/June
	oz/acre	%				
		<u>Avon</u>				
Plateau	10	59	68	93	100	45
Matrix	4	97	100	94	100	56
Plateau + RU	10 + 6	29	81	99	100	81
Matrix + RU	4 + 6	97	98	100	100	72
Roundup ProMax	6	11	9	61	85	84
LSD (0.05)				19.0		
		<u>Tremonton</u>				
Plateau	10	69	74	91	98	69
Matrix	4	98	99	98	99	76
Plateau + RU	10 + 6	69	86	97	99	76
Matrix + RU	4 + 6	100	98	100	100	71
Roundup ProMax	6	0	38	63	63	89
LSD (0.05)				13.8		

*All treatments included ammonium sulfate (AMS) at 8.5 lb/100 gal. Plateau and Matrix treatments also included methylated seed oil (MSO) at 1.0% v/v.



Medusahead Herbicide Trials Spring, 2012

Two Trials in Cache Valley

Boot to heading: May 19 and 21, 2012

Full heading: May 29, 2012

Evaluations: 2012 and 2013

Treatments:

Plateau at 6.0, 8.0, and 10.0 fl oz

Roundup ProMax at 2.0, 4.0, 6.0, and 8.0 fl oz



Harvested seed heads in July 2012 analyzed seed number and germination.



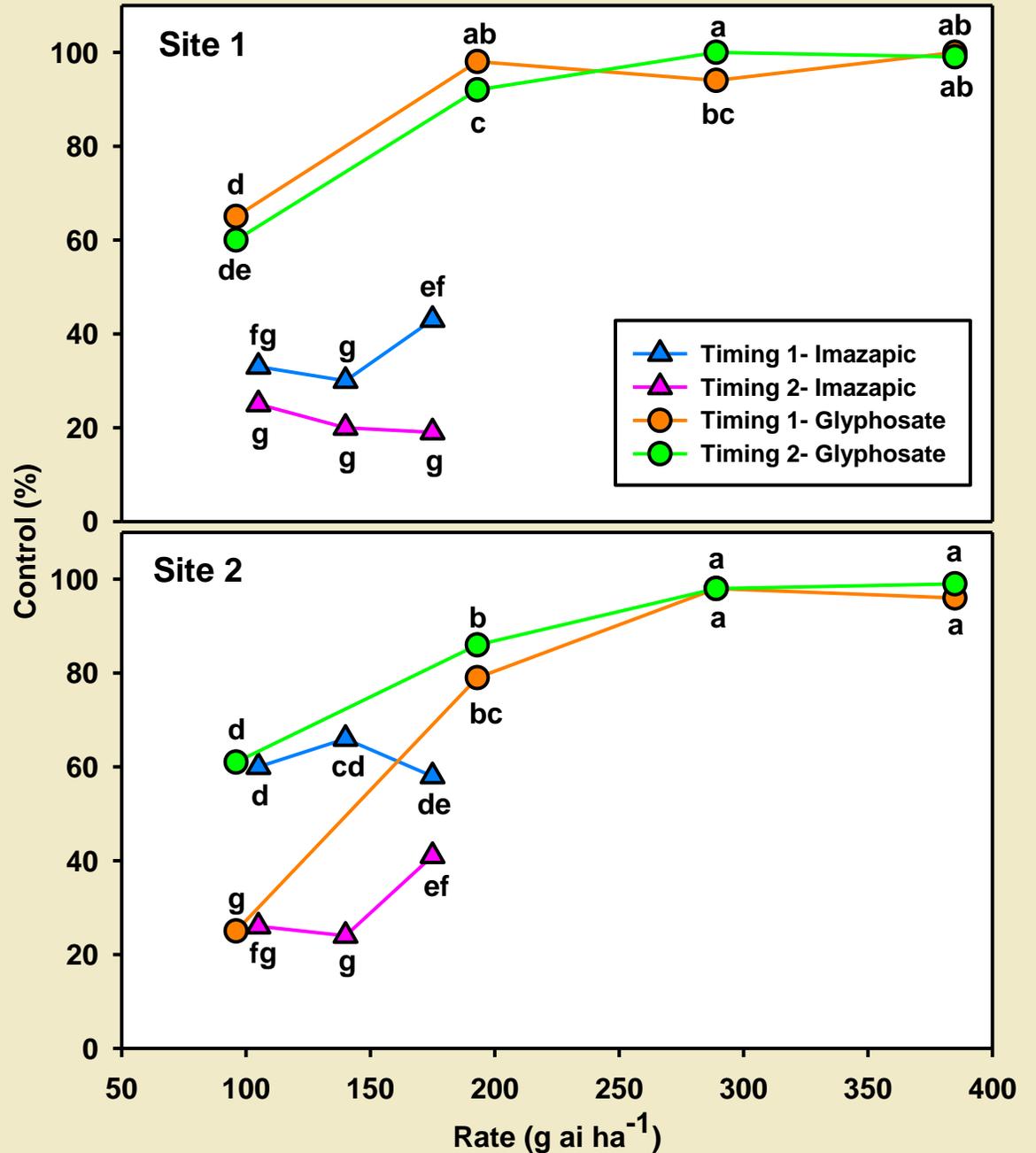
Medusahead control in response to glyphosate and imazapic at various rates, timings, and sites (Site 1 – Hardware, Site 2 - Avon).



