

Forage Weed Management

Bonus Feature!

Roundup Ready Alfalfa- How does it fit?

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Weed Management—the basics

- No free lunch concept
- Weed management options:
 - Labor - pulling, cutting
 - Herbicides
 - Tillage/Mowing/Burning
 - Optimizing Desirables
 - Is there anything else?



Basic Concept

- Weeds are forages too

Impacts of Weeds on Forage Quality

- Concepts – Weeds on Forage
 - Weeds are forages too

The management questions are:

- Forage quality of weeds?
- Toxic or anti-feeding qualities present?
- Hindrances to effective management?
 - Insect or nematode interaction
 - Forage drying time, storage
 - Forage stand longevity
- Tonnage often reduced



Annual Weeds – Forage Quality

Nutrient Composition/Digestibility

Similar to Alfalfa

- R. Pigweed, C. Lambsquarters, C. Ragweed

Lower than Alfalfa

- Giant and Yellow Foxtail, Shepherdspurse, P. Smartweed

(Marten and Andersen, 1975, Temme et al., 1979)



PERENNIAL WEEDS – FORAGE QUALITY

Forage Quality Relative to Alfalfa

Similar

- Dandelion, White Cockle

Lower

- Quackgrass, Yellow Rocket

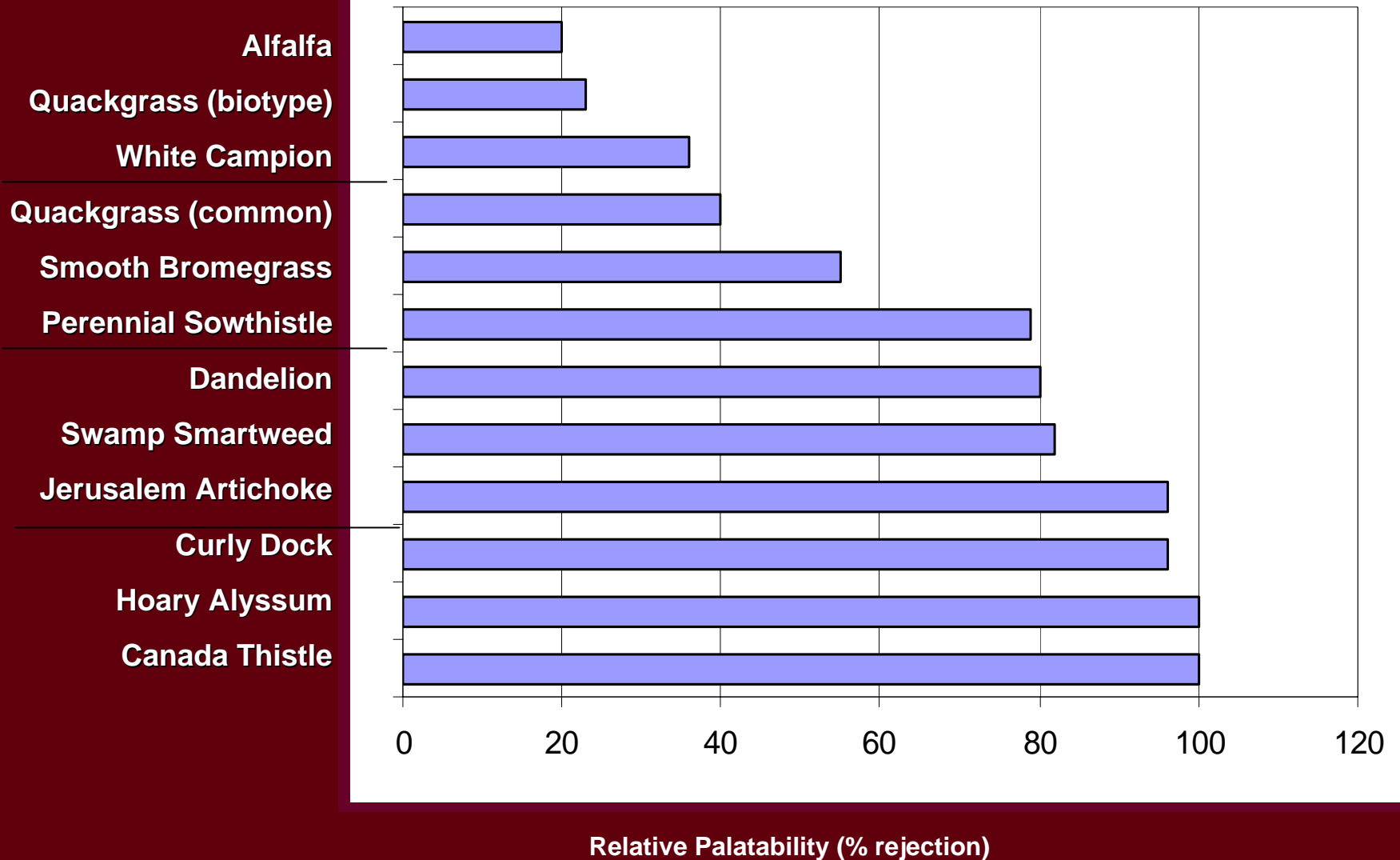
Much Lower

- C. Dock, C. Thistle, H. Alyssum
S. Smartweed, J. Artichoke

(Dutt et al., 1982; Dutt et al., 1979; Marten et al., 1983)



1982-S2



Relative Palatability of two perennial forages and 10 weeds. Trials in 1982 were conducted when first-crop alfalfa was at early bud (S2) stage. (Marten, G.C., C.C. Sheaffer, and D.L. Wyse. 1987. Forage nutritive value and palatability of perennial weeds. Agron. J. 79.



Forage In Vitro Digestible Dry Matter (IVDDM), Crude Protein (CP), and Neutral Detergent Fiber (NDF) concentration of quackgrass (QG) biotypes, reed canarygrass (RCG), and smooth brome grass (SBG) for three cutting schedules in typical years at Rosemount.

| Grass [†] | CP | | NDF | | IVDDM | |
|--------------------|-----------------------------|----------------|----------------|----------------|----------------|----------------|
| | 1981 (yr 1) | 1983 (yr 3) | 1981 (yr 1) | 1983 (yr 3) | 1981 (yr 1) | 1983 (yr 3) |
| | ----- % of Dry Weight ----- | | | | | |
| QG-2 | 15.2 | 14.9 | 63.8 | 61.2 | 57.3 | 66.8 |
| QG-3 | 15.3 | 13.7 | 64.1 | 64.0 | 56.6 | 64.7 |
| QG-5 | 15.3 | 14.2 | 63.7 | 63.3 | 54.8 | 59.9 |
| QG-6 | 16.6 | 14.4 | 62.9 | 64.6 | 57.8 | 64.6 |
| QG-10 | 16.3 | 14.5 | 63.5 | 63.9 | 57.8 | 64.4 |
| RCG | 17.7 | 14.3 | 60.7 | 62.3 | 56.6 | 63.2 |
| SBG | 15.7 | 14.4 | 61.2 | 61.6 | 58.8 | 65.5 |
| LSD (0.05) | 1.3 | NS | 1.2 | 0.9 | 1.6 | 1.1 |

[†] Values are means of three schedules.



Effect of Dandelions on Alfalfa 4-Year Average

| Cutting | Protein Content (%) | |
|---------|---------------------|------------|
| | Alfalfa | Dandelions |
| First | 19.5 | 14.6 |
| Second | 18.9 | 19.4 |
| Third | 18.9 | 19.7 |
| Average | 19.1 | 17.9 |

(University of Wisconsin, 1980-1983)



Dandelion - Alfalfa Dry Down

| Days After Cutting | % Dandelion | ----- % Moisture ----- | | |
|-----------------------|-------------|------------------------|-----------|--------|
| | | Alfalfa | Dandelion | Forage |
| 1 | 3 | 75 | -- | 75 |
| | 31 | 79 | 85 | 82 |
| 2 | 3 | 65 | -- | 64 |
| | 31 | 71 | 79 | 74 |
| 3 | 3 | 45 | -- | 44 |
| | 31 | 53 | 67 | 60 |
| 4 | 3 | 29 | -- | 28 |
| | 31 | 32 | 50 | 35 |

(Adapted from Doll, 1985)



Alfalfa Seeding Herbicide Options

Preplant Incorporated

Grasses and some Broadleaves

- Eptam, Treflan, Balan, Kerb

Postemergence Options

Grass only

- Poast, Poast Plus; Select Max

Grasses and Broadleaves

- Pursuit, Raptor, (Prowl (2 trifol. to < 6"))

Broadleaves

- Buctril, 2,4-DB

Companion Crop Seedings

- Buctril
- MCPA, 2,4-D (Rescue only!)

Roundup Ready?



