

Sunflower Weed Control – Update and Issues

Rich Zollinger
NDSU Extension Weed Specialist

Broadaxe Herbicide for Sunflower



Pyroxasulfone (KIH-485)

BroadAxe (FMC)

- a.i. = metolachlor+sulfentrazone (Dual+Spartan)
- Mode of action: Fatty acid (15) + PPO(14)
- Crops: soybean and sunflower
- Stage: Soil applied – 14 d prior to 3 d after plant
- Weeds: Grass + broadleaf weeds
- Rate: 17 – 38 fl oz/A – adjust with soil type
- Tillage incorporation: Not required
- ****1 inch of rain REQUIRED****
- Crop rotation: All crops 12 months except sgbt
4 months for small grains and corn

Broadaxe Use Rate Chart

Broadaxe Herbicide Use Rate (Sunflowers)			
Fall, Spring Preplant, Preemergence, Preplant Incorporated Applications			
Broadcast Rate	Fl oz Broadaxe Herbicide per acre		
	Soil Texture		
% Organic Matter	Coarse	Medium	Fine
<1.5	17-21	17 - 26	21-30
1.5-3.0	17-26	21 - 34	26-38.7
>3	21-34	26 – 38.7	34-38.7
<p>Refer to the previous information on soil types under the COARSE, MEDIUM, and FINE categories</p> <p>For soils with pH >7.2 use the lowest rate for that specific soil texture and organic matter.</p>			



Broadaxe Herbicide

- **Product:** Broadaxe
- **Mode of Action:** PPO Inhibitor + Long Chain Lipid Inhibitor
- **Flexible formulation for easy mixing with other herbicides**
- **Crops:** Soybeans, Sunflower
- **4 Month plant back restriction to wheat, barley and corn**
- **Rates: 17-38 oz/A: Rate dependent on soil type**
- **Weed Activity:** Preemergence control of ALS resistant: kochia, other small seeded broadleaf weeds and added benefit of early season grass control and increased pigweed control
- **Guidelines:** Preemerge or early preplant up to 14 days prior to planting. Moisture event is required for activation.
- **At least 0.5-1 inch of rain or the product will be inconsistent.** Does not need incorporation (is not volatile, does not break down by sunlight)



Broadaxe Herbicide

What it does well

- Very Consistent Kochia Control
- Excellent Grass Control (Foxtails, barnyardgrass)
- Increased level of control on pigweed species
- Reliable Russian Thistle control
- Excellent formulation for mixing
- Low plant back concerns for cereal grains (4 months)
- Lower use rate compared to traditional grass PRE herbicides
- Does not need incorporation

What is doesn't do well

- Needs Rain for herbicide activation at least 0.5 to 1 inch at one time
- Isn't the best on wild oat or volunteer cereal grains grasses
- Under dry conditions may need a follow up grass application
- Mustard/volunteer canola control will be weaker
- Can be applied up to three days after planting

<u>Weeds</u>	<u>BroadAxe</u>
Foxtail, Bygrass	Control
Pigweed	C
Lambsquarters	C
Kochia	C
R. Thistle	C
Nightshade	C
Smartweed	C
Horseweed	Suppression
Mustards	S
Wibw	S
Cocb	S
Marshelder	S
Prickle lettuce	S
Ragweed	None

BroadAxe Research Review- 2010-2011

Research Review:

- No. of trials: 11 research trials
- Time span: 2 years
- Geographic area: ND, SD, NE, KS, TX, WY
- Snfl injury: No crop injury in the northern plains