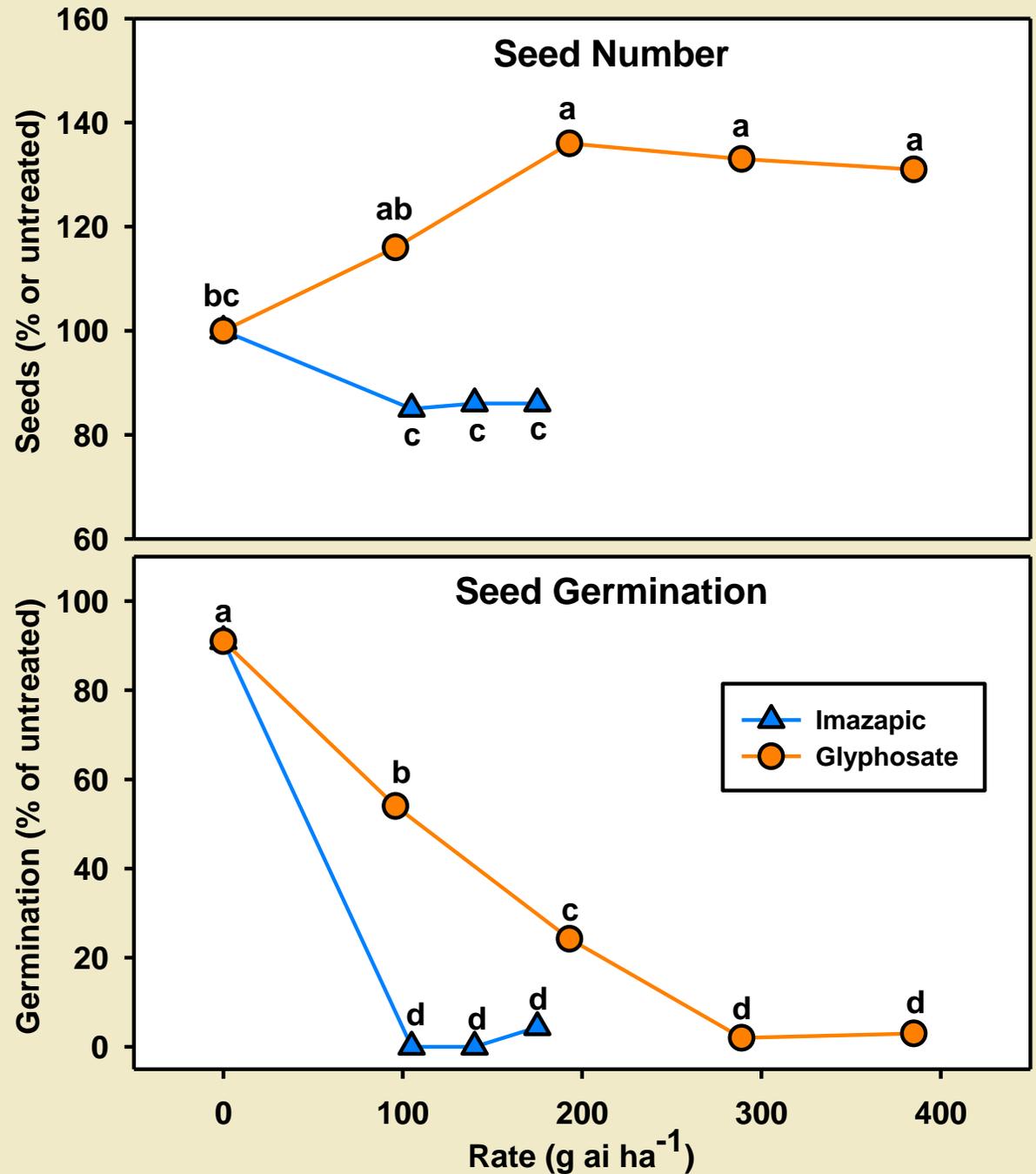
Plateau treated



Roundup treated



Seed production and germination of medusahead in response to herbicide treatments (timing not significant).