Established Alfalfa Herbicide Options

Between Cuttings

- **Grasses and some Broadleaves**
 - Gramoxone, Chateau

Postemergence Options

- **Grass only**
 - Poast, Poast Plus; Select Max, Kerb
- **Grasses and Broadleaves**
 - Pursuit, Raptor, (Prowl (< 6"))
 - Velpar (dormant or early, < 2"),
 - Sencor, Sinbar, Karmex (dormant only)
 - Kerb
- **Broadleaves**
 - Buctril, 2,4-DB, Chateau, (MCPA - Rescue only!)
- **Roundup Ready**

Roundup Ready or Not

Alfalfa GMO's and You



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Crop Pest Management Short Course

Tuesday, November 22, 2005



Roundup Ready Alfalfa

**First perennial GMO
crop approved!**

- **Mkt. share potential is there**
 - **Not that of RR soybeans and corn,
but what else is?**

Roundup Ready Alfalfa

- **2006 Center for Food Safety lawsuit filed**
 - Failure to file EPA EIS (Environmental Impact Statement)
- **2007 sale and planting stopped awaiting EIS**
- **2010 US Supreme Court overturned 2007 ruling**
 - Directed APHIS to make the decision
- **By January 2011, 2009 EIS reviewed**
 - USDA resumption of sale as of Feb. 2, 2011
- **March 2011, Center for Food Safety**
 - filed motion challenging USDA authority
- **January 2012 District Court denied motion**

Roundup Ready Alfalfa

- **Export beyond USA only to countries where allowed**
 - **Do not export to China**
- **Do not plant in Imperial Valley, CA. (too much conv. seed production)**

Roundup Ready Alfalfa

Monsanto Tech/ Stewardship agreement

- Harvest before 10% bloom to prevent seed production (promote quality)
- Avoid following alfalfa
- Need more than Rup to terminate
- Manage volunteer alfalfa in rotation crops
- Do not plant in wildlife plots
- MUST sign stewardship agreement (MTSA)
- Can not harvest seed

Roundup Ready Alfalfa

Why Me????

- **Weed control easier**
 - **But will it pay?**
 - **Little treated now**
 - **Better than competitors?**
 - **Space-Bank the tech fee....**

Roundup Ready Alfalfa

Now what's this going to cost?

- **\$130/ 50 lb bag east of the Rockies (\$2.60/lb)**
- **12 lb/A seeding rate = \$31.20/A, 15 = \$39.00/A**
 - Absent tolerance gene, is it the alfalfa variety you really want?
 - **Depreciate costs of tech fee over 3 to 5 years?**

<http://www.genuity.com/specialty/Pages/Genuity-Roundup-Ready-Alfalfa-CalculatorEst.aspx> accessed Jan. 14, 2013

Roundup Ready 2011 Prices

| No. | Trt. | Product | Rate | Cost \$/A | Total \$* |
|-----|--------------------|---------|------|-----------|-----------|
| 1 | Roundup WeatherMax | 16 | OZ/A | \$3.42 | |
| | N-Pak AMS | 2.94 | QT/A | \$6.97 | |
| | RR Tech Fee | | --- | \$45.00 | \$62.39 |
| 2 | Roundup WeatherMax | 21.3 | OZ/A | \$4.56 | |
| | N-Pak AMS | 2.94 | QT/A | \$6.97 | |
| | RR Tech Fee | | --- | \$45.00 | \$63.53 |
| 3 | Raptor | 4 | OZ/A | \$17.76 | |
| | Crop Oil Conc. | 1 | QT/A | \$2.81 | |
| | 28% N | 2 | QT/A | \$4.73 | \$32.29 |
| 4 | Select | 8 | OZ/A | \$9.59 | |
| | Crop Oil Conc. | 1 | QT/A | \$2.81 | |
| | 28% N | 2 | QT/A | \$4.73 | \$24.13 |
| 5 | Select | 10 | OZ/A | \$11.99 | |
| | Buctril | 1.25 | PT/A | \$11.17 | |
| | Crop Oil Conc. | 1 | QT/A | \$2.81 | \$32.97 |

2011 U of M
deal survey costs.

\$45 /A RR alfalfa
tech fee based on
15 lb /A seeding rate
and if only spray
once seeding year.

*All include \$7/A
application costs.

Roundup Ready Alfalfa

New windows of opportunity....

- **Dandelion, white cockle, hoary alyssum, smooth and curly dock, E B nightshade**
- **Dodder**
- **Still rate dependent**
- **Still difficult to control**
 - **e.g. Colq, Codl etc. still a problem**
 - **resistance common ragweed, waterhemp**

Roundup Ready Alfalfa

Roundup WeatherMAX, PowerMAX

– 4.5 ae / 5.5 ai K salt

- 5.3 qts / yr including preplant
- 4.1 qts / yr in crop
- 44 fl oz / A single applications
 - 22 to 44 fl oz up to 4 trifoliolate

Roundup Ready Alfalfa

Supplemental label for Tank Mixes

- **Up to 44 fl oz. PowerMAX, WeatherMAX**
 - **New seeding: Assure II, Poast, Prism, Pursiut, Raptor, SelectMAX**
 - **Established: Kerb 50W, Lexone, Pursuit, Raptor, Sencor**
 - **Dormant: to control quack, downy brome, cheatgrass**

Roundup Ready Alfalfa

- **Remove livestock before app., 5 day grazer REI**
- **5 day PHI**
 - (grazing, cutting or feeding)
 - sequentials at least 7 days apart
 - Up to 10% non RR seed
 - apply 22 fl oz before 3 - 4 trifoliolate to avoid gaps in stand (self-thinning theory)

Roundup Ready Alfalfa

Searching for Resistant Weed Options

Chateau (Flumioxazin)

- Primarily annual weed control PRE
- 4 oz/A applied to established alfalfa (previously harvested) alfalfa < 6 inches.
- 25 day PHI

Warrant (Acetochlor ME)

- Testing tolerance in 2012

Roundup Ready Alfalfa

Searching for Resistant Weed Options

Extreme (imazethapyr + glyphosate)

- Established Alfalfa
- 2.2 to 4.4 pt/A
 - 1 pt of nonionic surfactant + 8.5 to 17 lbs/100 gal AMS
 - *Postemergence* when alfalfa \leq 3 in. growth (regrowth)
 - Weeds 1 to 3 inches in height or diameter
 - Combination of glyphosate and imazethapyr
 - Controls most weed species encountered
 - Imazethapyr will provide some residual control
 - 30 day PHI

Roundup Ready Alfalfa

Even RR won't solve

- **Rain on cut hay**
- **Winter kill**
- **Disease**

Roundup Ready Alfalfa

- **It's the Yield and Quality.....still.**
- **GMO issues?**
 - **Not for organic production**
- **Natural tolerance is there....**
- **Resistance is here!**
- **Value gained to off-set technology fee?**
- **New weed management ops**

Well, What Do We Know?

U of M Establishment Trials

Research 2003 - 2006 at Rosemount and other MN sites

- Solo seeding with herbicides
- Oat-mulch with herbicides
- Oat boot for forage
- Control (no herbicides)
 - Roundup Ready and conventional varieties