Exception: One trial = NE

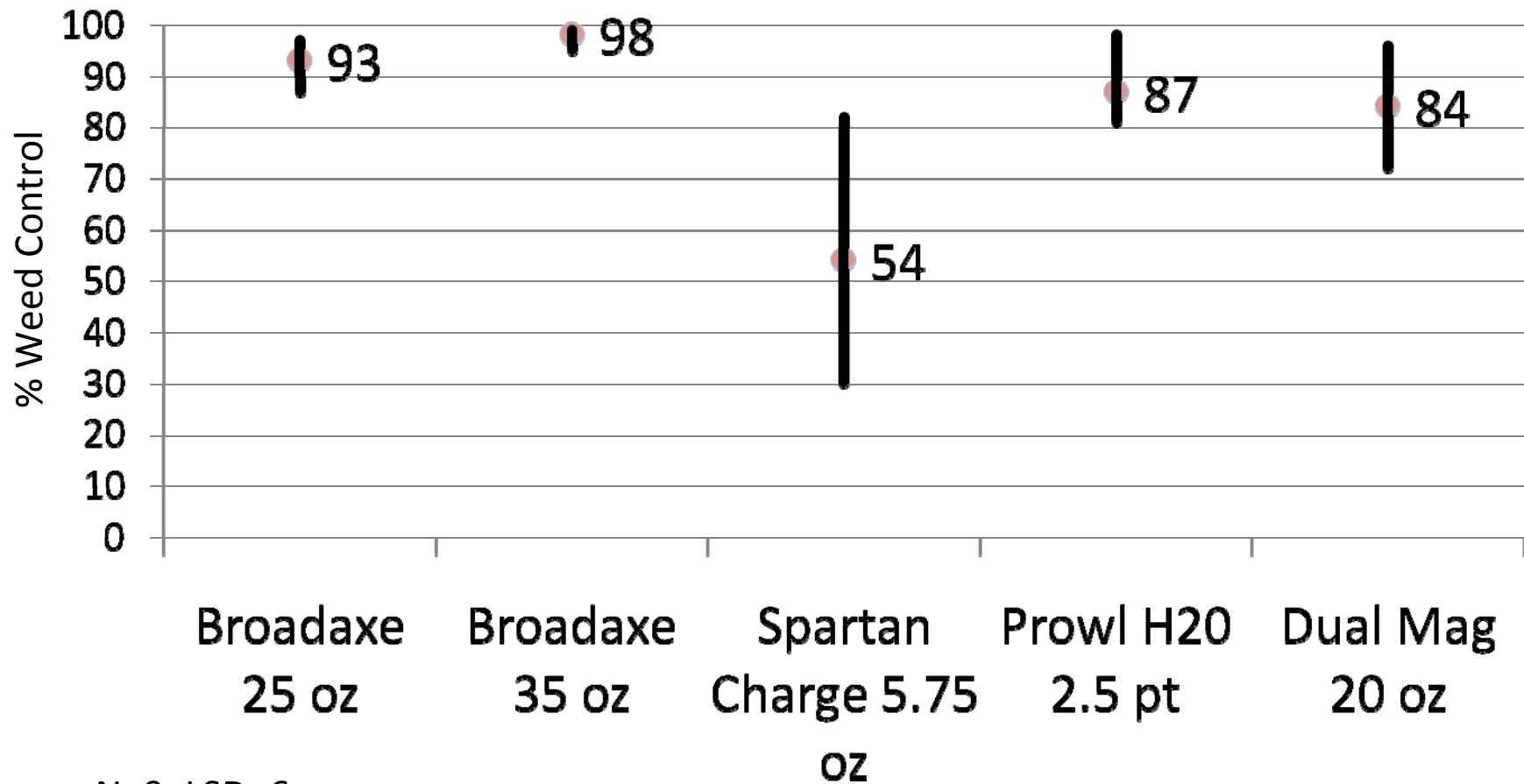
<1% OM, high pH, sandy coarse soil

Slight injury early but recovered

No yield impact

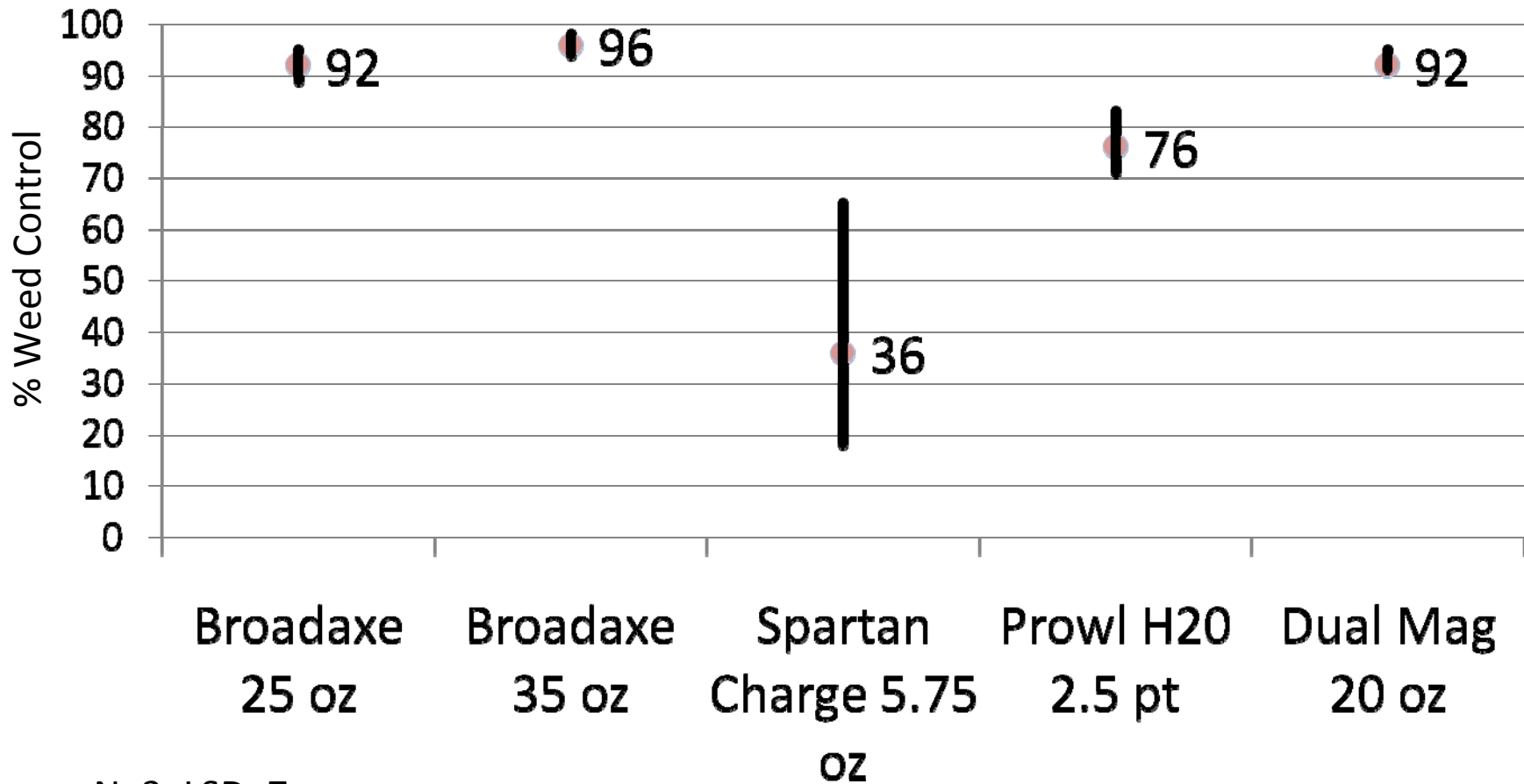
- Weed control: Consistent grass/broadleaf weed control