Medusahead Control Year Following Spring Applications, 2013

Treatment†	Rate fl oz/acre	Control 2013			
		Hardware		Avon	
		Early	Late	Early	Late
		%			
Plateau	6	63	64	82	79
Plateau	8	78	82	95	81
Plateau	10	90	92	95	96
Roundup ProMax	2	0	0	0	0
Roundup ProMax	4	0	0	0	0
Roundup ProMax	6	0	0	0	0
Roundup ProMax	8	0	0	0	0
Untreated	-	0	0	0	0
LSD (0.05)		7.2		7.6	

Medusahead Gallonage Trial, 2014-15

Greenhouse and Field Trials

Field Application: April, 2014

Treatments:

Plateau at 10.0 fl oz + MSO

Plateau at 10.0 fl oz + MSO + AMS

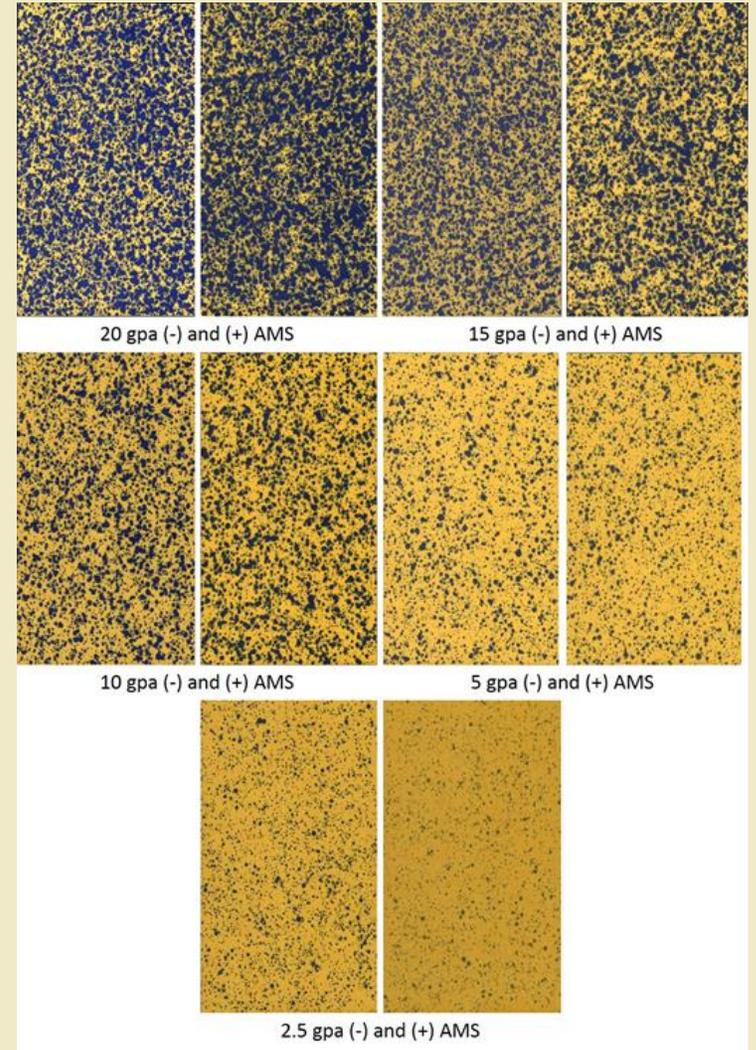
Spray Volumes:

20 gpa

10 gpa

5 gpa

2.5 gpa



Medusahead Gallonage Trial Results, 2014-15

Treatment	GPA	GH Run 1		GH Run 2		Field (control)	
		Control	Biomass	Control	Biomass	6/6/2014	6/16/2015
		%	grams	%	grams	%	%
Untreated		0 b	2.71 a	0 e	1.50 a	0 c	0 c
Plateau	20	99 a	0.14 b	98 a	0.46 e	82 a	44 b
Plateau + AMS	20	98 a	0.21 b	93 a-d	0.68 bcd	71 b	50 ab
Plateau	15	98 a	0.21 b	94 a-d	0.59 cde	90 a	45 ab
Plateau + AMS	15	98 a	0.22 b	91 d	0.71 bc	85 a	61 ab
Plateau	10	99 a	0.12 b	94 a-d	0.63 b-e	91 a	50 ab
Plateau + AMS	10	99 a	0.17 b	92 cd	0.56 cde	89 a	61 ab
Plateau	5	99 a	0.50 b	97 ab	0.51 de	86 a	45 ab
Plateau + AMS	5	99 a	0.12 b	91 d	0.80 b	88 a	61 ab
Plateau	2.5	-	-	93 bcd	0.72 bc	84 a	64 ab
Plateau + AMS	2.5	98 a	0.14 b	96 abc	0.64 b-e	70 b	65 a

*All treatments included Plateau at 10 fl oz/acre and MSO at 1.5 pt/acre. For treatments including AMS, it was included at 1.7 lb/acre.

Using Milestone to Control Medusahead, 2015

Applications:

April 10, 2015 – 3-leaf

August 11, 2015 - Preemergence

Treatments:

Milestone 7 or 14 fl oz/acre

Opensight 3.3 or 6.6 oz/acre

Plateau 10 fl oz/acre

Spray Volume:

18 gpa





Using Milestone to Control Medusahead, 2015

Herbicide	Rate	Timing	Medusahead	
			Seedheads no/ft ²	Shoots
Milestone	7	April	275 b	8 c
Milestone	14	April	170 b	13 c
Opensight	3.3	April	219 b	10 c
Opensight	6.6	April	218 b	14 c
Plateau	10	April	204 b	1 c
Milestone	7	August	-	101 b
Milestone	14	August	-	34 c
Opensight	3.3	August	-	43 c
Opensight	6.6	August	-	31 c
Plateau	10	August	-	6 c
Untreated	-	-	441 a	220 a



Herbicides for Medusahead Control, Summary

- ✓ **Herbicides can effectively control medusahead, for two or more years.**
- ✓ **Early spring applications can reduce seed numbers and or viability, but sufficient seeds remain to warrant using a soil active herbicide.**
- ✓ **Herbicide application timing is critical, possibly due to coverage issues or discontinuous germination, or both.**
- ✓ **Selectivity to desirable vegetation is herbicide and timing dependent.**
- ✓ **Integration of herbicides with vegetation recovery or establishment will be key to long term control.**

A landscape photograph showing rolling green hills in the foreground and middle ground, leading to a range of mountains in the distance. The sky is overcast with soft, grey clouds. The overall scene is a natural, rural setting.

Support: UAES, USDA-EBIPM, UDAF Cap Ferry and ISM Grants

Questions?

Medusahead Look-Alikes

Medusahead



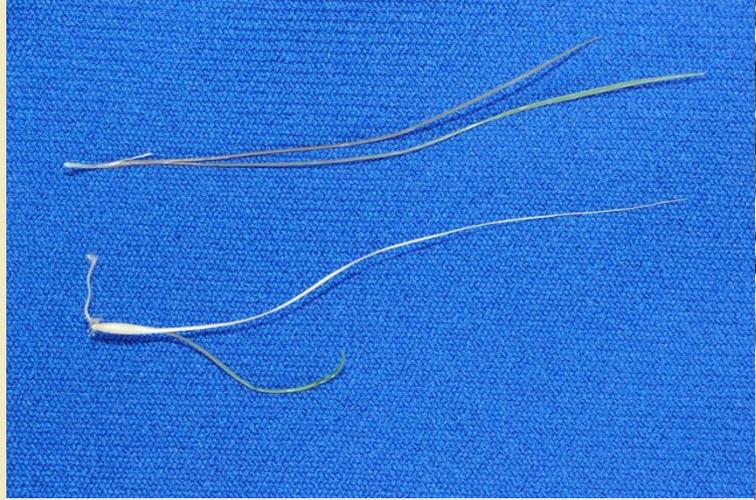
Bottlebrush Squirretail



Foxtail Barley



<http://www.webpages.uidaho.edu/west/plantid.htm>







Medusahead Management Guide for the Western States

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