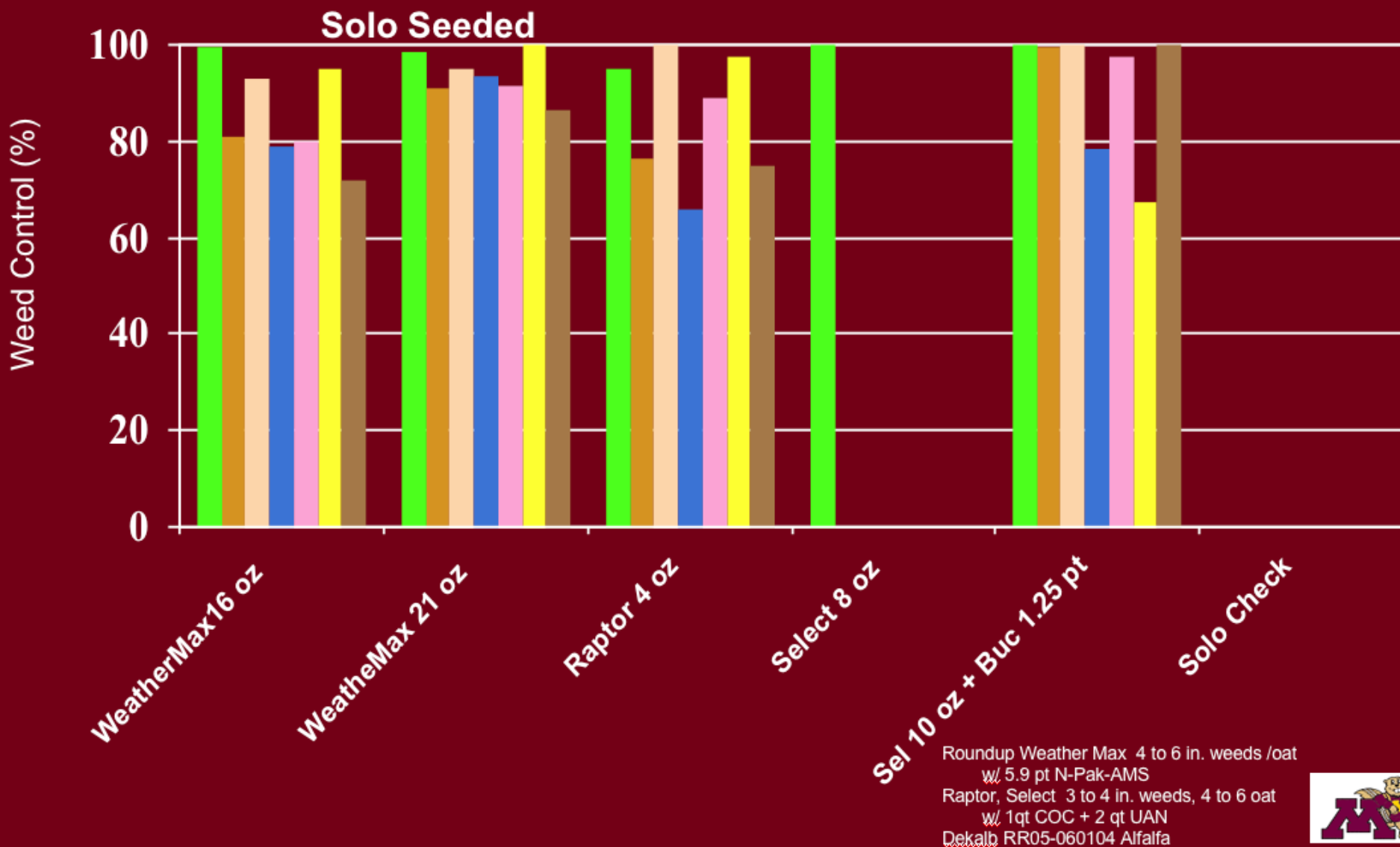
Roundup Ready Alfalfa Establishment Systems

First Season % Weed Control

Rosemount MN

June 29, 2006

LSD NS 10.2 NS 13.4 NS 7.3 12.3
 Gift Colq Wimu Corw Prkw Poam Wibw



Roundup Ready Alfalfa Establishment Systems

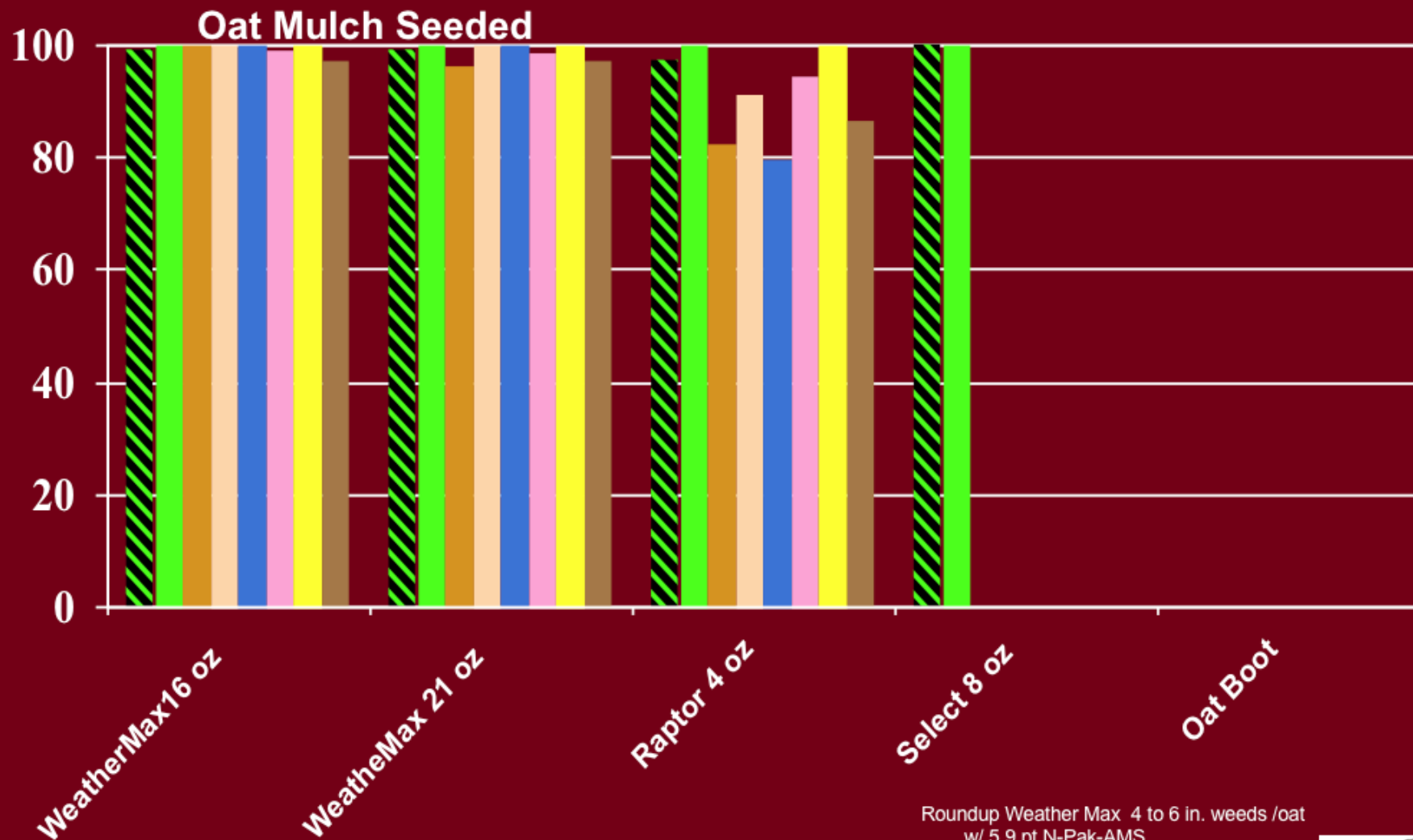
First Season % Weed Control

Rosemount MN

June 29, 2006

LSD 1.4 NS 10.2 NS 13.4 NS 7.3 12.3

Oat Gift Colq Wimu Corw Prkw Poam Wibw



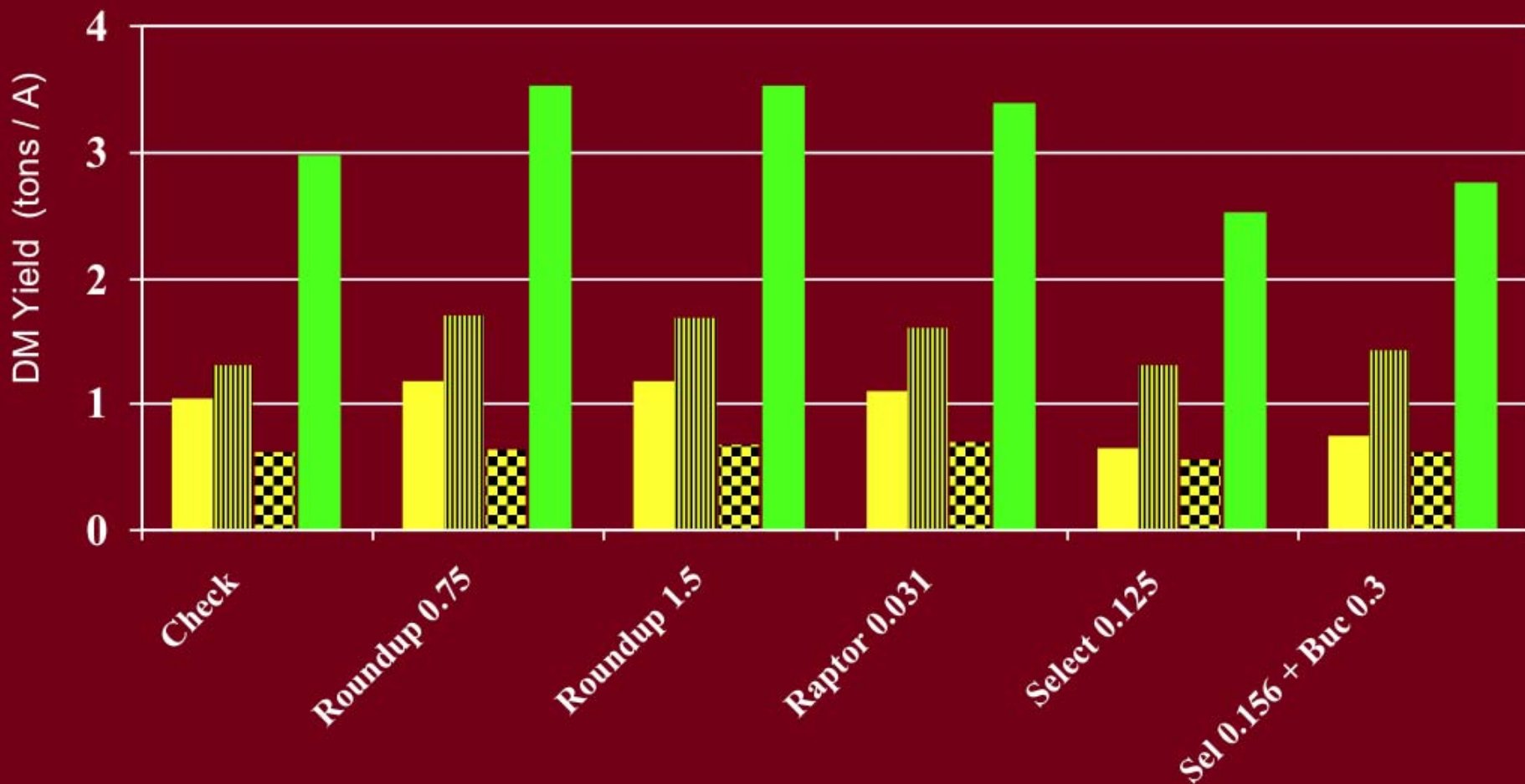
Roundup Weather Max 4 to 6 in. weeds /oat
 w/ 5.9 pt N-Pak-AMS
 Raptor, Select 3 to 4 in. weeds, 4 to 6 oat
 w/ 1qt COC + 2 qt UAN
 Dekalb RR05-060104 Alfalfa