Green Foxtail Control 60 DAT



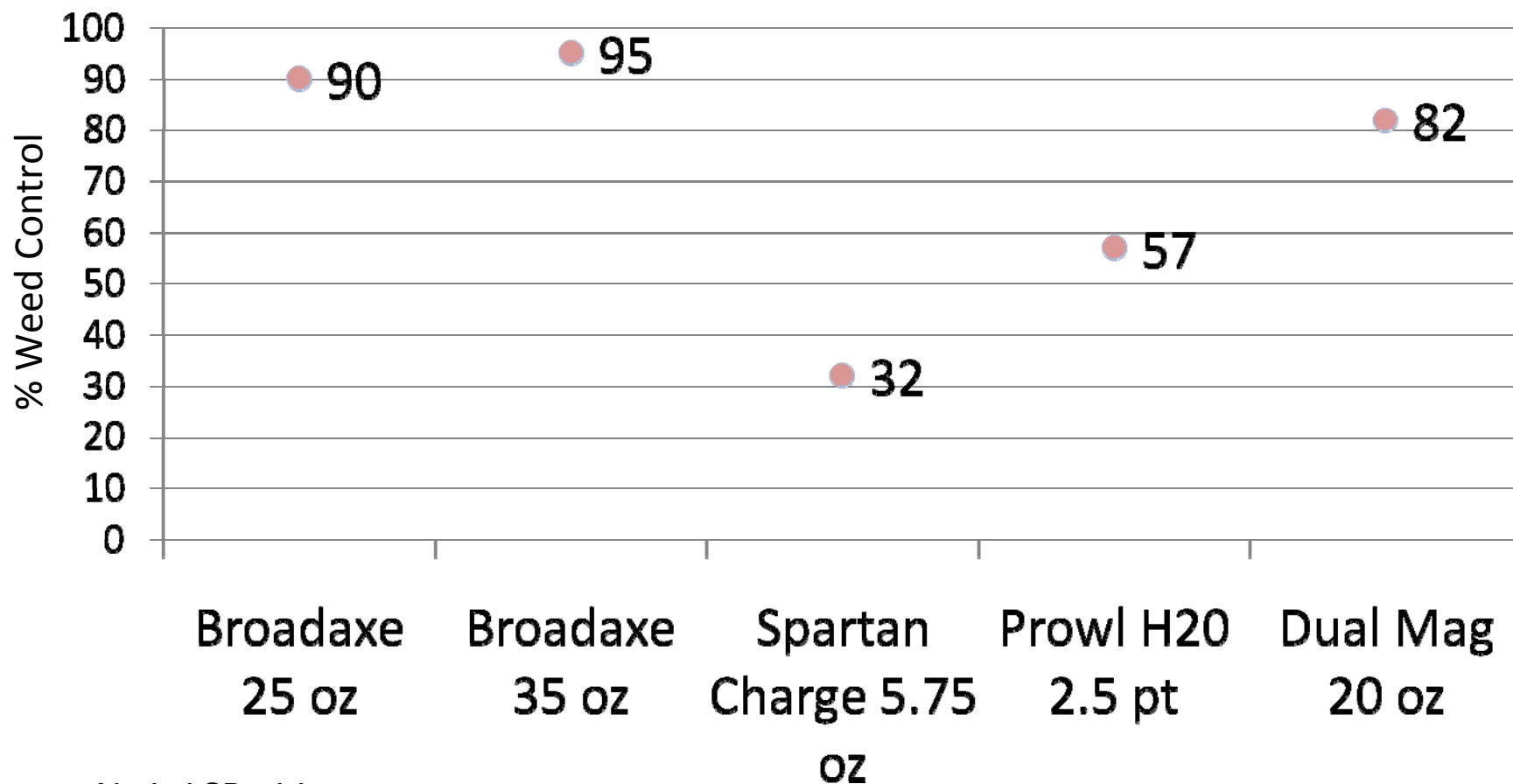
N=9, LSD=6

Yellow Foxtail Control 60 DAT



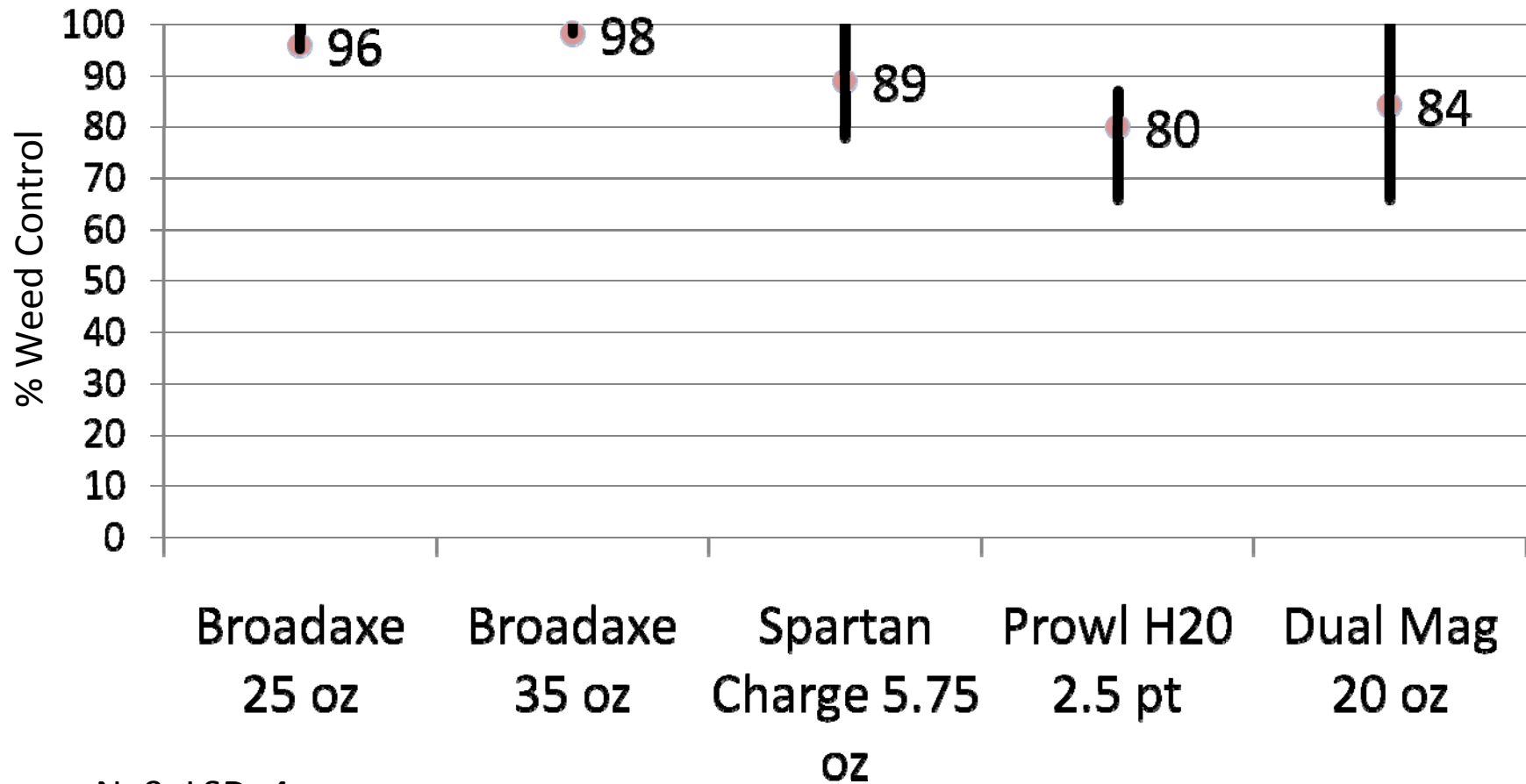
N=3, LSD=7

Barnyardgrass Control 30-45 DAT



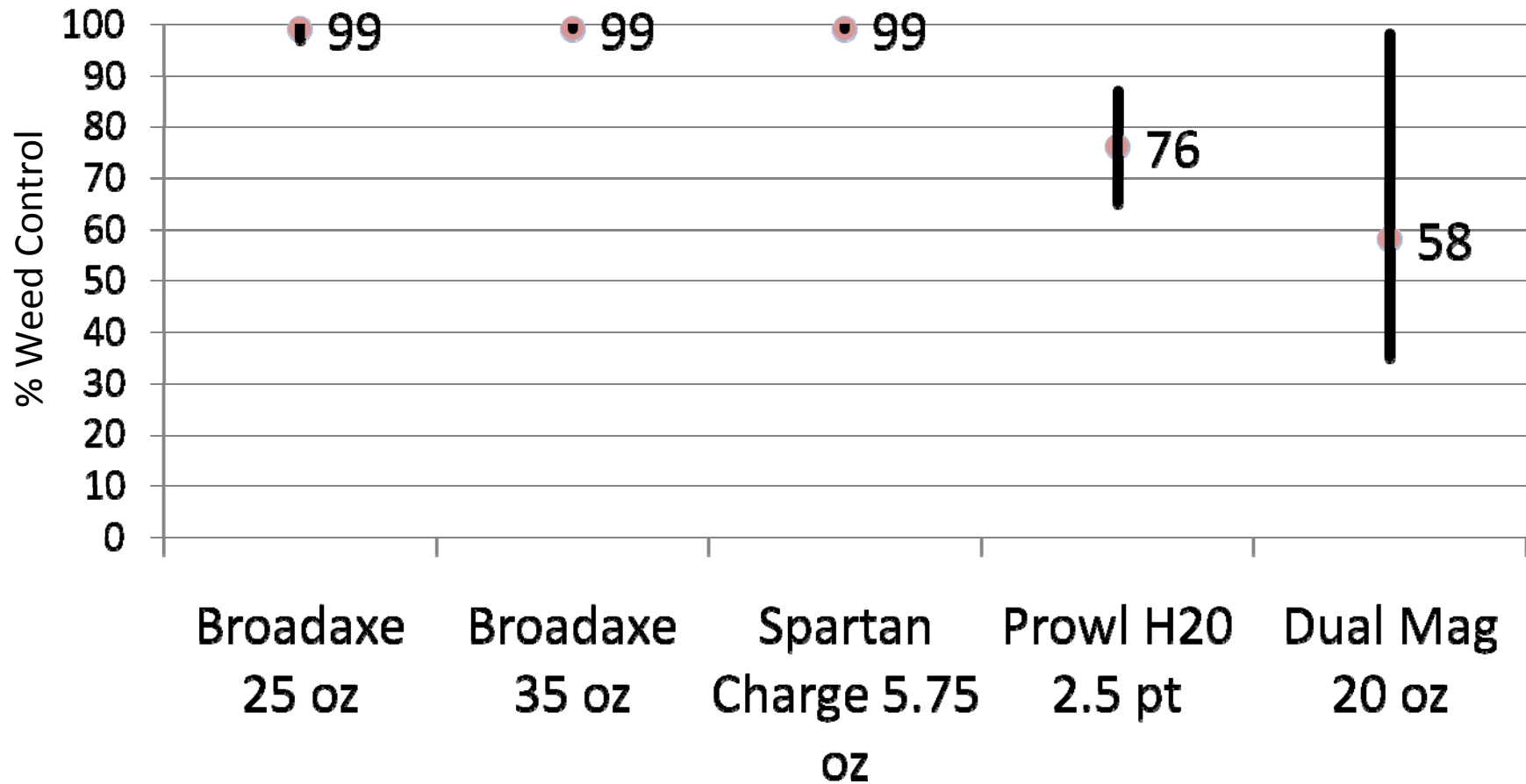
N=1, LSD=11

Redroot Pigweed Control 60 DAT



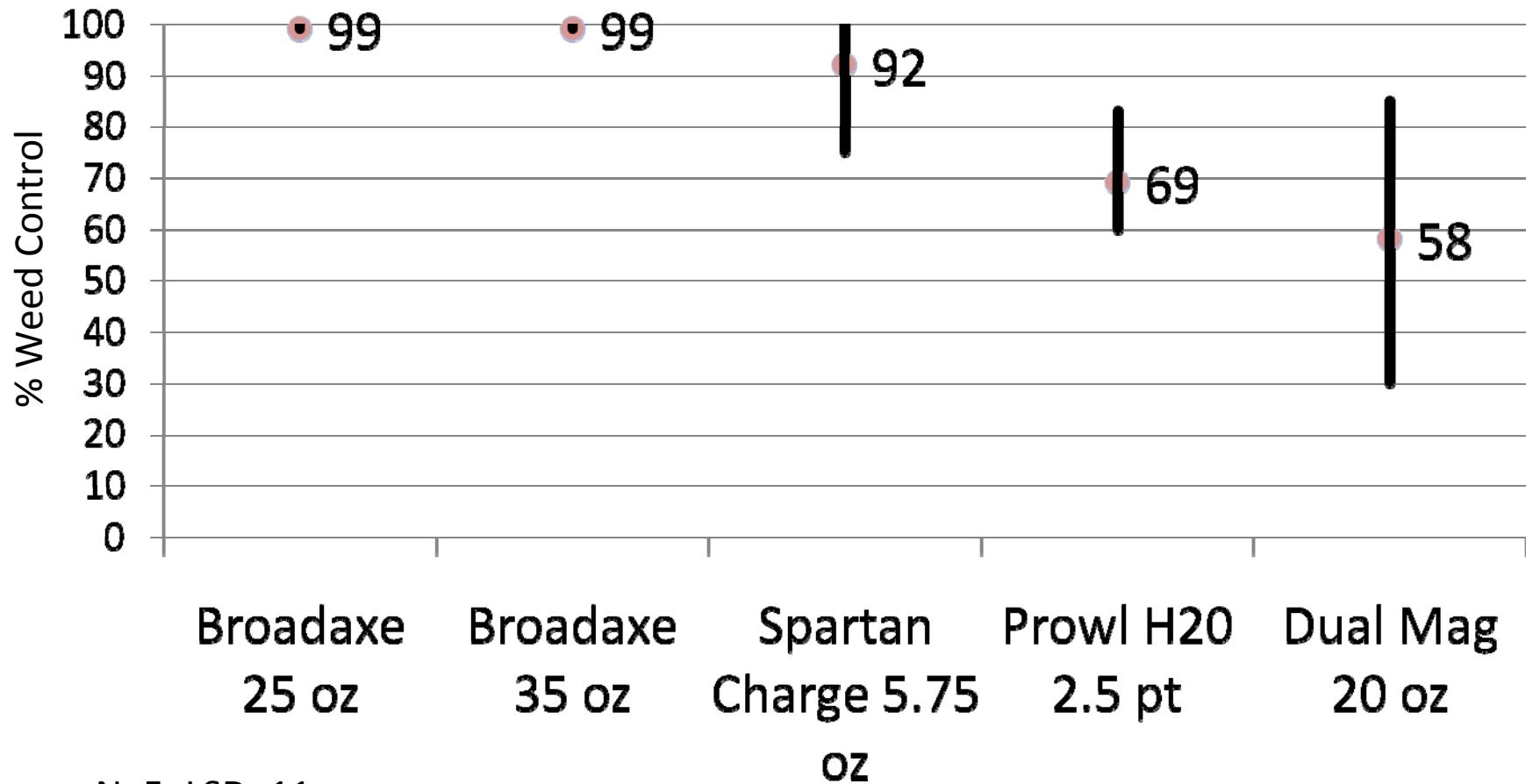
N=9, LSD=4

Lambsquarter Control 60 DAT



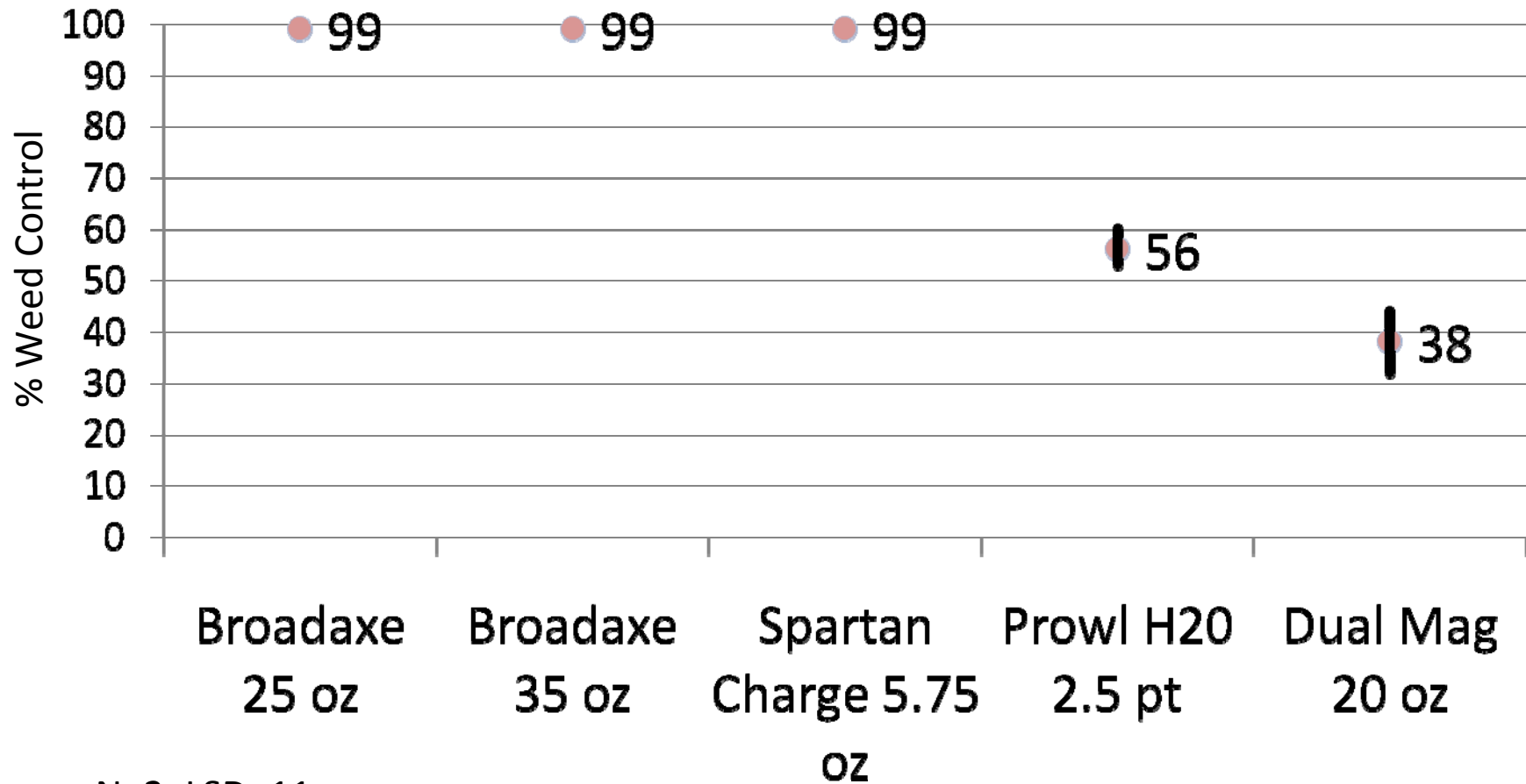
N=5, LSD=3

Kochia Control 60 DAT



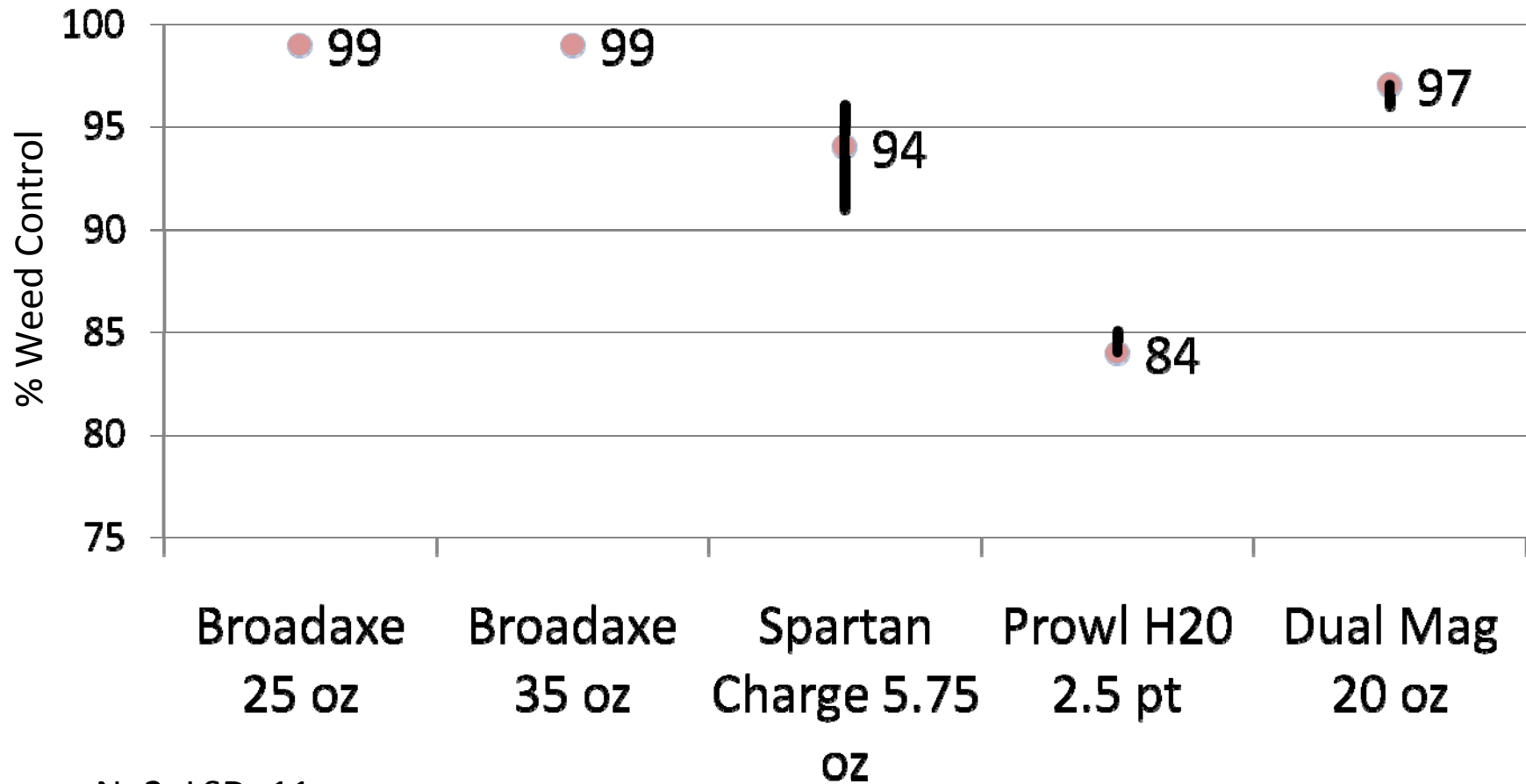