Roundup Ready Alfalfa Herbicide Comparisons

Solo Seeding Alfalfa Yield Rosemount MN 2005

■ 1st Cut ▨ 2nd Cut ▩ 3rd Cut ■ Total



Roundup Weather Max 4 t 6 in. weeds, other trts. 3 to 4 in. weeds

Raptor and Select w/ 1qt COC + 2 qt UAN

R04BD-2411 Alfalfa

Select + Bucril w/1 qt COC





Roundup Ready Alfalfa 2003 Rosemount MN



Direct Seed

Check

July 11, 2003



Oat Mulch Raptor 4 oz (0.031) July 11, 2003



Oat Mulch Raptor 4 oz (0.031)

July 11, 2003



Oat Mulch Roundup WeatherMax 22 oz (0.75) July 11, 2003



Oat Mulch

Select 8 oz (0.125)

July 11, 2003



Direct Seed
Roundup 22 oz
July 11 2003
Flash?
Potassium?
Leafhopper?

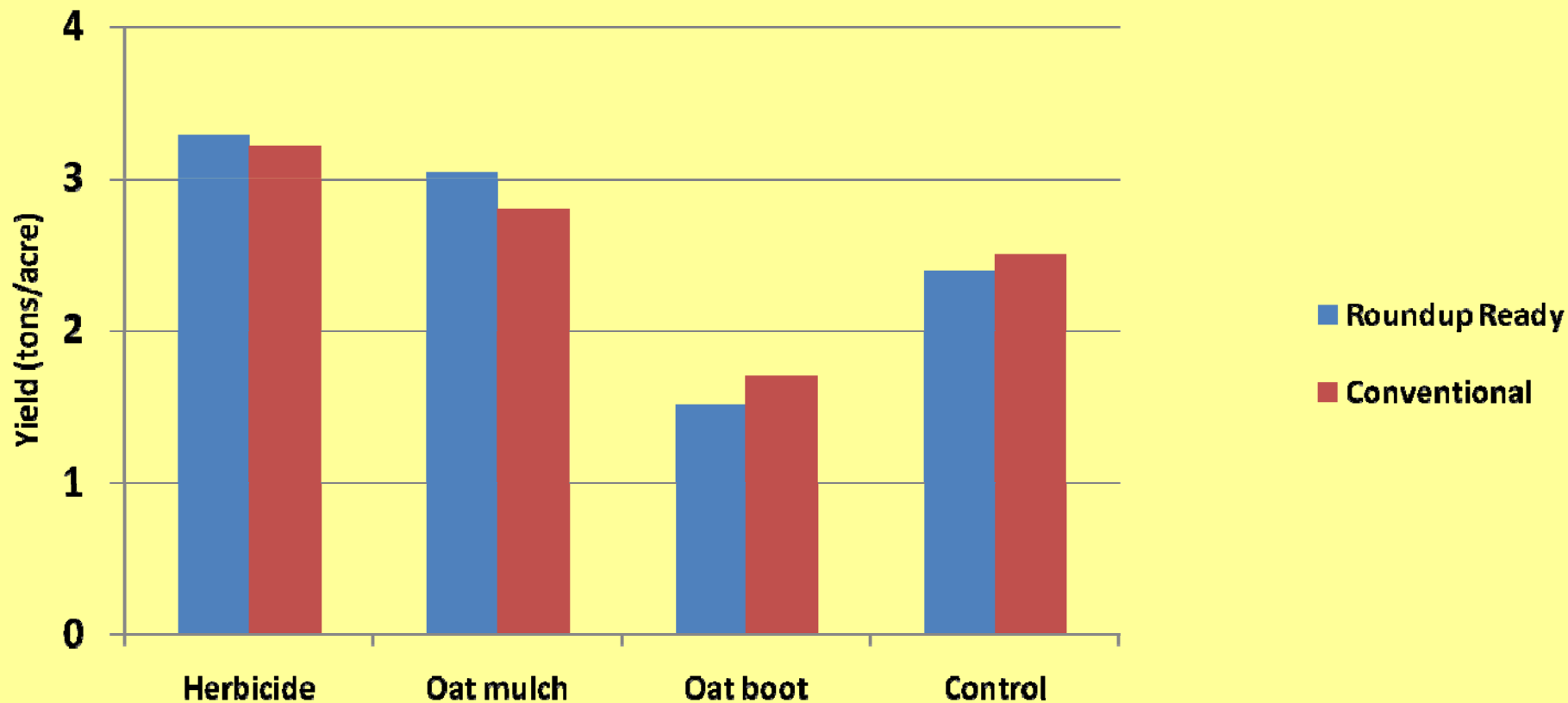


Roundup Ready Alfalfa vs. Conventional Systems

Rosemount MN

Seeding Year Yields

Year 1

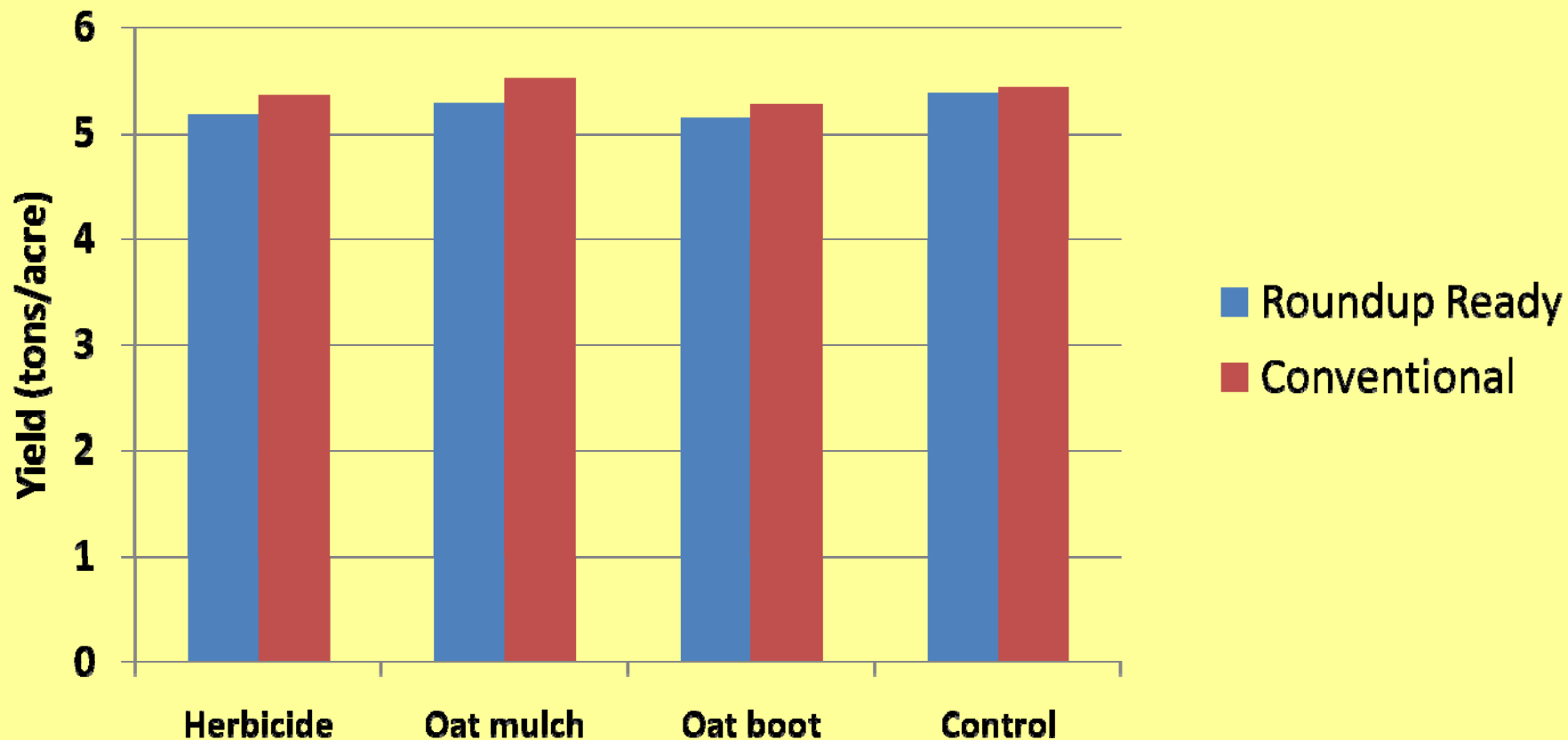


Roundup Ready Alfalfa vs. Conventional Systems

Rosemount MN

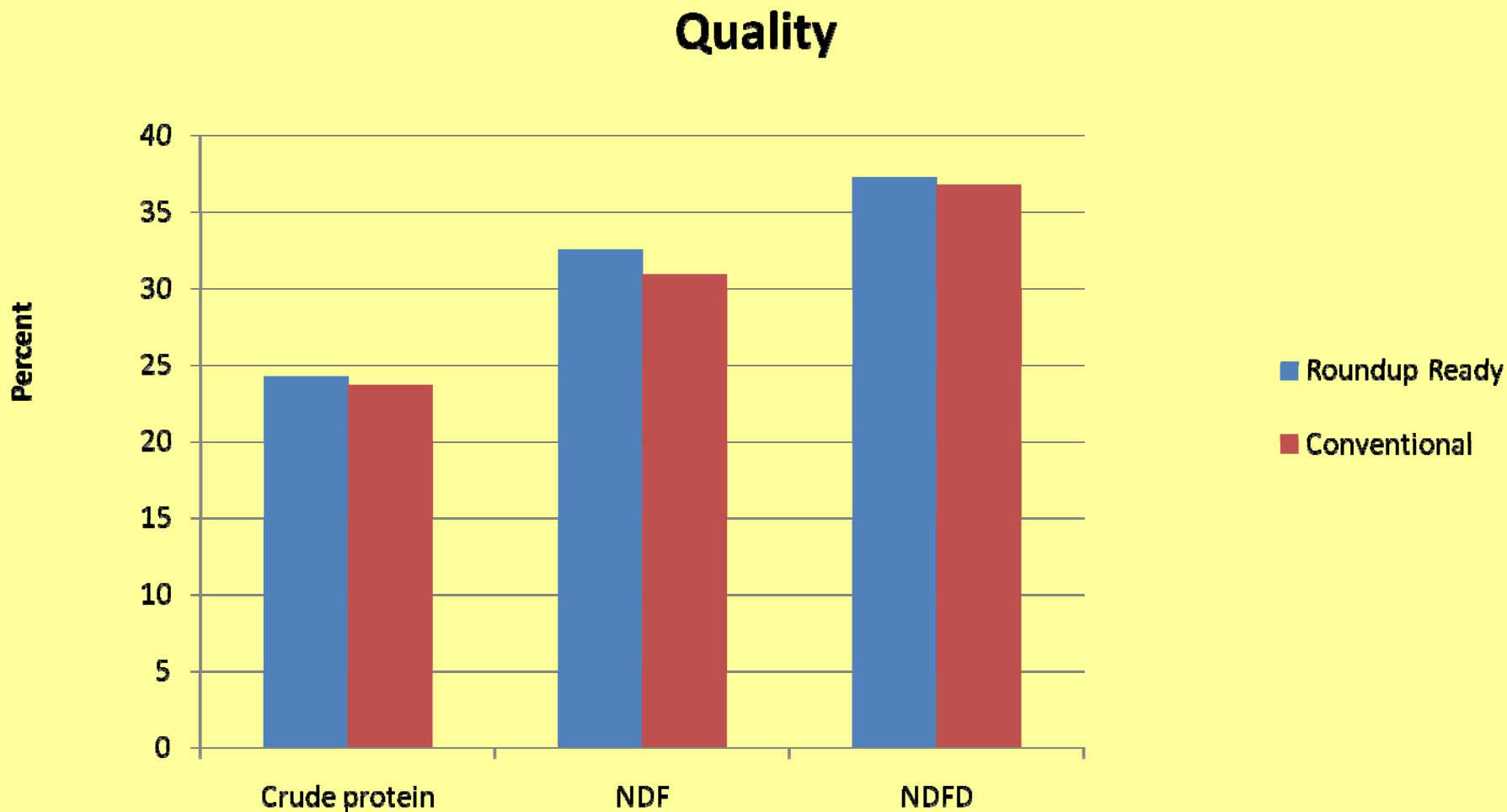
2nd Year Established Yields

Year 2



Roundup Ready Alfalfa vs. Conventional Systems

Rosemount MN



**MN research
conclusion:**



- Forage yield and quality similar for RR and conventional alfalfa varieties
- Establishment treatment effects consistent for both alfalfa types



Alfalfa entry (variety/experimental population) forage yield and quality (Sheaffer et al.)

| Variety | 2004 | 2005 | |
|-------------|--------------|--------------|-----|
| | Forage Yield | Forage Yield | RFQ |
| | T/A | T/A | |
| RR 202 | 3.2 | 5.4 | 180 |
| RR 257 | 3.1 | 5.2 | 185 |
| RR 200 | 3.3 | 5.3 | 195 |
| RR 286 | 3.2 | 5.3 | 191 |
| RR 250 | 3.1 | 4.9 | 184 |
| RR 218 | 3.2 | 5.1 | 188 |
| RR 209 | 3.2 | 5.1 | 186 |
| RR 216 | 3.3 | 5.3 | 183 |
| 54V46 | 3.2 | 5.3 | 184 |
| Rebound 5.0 | 3.3 | 5.4 | 186 |
| Mean | 3.2 | 5.2 | 186 |
| LSD (0.05) | NS | NS | NS |



Other Roundup Ready Alfalfa Studies