N=5, LSD=11

Russian Thistle Control 60 DAT



N=2, LSD=11

Palmer Amaranth Control 60 DAT



N=2, LSD=11

Sunflower Yield

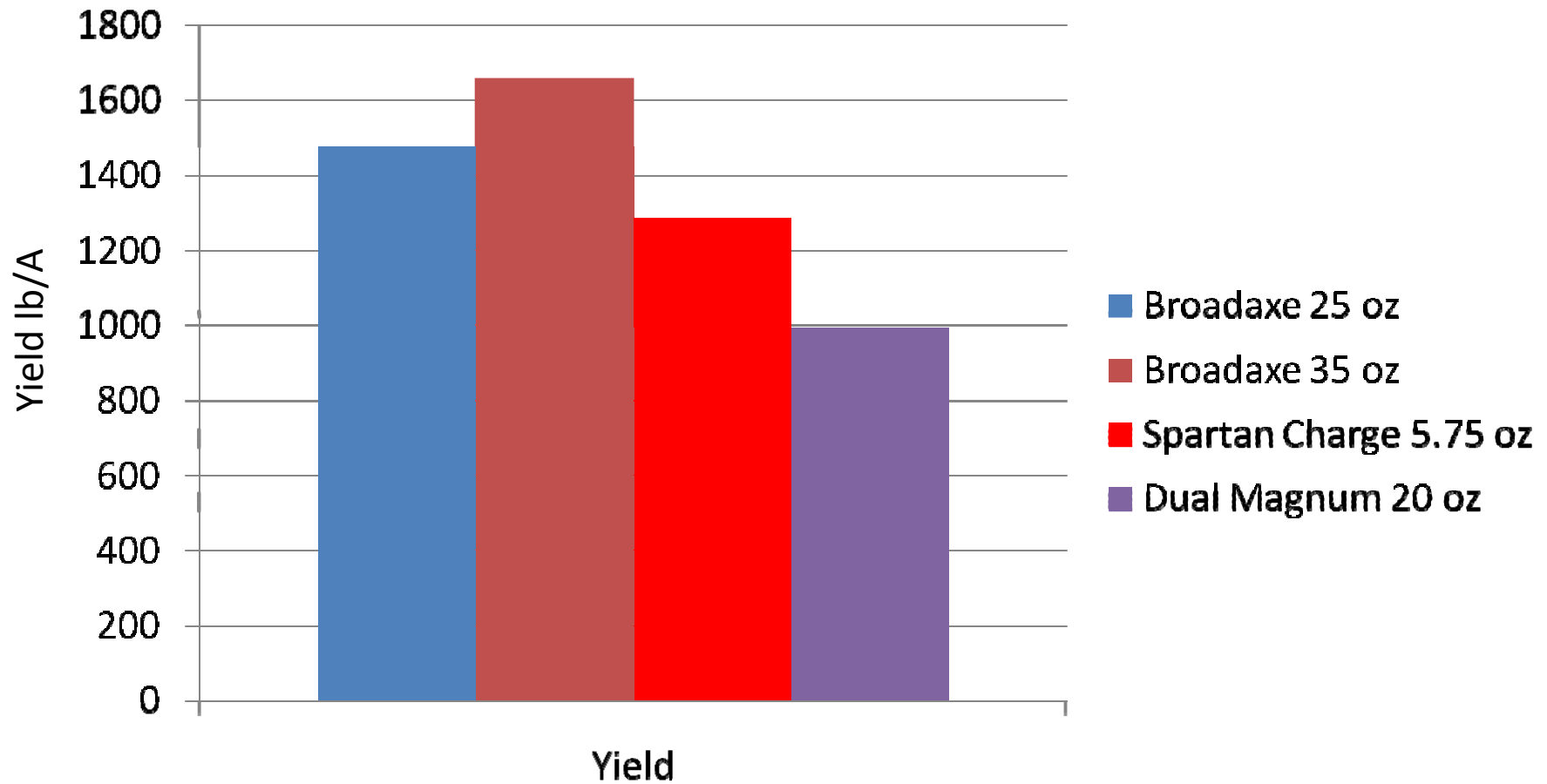


Table. BroadAxe in sunflower (Zollinger, Ries, Kazmierczak). 2011

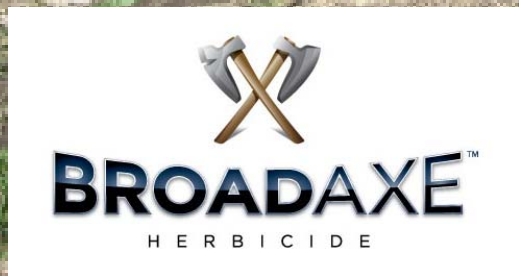
Treatment	Rate (product/A)	63 DAT - PRE								
		Fxtl	Bygr	Wimu	Rrpw	Colq	Ebns	Biww	Mael	Dand
		----- % control -----								
Dual Magnum	20fl oz	77	75	20	72	70	20	20	20	0
Spartan Charge	5.75fl oz	48	38	77	99	99	99	72	83	33
BroadAxe	25fl oz	87	88	99	96	99	99	83	92	43
BroadAxe	35fl oz	95	95	99	99	99	99	92	99	70
Prowl H ₂ O	2.5pt	83	53	23	90	90	0	20	0	0
Anthem	8fl oz	95	95	99	99	97	99	77	90	70
Anthem	10fl oz	98	98	99	9	99	99	80	93	68
LSD (0.05)		5	8	5	2	3	3	6	4	8

BroadAxe at 25 fl oz/A =

Dual Magnum = 20 fl oz/A

Spartan Charge = 5.75 fl oz/A

BroadAxe 34 oz/A next to Untreated 30 DAT





Untreated





North Dakota
90 DAT

Broadaxe 35 oz/A



Untreated



Nebraska
90 DAT
Broadaxe 25 oz/A



Untreated



Broadaxe control at bloom





Conclusion

- BroadAxe:
 - is new weed management tool for snfl growers
 - controls many grass and broadleaf weeds
 - provides consistent weed control
 - controls ALS and glyphosate resistant weeds including kochia
 - is an effective tool for both no-till and conventional till sunflower growers

Pyroxasulfone (Kumiai)

How is pyroxasulfone different than acetanilide herbicides (Dual, Outlook, Harness/Surpass)?