Solo seeding trials



Select 8 oz. (0.125 ae) COC 28%

RR cultivar



Untreated Check

RR cultivar



Raptor 4 oz. (0.031 ae) COC 28% RR cultivar



Roundup WeatherMax 44 oz. (1.5 ae) RR cultivar



Roundup WeatherMax 22 oz. (0.75 ae)

RR cultivar



Select 10 oz. + Bucril 1.25 pts (0.156 + 0.31 ae) COC RR cultivar

Roundup Ready Alfalfa

Weed Mgt Trial



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Craig Sheaffer
University of Minnesota

2011-2012



Roundup Ready Alfalfa Weed Mgt Treatment List

| Trt. No. | Product | Product Rate/A | Weed/Oat Stage | Seeding Method |
|-------------|---|--|-------------------|-------------------|
| 1 | Untreated Check | -- | -- | Direct |
| 2 | Roundup 4.5 + AMS | 22 oz + 2% v/v | 4-6 in. | Direct |
| 3 | Roundup 4.5 + AMS | 44 oz + 2% v/v | 4-6 in. | Direct |
| 4 | Roundup 4.5 + Sharpen 2.85 FL + AMS | 22 oz + 2.5 oz + 2% v/v | 4-6 in. | Direct |
| 5 | Roundup 4.5 + Chateau 51 WDG + AMS | 22 oz + 4 oz + 2% v/v | 4-6 in. | Direct |
| 6 | Raptor 1 SL + SelectMax 0.97 EC | 4 oz + 6 oz | 3-4 in. | Direct |
| 8 | Roundup 4.5 + Raptor 1 SL+ AMS | 22 oz + 3 oz + 2% v/v | 4-6 in. | Direct |
| 9 | Roundup 4.5 + Prowl H2O 3.8 ME + AMS | 22 oz + 1.5 pt + 2% v/v | 4-6 in. | Direct |
| 10 | Roundup 4.5 + SelectMax 0.97 EC+ AMS | 22 oz + 6 oz + 2% v/v | 4-6 in. | Direct |
| 11 | Roundup 4.5 + Warrant 3 ME+ AMS | 22 oz + 3 pt + 2% v/v | 4-6 in. | Direct |
| 12 | Select Max 0.97L + Buctril 2.0 EC + NIS + AMS | 20 oz + 1.25 pt + 0.25 % v/v + 2.5 lbs/A | 3-4 in. | Direct |
| 13 | Raptor 1 SL + COC + 28% | 4 oz + 1 qt + 2 qt | 3-4 in. | Direct |
| 14 | Roundup 4.5 + AMS | 22 oz + 2% v/v | 4-6 in. oat | Oat Mulch |
| 15 | Select Max 0.97L + NIS + AMS | 20 oz + 0.25 % v/v + 2.5 lbs/A | 4-6 in. oat | Oat Mulch |
| 16 | Raptor 1 SL + COC + 28% | 4 oz+ 1 qt + 2 qt | 4-6 in. oat | Oat Mulch |

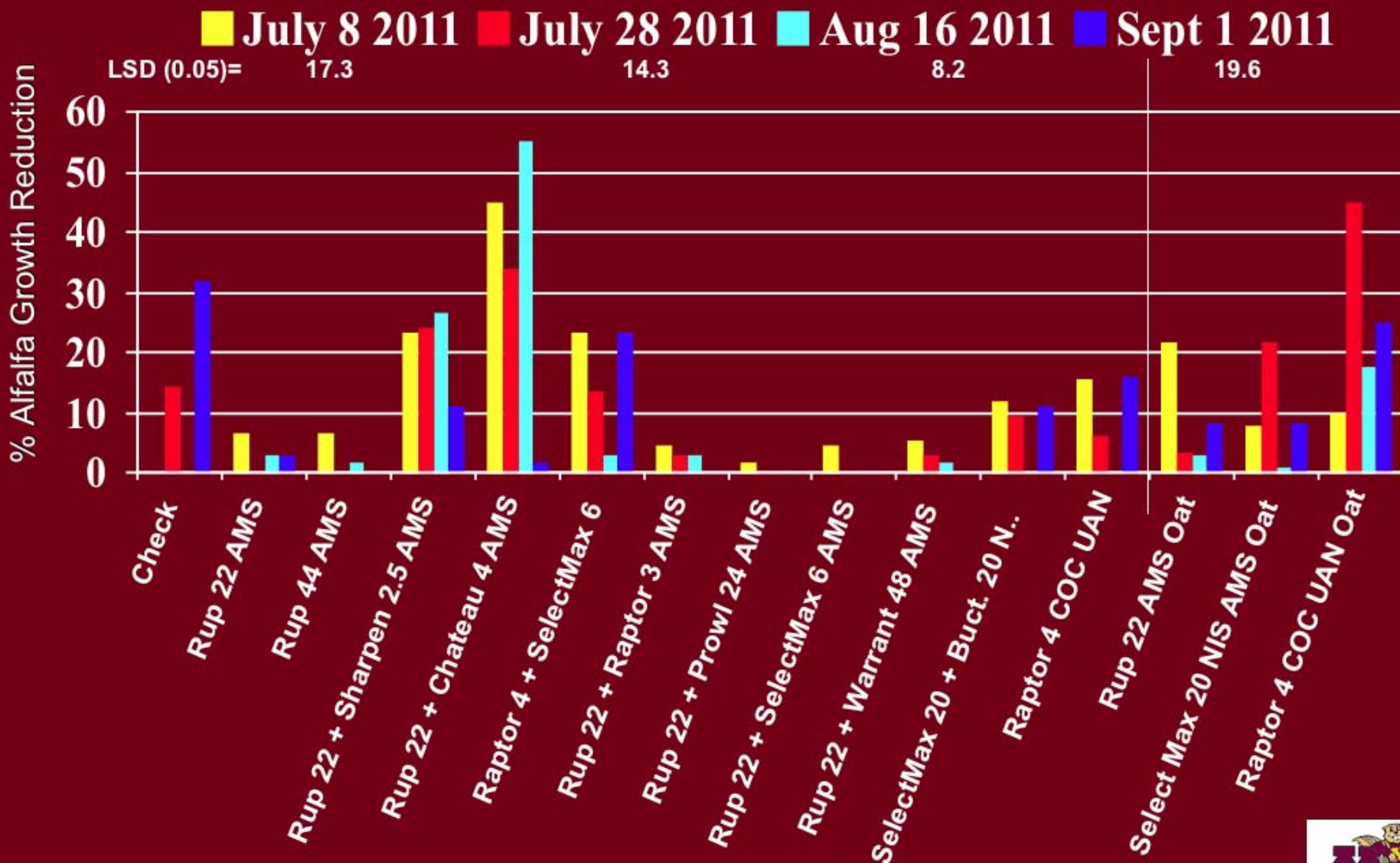
Glyphosate was Roundup Powermax 4.5 ae SL

AMS was N-Pak AMS 3.4L

Seeded May 4th, trts. applied @20 gpa June 16, 2011.