Registration / label pending

Crops: Corn, soybean, winter wheat

Weeds: Grass + many small-seeded and some large-seeded broadleaf weeds

Activation: Multiple rain events – 1 to 2 inches

Pyroxasulfone (Kumiai)

How is pyroxasulfone different than acetanilide herbicides (Dual, Outlook)?

Rate: 3 to 8 x less than Dual, Outlook, etc

Soil activity: 8 to 12 weeks - season-long control

Pyroxasulfone (Kumiai)

How is pyroxasulfone different than acetanilide herbicides (Dual, Outlook)?

Carryover restrictions

- Conservative = 0 months to wheat, corn, soy
- 18 months to all other crops

NDSU data shows excellent safety to all crops including sugarbeet 12 months after application

FOLLOW THE LABEL!

Pyroxasulfone (Kumiai)

How is pyroxasulfone different than Dual, Outlook?

Possibly registered on other crops:

sunflower, safflower, pulse crops, potato

Pyroxasulfone

- Regional Sunflower tolerance studies
- More data on weed control

NSA Proposal

- Regional Sunflower Herbicide Study
 - Mike Moechnig SDSU, Brookings, SD
 - Curtis Thompson KSU, Garden City, KS
 - Phil Stahlman KSU, Hayes, KS
 - Brian Olson KSU, Colby, KS
 - Dallas Peterson KSU, Manhattan, KS
 - Alan Helm CSU, Julesburg, CO
 - Brian Jenks NDSU, Minot, ND
 - Richard Zollinger NDSU, Fargo

NSA Research Summary

- KIH-485/pyroxasulfone
- NSA Research Timeline:
 - 2004-2005 – researchers saw selectivity
 - 2006 – NSA funded standard protocol
 - 2007 – Study repeated for validation
 - 2008 – KIH-485 + Spartan

06-07 Weed Control Summary

- Weeds controlled (80-99%):

Grasses

foxtail

crabgrass

wild oat

Jap. brome

Downy brome

Broadleaf weeds

pigweed

lambsquarters

kochia

nightshade

buckwheat

pigweed/amaranth

velvetleaf

puncture vine

Russian thistle

c. ragweed

marshelder

prostrate spurge

2008 Summary

- Sunflower injury from KIH-485 + Spartan:

6 of 8 researchers = 0% injury –

Spartan alone

KIH 485 alone

Spartan + KIH 485 in all combinations

2 researchers reported injury = ~15%

Snfl recovered quickly

No apparent yield penalty

Pyroxasulfone Snfl Registration

Timeline made to Kumiai:

Product: Pyroxasulfone

2008 Apply for ND Minor Use Fund

2009 IR-4 residue trials

2010-11 Possible Section 18

2013 Section 18 or..... Section 3

ND Department of Ag

Established a Minor Use Fund in 1997

Amount: ~\$350,000 per biennium

Purpose: To register pesticides on minor crops

Source: State pesticide reg. - \$125/prod

Proposal: NDSU + National Sunflower Assoc.
for MUF to support residue trials

Granted: \$75,000 for Spartan on sunflower
\$60,000 for Beyond on Clearfield

snfl

\$60,000 for Express on Express

R snfl

Pyroxasulfone - 2012

ZIDUA

By: BASF SE

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Chemicals used in agriculture, horticulture and forestry, especially plant fortifying preparations, plant growth regulating preparations, chemical preparations for the treatment of seeds, surfactants, natural or artificial chemicals to be used as sexual baits or agents to confuse insects

BASF signs herbicide licensing agreement with Kumiai

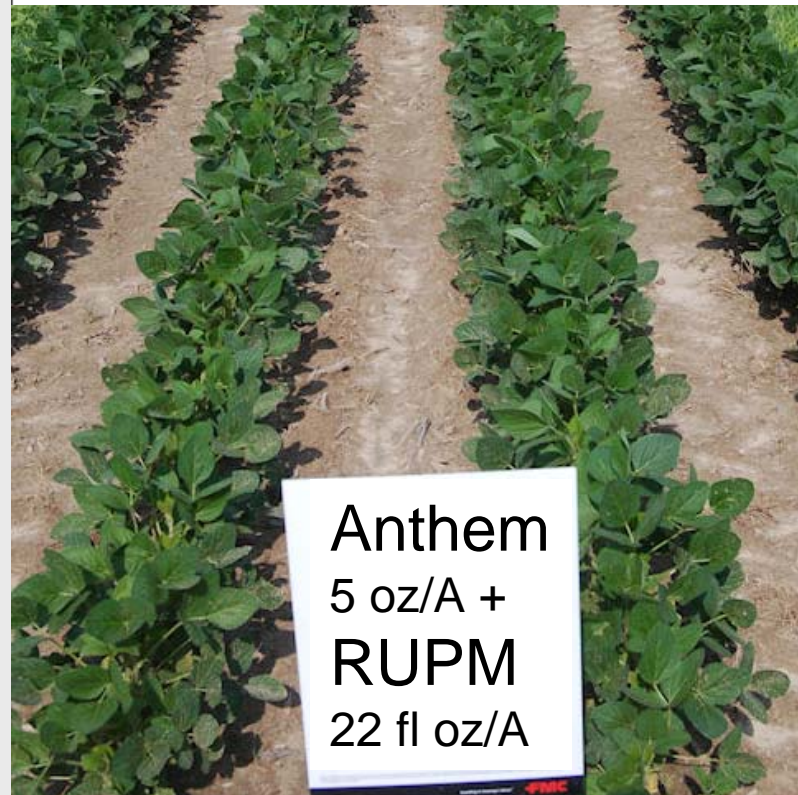
Source: corn and soybean digest 2011-1-21

Tags: Kumiai, BASF, herbicide, pyroxasulfone, Zidua

Zidua herbicide in the pipeline - BASF anticipates introducing its first solo herbicide product with pyroxasulfone in the United States in 2012

Anthem Could Strengthen FMC's role in Herbicide Market

Extraordinary new compound could be available next year.



FIERCE[™]
HERBICIDE 999

(Registration Pending)

TECHNICAL INFORMATION BULLETIN



Pyroxasulfone (Kumiai)

How is pyroxasulfone different than other acetanilide herbicides (Dual, Outlook)?