Roundup Ready Alfalfa Establishment Systems

First Season Crop Injury Rosemount MN, 2011



Roundup Ready Alfalfa Establishment Systems

Forage Yield/Quality

1st Hary. July 13, 2011

Rosemount MN

RFV Adj. \$/A

LSD = 37.9

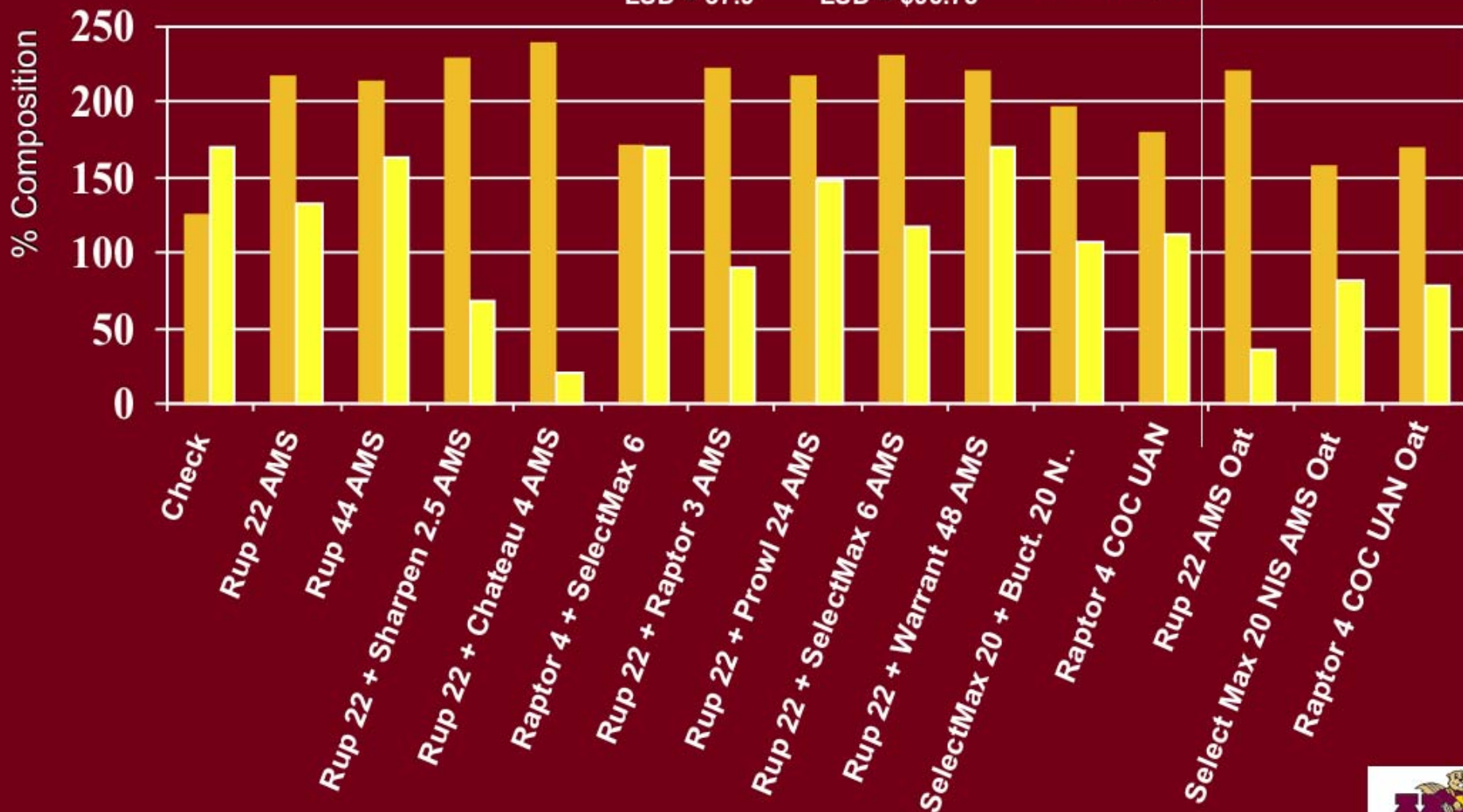
LSD = \$96.73

2000-01 Sauk Center adj for 2012 value

200 RFV = \$181

150 RVV = \$139

100 RFV = \$95



Roundup Ready Alfalfa Establishment Systems

Forage Yield/Quality

2nd Hary. Aug 23, 2011

Rosemount MN

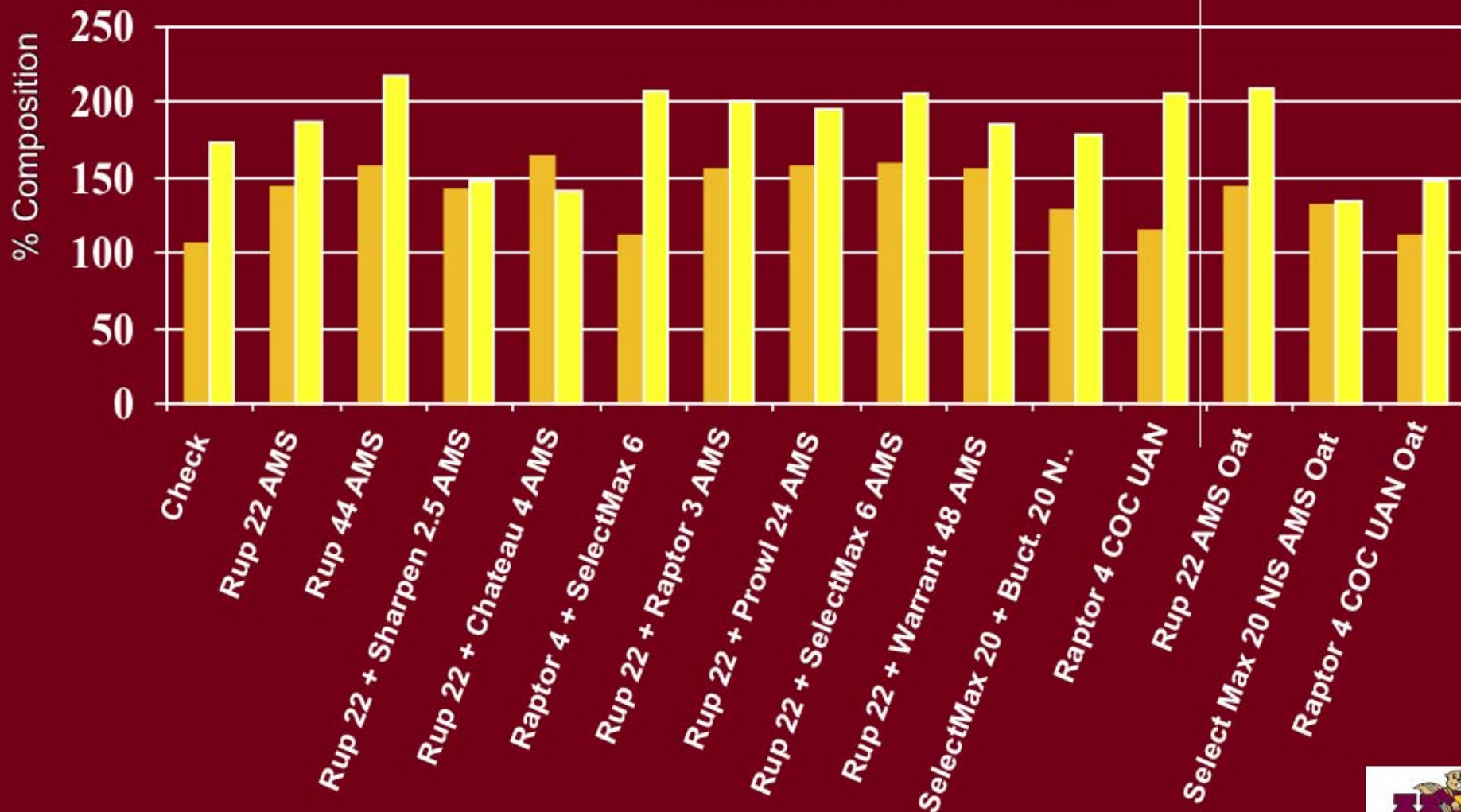
■ RFV ■ Adj. \$/A
LSD = 25.2 LSD = \$51.26

2000-01 Sauk Center adj for 2012 value

200 RFV = \$181

150 RVV = \$139

100 RFV = \$95



Roundup Ready Alfalfa Weed Mgt. Rosemount, MN



June 16, 2011. Check

Oat Mulch

Roundup Ready Alfalfa Weed Mgt. Rosemount, MN



July 8 2011. Oat Mulch trt.

Roundup 22 oz.

Select MAX 20 oz.

Raptor 4 oz.

Roundup Ready Alfalfa Weed Mgt. Rosemount, MN



July 8 2011.

Rup + Sharpen

Rup + Chateau

Roundup Ready Alfalfa

Can We Terminate It?



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2011-2012



Alfalfa Termination Trial Trt. List

Seeded May 4th
Pioneer 54V46 (standard)
RR alfalfa = Dekalb DKA41-18RR

| Application Timing | Trt. No. | Product (Rate/A) |
|--|----------|-----------------------------------|
| Oct 4 2011 2-6 in. Alf | 1 | 2,4-D ester 2 pt |
| | 2 | 2,4-D ester 3 pt |
| | 3 | 2,4-D amine 3.2 pt |
| | 4 | 2,4-D amine 4.2 pt |
| | 5 | Clarity 1 pt |
| | 6 | Clarity 1.5 pt |
| | 7 | 2,4-D ester 1 + Clarity 1 pt |
| | 8 | 2,4-D ester 2 + Clarity 1 pt |
| | 9 | 2,4-D amine 2.1 + Clarity 1 pt |
| | 10 | Stinger 2/3 pt |
| | 11 | 2,4-D ester 2.1 + Stinger 1/2 pt |
| | 12 | 2,4-D ester 3.1 + Stinger 1/2 pt |
| | 13 | 2,4-D ester 2.1 + Stinger 2/3 pt |
| | 14 | 2,4-D ester 3.1 + Stinger 2/3 pt |
| | 15 | Sharpen 3 oz |
| | 16 | Curtail 2 pt |
| | 17 | Rup PM 22 oz + 2,4-D ester 2.1 pt |
| | 18 | Milestone 5 oz |
| April 20 2012 6-8 in. Alf | 19 | Untreated Check |
| | 20 | 2,4-D ester 3.1 pt |
| | 21 | Clarity 2 pt |
| | 22 | 2,4-D ester 2.1 + Clarity 1 pt |
| | 23 | Stinger 2/3 pt |
| | 24 | Curtail 2 pt |
| May 11 2012 13-16 in. Alf | 25 | 2,4-D ester 3.1 pt |
| | 26 | Clarity 2 pt |
| | 27 | 2,4-D ester 2.1 + Clarity 1 pt |
| | 28 | Stinger 2/3 pt |
| | 29 | Curtail 2 pt |
| | 30 | Milestone 5 oz |
| April 20 2012 6-8 in Alf 2,4-D Ester 3 pt + (Rup PM 22 oz + In Crop Bldf Trt.) | 31 | 2,4-D ester 2 pt |
| | 32 | Clarity 1 pt |
| | 33 | Status 5 oz |
| | 34 | Status 10 oz |
| | 35 | Hornet 3 oz + Clarity 5 oz |

Alfalfa Termination Study

Rosemount, MN



Sept 29, 2011. No trt. applied yet.