1.Active ingredient owned by Kumiai

2.Kumiai allow marketing to

Valent = Fierce (Valor + pyroxasulfone)

FMC = Anthem (Cadet + pyroxasulfone)

BASF = Zidua (pyroxasulfone)

Registration pending for all products.

October 19, 2011 - The Heavens Parted

RE: IR-4 pyroxasulfone project

Yoshihiro Yamaji <yyamaji@kichem-usa.com>

 You replied to this message on 10/19/2011 3:56 PM.

Sent: Wed 10/19/2011 2:10 PM

To: Zollinger, Richard; 'Gray, Jim A.'; Howatt, Kirk; 'Larry Kleingartner'; 'Lisa Setliff'; leo.charvat@basf.com; 'Scott A Fitter'

Dear Rich-san

Kumiai made a decision to move forward for sunflower using IR-4.
I replied IR-4 that Kumiai will support PR# 10932 pyroxasulfone/sunflower project.

Thank you for your consideration and proposal.

Yoshihiro Yamaji

K-I Chemical U.S.A. (Kumiai America)
11 Martine Avenue, Suite 1460
White Plains, NY 10606

PR NUMBER:
DATE RECD.: 09/2011

IR-4 PCR Form for Pyroxasulfone

1 REQUESTER:

Name: Rich Zollinger
Affiliation: North Dakota State University
Address: Dept of Plant Sciences, Loftsgard Hall, FARGO, ND 58109-6050
Phone: 701-231-8157 Fax: 701-231-8474 Email: r.zollinger@ndsu.edu

2 PESTICIDE (Common Name Mfg): pyroxasulfone (KIH-485)

3 COMMODITY:

CROP: Sunflower
USE SITE: Soil
PARTS CONSUMED: Seed
ANIMAL FEED BY PRODUCTS: No
PLANTING SEASON: May-June
HARVEST SEASON: October-November
LOCAL ACREAGE: 1.5 million acres
PERCENT NATIONAL ACRES: 3 million acres

4 POTENTIAL INTERNATIONAL CONSIDERATIONS:

IS THIS AN EXPORT COMMODITY?: Yes
KEY EXPORT MARKETS: Not sure
ARE THERE MRL'S ESTABLISHED IN KEY EXPORT MARKETS?: Yes
WHICH MARKETS: Not sure

5 TARGET PEST(S)/POTENTIAL EFFECTS: Annual grass and broadleaf weeds

6 WHY IS THIS USE NEEDED: Pyroxasulfone controls weeds that are not controlled

7 PROPOSED LABELLING:

TRADE NAME/FORMULATION: Zidua
DOSAGE RATE (Active Ingredient/Acre): 100-~~400~~ grams/ha
TYPE OF APPLICATION: Up to 30 days early preplant (EPP)

300.

Preplant incorporated (PPI)

Preemergence (PRE)

Early postemergence - up to 6-8 leaf stage.

NUMBER OF APPLICATIONS: 2 - Soil app (PRE) fb early POST

RE-TREATMENT INTERVAL (DAYS): 3 to 5 weeks

Pyroxasulfone (Kumiai)

Research Rates

(7 yrs)

166 g/ha = 2.4 oz/A

250 g/ha = 3.6 oz/A

332 g/ha = 4.7 oz/A

418 g/ha = 6.0 oz/A

500 g/ha = 7.1 oz/A

Commercial rates

(Expected)

100 g/ha = 1.4 oz/A

200 g/ha = 2.8 oz/A

300 g/ha = 4.25 oz/A

400 g/ha = 5.7 oz/A

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Opportunity for Snfl growers



WARRANT™ is an encapsulated herbicide for weed control in Soybeans and Cotton.

- Apply Early POST in soybean.
- Add Warrant with 1st glyphosate appl in RR soybean
- Gives 3 to 4 weeks residual control

Opportunity for Snfl growers



WARRANT™ is an encapsulated herbicide for weed control in Soybeans and Cotton.

compare

KIH-485
Pyroxasulfone

- Apply Early POST in sunflower.
- Add with Beyond or Express at V-4 snfl
- Gives 8 to 12 weeks residual control

Pyroxasulfone on Sunflower, 2011, Horace and Buffalo, ND

NDSU graduate student: Justin Mack

Treatments:

<u>Pyrox (PRE)</u>	fb	<u>Beyond</u>
100, 200, 400 g/ha		4 fl oz/A

<u>Pyrox (PRE)</u>	fb	<u>Pyrox (POST)</u>	+	<u>Beyond</u>
100		200, 400 g/ha		4 fl oz/A
200		200, 400 g/ha		4 fl oz/A
400 g/ha		100, 200, 400 g/ha		4 fl oz/A

Results:

Pyroxasulfone on Sunflower, 2011, Horace and Buffalo, ND

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400 g/ha		100, 200, 400 g/ha		4 fl oz/A

Results:

All PRE =

Snfl injury

0%

PRE fb POST =

7 DAT

14 DAT

28 DAT

16-41%

0-5%

0% injury

Plant height =

N/A

Delay flowering =

N/A

Yield =

N/A

Pyroxasulfone Weed Control, 2011, Hatton, ND

PRE = Jun 11, POST = Jul 11, V1-V2 deb, good activation.

		<u>28 DAT</u>	<u>42 DAT</u>	<u>60 DAT</u>
<u>Outlook PRE fb POST (1-3" weeds)</u>		(8/8)	(8/22)	(9/11)
Dual Magnum	1.33 pt	46	42	42
Warrant	1.5 qt	43	36	35
	2 qt	49	46	45
Zidua	100 g/ha	64	81	73
	200 g/ha	98	96	96
	300 g/ha	95	96	94
<u>POST (1-5" weeds) +</u>				
Result B+G +	1.6+1.6 pt	90	42	38
Dual Magnum	1.33 pt	53	42	35
Warrant	1.5 qt	70	57	48
	2 qt	71	60	56
Zidua	100 g/ha	92	92	91
	200 g/ha	91	93	94
	300 g/ha	95	96	95
LSD (0.5)		8	9	10

Data averaged over fxtl, rrpw, colq, and ebns

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Herbicide Summary

BroadAxe – Registration / label pending

Excellent foundation weed control

Zidua (pyroxasulfone) – Reg. / label pending

Crops: Corn, soybean, winter wheat

Snfl: Excellent safety

Excellent weed control

PRE fb EPOST – extend residual control

High utility potential lost!



Area
C7

beef hot dog

50¢

IKEA FOOD

Not actual size

AISLES

← 38, 40



CHECK-OUTS
HOME DELIVERY
EXIT

AISLES

35, 37
39, 41 →

EXIT

\$99 99

WINNING AT DISAPPOINTMENT

Winning at Everything.com