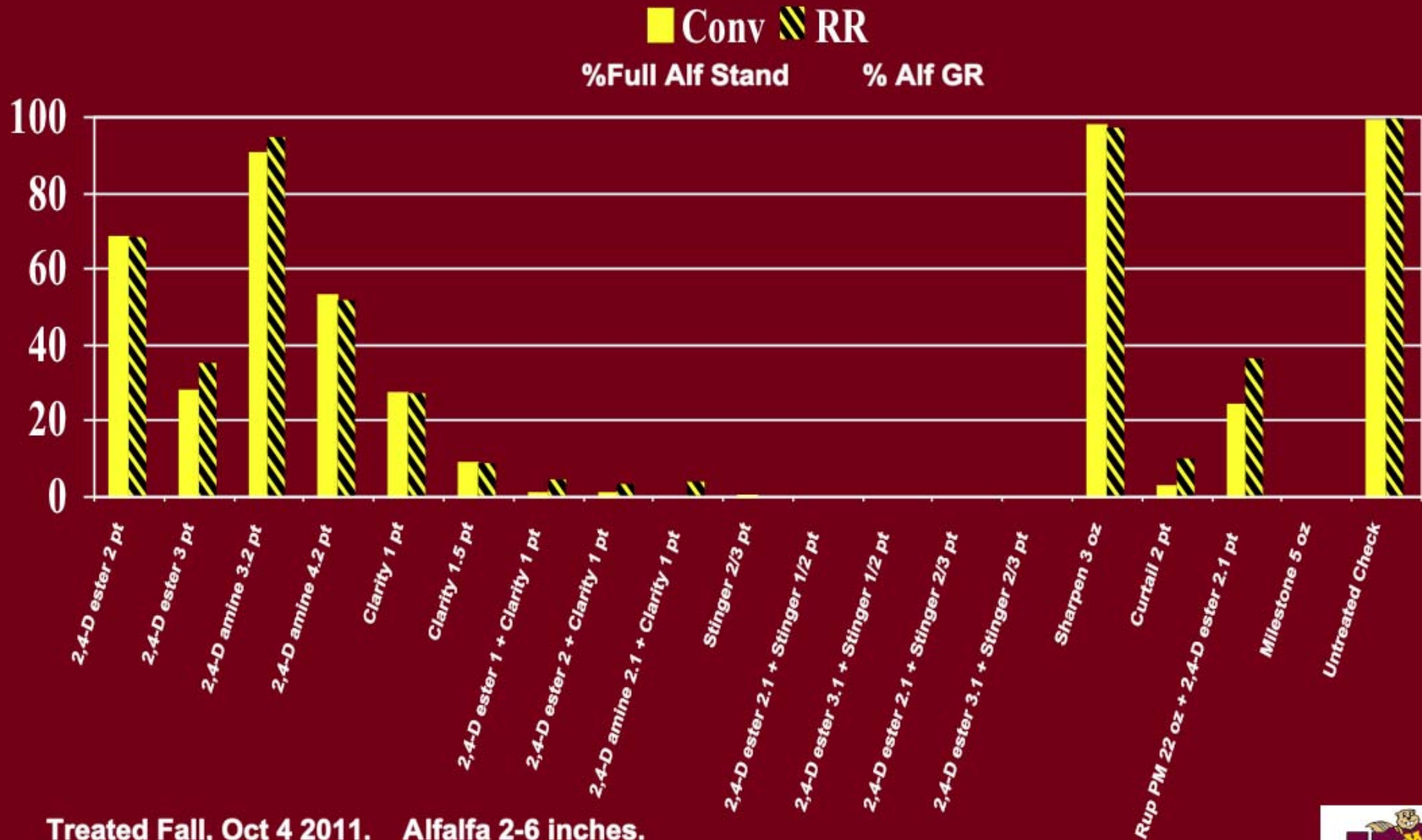
RR Alfalfa.

Conv. Alfalfa.

Alfalfa Termination Study

Rated June 19, 2012

Rosemount MN



Treated Fall, Oct 4 2011. Alfalfa 2-6 inches.

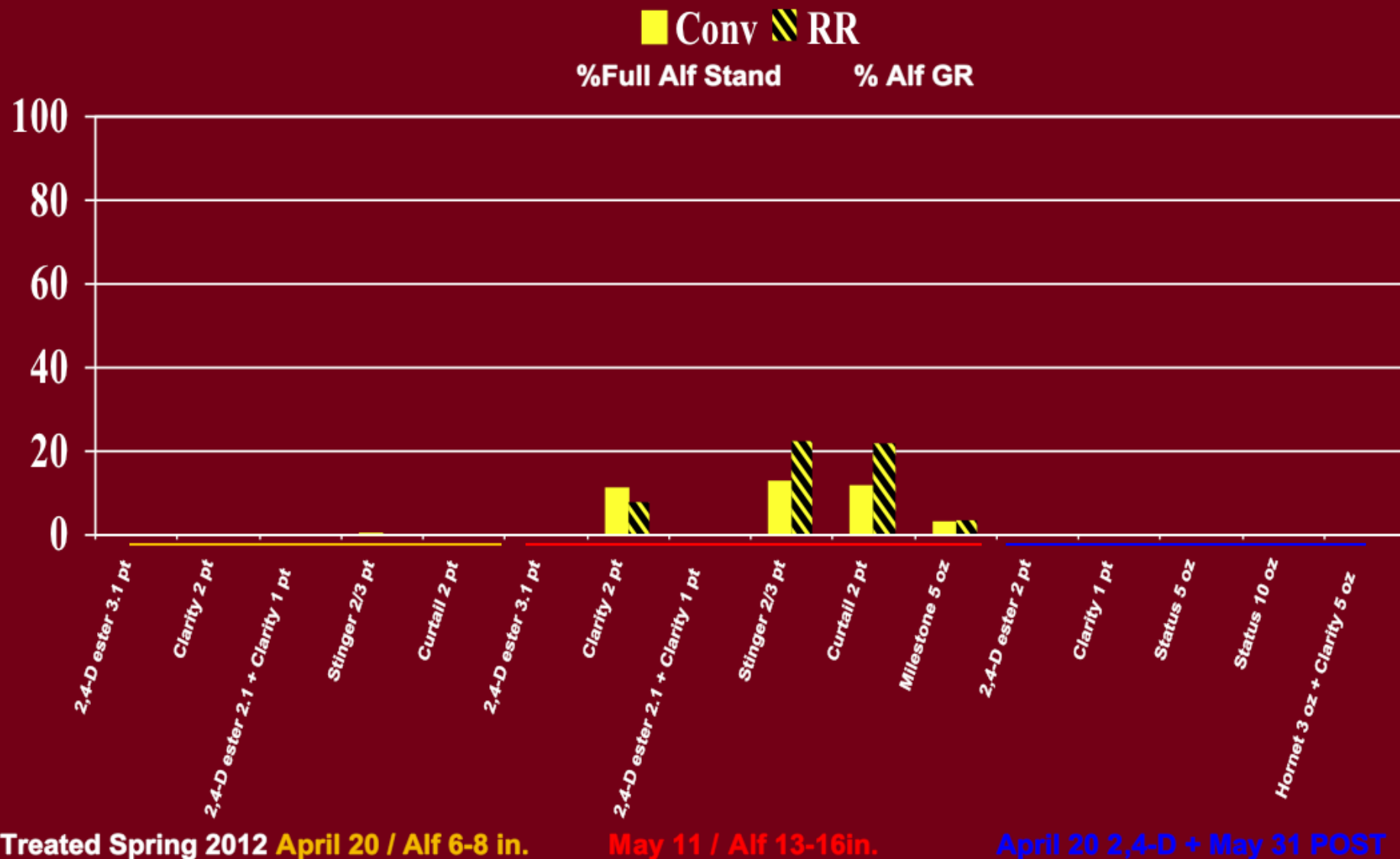


Alfalfa Termination Study



Rated July 15, 2012

Rosemount MN



Alfalfa Termination Study

Rosemount, MN



Oct 21, 2011. Fall trt. applied Oct 4.

Close-up



Alfalfa Termination Study

Rosemount, MN



Nov 11, 2011. Fall trt. applied Oct 4.

Alfalfa Termination Study

Rosemount, MN



May 15, 2012. Fall trt.

-applied Oct 4.

Spring trt.

-applied April 20

-applied May 11

Alfalfa Termination Study

Rosemount, MN



July 15, 2012.

April 20 2012 with May 31 POST trt. now applied.

Roundup Ready Alfalfa

Can We Interseed Grasses?



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University of Minnesota

2011-2012



Alfalfa Grass Interseed Study

Rosemount, MN

June 16, 2011



Alfalfa Grass Interseed Study Rosemount, MN
July 15, 2012 Close-up



Alfalfa Warrant Residual Study

Rosemount, MN





Related issues

Effect of Weed Management in Roundup Ready Alfalfa on Forage Productivity and Longevity

Michigan State Univ. Study: Could RR alfalfa improve longevity under frequent cutting due to removal of weed interference with minimal crop injury?

RR alfalfa yield, weed invasion, alfalfa stand persistence and relative forage quality (RFQ) seeded 2003, managed until 2010

- 3 weed control methods (no herbicide, glyphosate, and hexazinone)**
- 2 harvest frequencies (high and moderate)**

Effect of Weed Management in Roundup Ready Alfalfa on Forage Productivity and Longevity

Michigan State Univ. 2003 to 2010 (7 years)

- stand density decreased approx. 90%
 - natural thinning regardless of harvest intensity or herbicide treatment
 - weed removal and harvest intensity did not effect stand persistence
- yield decreased approx. 30%
 - Alfalfa yield not affected by herbicide treatments most years
 - relative forage quality sign. higher under high vs. moderate intensity harvesting system 4 of 6 years
 - RFQ not affected by weed removal with herbicides most years
 - No differences in weed biomass (glyphosate and hexazinone trts., except in 2007. Colq)

Seeding rates for RR alfalfas

- Wisconsin studies have shown that, due to better weed control Roundup, 10-12 lbs of Roundup Ready alfalfa seed per acre is adequate
- However, seeding rate recommendation is complicated by seed coatings, seeding equipment, and producer philosophy

<http://hayandforage.com/hay/alfalfa/cut-roundup-ready-alfalfa-costs-0301/>





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Questions?

<http://appliedweeds.cfans.umn.edu/>