Sunflower response to KIH-485

R.K. Zollinger and J.L. Ries
North Dakota State University

KIH-485

KIH-485 (pyroxasulfone) – Kumiai America

- PPI/PRE corn herbicide (rainfall needed)
- 2.8 to 5.6 oz ai/A (60 WDG)
- Unknown mode of action
- Compare to acetanilides – Dual, Lasso, etc.
- Excellent corn safety (Registration 2008)
- Season-long grass and broadleaf weed control.
- No carryover

Poor cocklebur, ragweed, sunflower control

Materials and Methods

- Weed efficacy and crop safety studies
  - Two years (2004-2005)
  - 3 locations and soil types

Casselton, ND – clay loam	4.9% OM
Carrington, ND – loam	5.6% OM
Valley City, ND – sandy loam	2.5% OM

Casselton, ND – Fine Texture

Treatment	Rate	42 DAT		73 DAT				
		Yeft	Wimu	Yeft	Wimu	Rrpw	Colq	Wibw
	(prod/A)	% control		% control				
KIH-485	1.5 oz	87	87	99	50	99	99	50
	3.0 oz	99	78	99	83	99	99	88
	*3.6 oz	99	83	99	91	99	99	95
	4.3 oz	99	95	99	99	99	99	99
Dual Magnum	1.5 pt	70	20	82	0	73	73	0
	2 pt	83	40	87	0	78	75	0
Harness/Surpass	2 pt	99	63	99	83	72	99	62
	3 pt	98	75	99	99	99	99	63
Outlook	10 fl oz	75	30	72	0	99	99	0
	21 fl oz	90	40	90	40	99	99	0
Define	11 fl oz	80	20	77	0	90	90	0
	22 fl oz	93	30	83	0	95	95	0
LSD (0.05)		3	4	3	2	2	2	4

Carrington, ND – Med. texture

Treatment	Rate	Fxtl	Rrpw	Colq	Wibw	Fxtl	Rrpw	Colq	Wibw	Koch
	(prod/A)	- - - - % control - - - -				- - - - -- - - % control - - - - -				
KIH-485	1.2 oz	99	99	95	87	99	99	95	87	80
	2.4 oz	99	99	99	92	99	99	99	92	70
	*3.0 oz	99	99	99	99	99	99	99	99	99
	3.6 oz	99	99	99	99	99	99	99	99	99
Dual Magnum	0.65 pt	99	80	68	53	99	67	60	23	20
	1.3 pt	99	83	80	57	99	70	70	30	30
Harness/	1.4 pt	99	99	98	93	99	99	85	50	50
Surpass	2 pt	99	99	99	99	99	99	91	96	68
Outlook	9 fl oz	99	90	73	67	99	90	65	30	20
	19 fl oz	99	99	83	77	99	99	83	47	37
Define	10 fl oz	93	57	73	40	88	37	37	0	0
	20 fl oz	99	85	92	50	99	70	80	30	30
LSD (0.05)		5	5	6	5	4	4	7	5	3

Fxtl = green and yellow foxtail

Valley City, ND – Coarse texture

		35DAT	42 DAT				82 DAT			
Treatment	Rate	Grft	Grft	Corw	Mael	Wibw	Grft	Corw	Mael	Wibw
	(prod/A)	% cntrl	- - - - % control - - - -				- - - - % control - - - -			
KIH-485	0.9 oz	80	80	40	40	80	80	79	79	83
	1.8 oz	96	96	99	99	85	96	99	99	99
	*2.4 oz	98	98	99	99	99	97	99	99	99
	3.0 oz	99	99	99	99	99	99	99	99	99
Dual Mgnm	0.5 pt	78	50	0	0	0	50	0	0	0
	1 pt	80	77	30	60	30	77	30	30	30
Harness/	0.6 pt	99	99	75	75	40	99	99	60	40
Surpass	1.2 pt	99	99	83	83	50	99	99	90	90
Outlook	8 fl oz	99	87	70	70	20	85	99	70	20
	16 fl oz	97	87	80	80	40	90	99	80	50
Define	9 fl oz	68	60	57	57	30	60	90	57	30
	18 fl oz	88	87	70	70	30	90	90	70	30
LSD (0.05)		3	4	3	3	5	3	15	15	13

Conclusions

- KIH-485 weed efficacy is = or > at rates 3 to 8 times lower than other labeled products
- Good activity in coarse, medium, and fine textured soils
- KIH-485 controlled:

foxtail
lambsquarters
redroot pigweed
wild mustard
kochia
nightshade
wild buckwheat
common ragweed
marshelder

common cocklebur – 13-30% at 4.3 oz/A

KIH-485

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Poor cocklebur, giant ragweed, sunflower control

NSA Proposal

- Weed control demonstrated

- Objectives:

  Sunflower response to KIH-485

NSA Proposal

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

NSA Proposal

- Regional Sunflower Herbicide Protocol
  - KIH-485 rate by soil type

Medium texture	Coarse texture
2.8 oz ai/A	2.4 oz ai/A
3.5 oz ai/A	3.0 oz ai/A
4.2 oz ai/A	4.8 oz ai/A
7 oz ai/A	6.0 oz ai/A

Apply according to normal practices at location
No-till, conventional, Clearfield, Express Resistant

Helm - Colorado

		Sunflower	
	Rate	% injury	yield
KIH-485	2.8 oz ai/A	0	3098
	*3.5 oz ai/A	0	3099
	4.2 oz ai/A	0	2588
	7.0 oz ai/A	0	3314
Control		0	3322
LSD (0.05)		0	808

* = x rate for soil type

Injury data averaged over 22, 43, 62, 95 DAA

Conditions were dry after application.

Helm - Colorado

	Grft	Dand	Koch	Ruth	Rrpw
	---------- % control ----------				
KIH-485					
2.8 oz ai/A	62-88	43-83	53-93	50-92	53-92
*3.5 oz ai/A	83-92	47-83	58-88	57-88	47-88
4.2 oz ai/A	80-92	50-85	53-92	55-90	47-83
7 oz ai/A	87-93	52-82	62-92	55-93	52-88
Untreated	0	0	0	0	0
LSD (0.05)	9	8	4	6	9

* = x rate for soil type.

Control ratings averaged over 22, 43, 62, 95 DAA

Conditions were dry after application.

Olsen - Colby, KS

		Sunflower		
	Rate	% injury	pl/A	yield
KIH-485	2.8 oz ai/A	3	18,300	2308
	*3.5 oz ai/A	3	18,590	2121
	5.6 oz ai/A	4	17,140	2227
	7.0 oz ai/A	10	16,260	2194
Control		0	17,420	2248
LSD (0.05)		ns	ns	ns

* = x rate for soil type

Injury data averaged over 13, 22, 40 DAA

Conditions were dry after application.

Olsen - Colby, KS

	Tumble pw
	% control
KIH-485	
2.8 oz ai/A	97
3.5 oz ai/A	99
4.2 oz ai/A	99
7 oz ai/A	99
Untreated	0
LSD (0.05)	ns

* = x rate for soil type.

Control ratings averaged over 13, 22, 40 DAA

Conditions were dry after application.

Thompson - Tribune, KS

		Sunflower		
	Rate	% injury	pl/A	yield
KIH-485	2.4 oz ai/A	0	26,300	1300
	*3.0 oz ai/A	0	24,850	1570
	4.8 oz ai/A	0	21,780	1770
	6.0 oz ai/A	1	23,400	1410
Control		0	29,600	1370
LSD (0.05)		ns	3,100	ns

* = x rate for soil type

Injury data July 20, 2006

Conditions were dry after application.

Thompson – Tribune, KS

	Koch	Ruth	Tupw	Rrpw	Puvi
	---------- % control ----------				
KIH-485					
2.4 oz ai/A	65	83	93	90	86
*3.0 oz ai/A	70	91	95	90	88
4.8 oz ai/A	63	94	95	92	91
6 oz ai/A	71	93	98	99	92
Untreated	0	0	0	0	0
LSD (0.05)	ns	ns	ns	ns	ns

* = x rate for soil type.

Control ratings July 20, 2006

Conditions were dry after application.

Stahlman – Hays, KS

		Sunflower	
	Rate	injury	yield
KIH-485	2.4 oz ai/A	0	-
	*3 oz ai/A	0	-
	4.8 oz ai/A	0	-
	6 oz/A	0	-
Control		0	-
LSD (0.05)		ns	-

* = x rate for soil type

Injury data July 17, 2006 = 59 DAA

Conditions were dry after application.

Stahlman – Hays, KS

	Grft	Koch	Tupw	Rrpw	Prsp
	---------- % control ----------				
KIH-485					
2.4 oz ai/A	83	38	95	93	85
*3.0 oz ai/A	94	53	98	98	85
4.8 oz ai/A	93	63	99	95	85
6 oz ai/A	94	62	95	99	85
Untreated	0	0	0	0	0
LSD (0.05)	ns	16	ns	ns	ns

* = x rate for soil type.

Control ratings July 17, 2006 = 59 DAA.

Conditions were dry after application.

Peterson – Manhattan, KS

		Sunflower	
	Rate	injury	yield
KIH-485	2.4 oz ai/A	0	-
	*3 oz ai/A	0	-
	4.7 oz ai/A	0	-
	6 oz/A	0	-
Control		0	-
LSD (0.05)		ns	-

* = x rate for soil type

Injury data averaged over 0.75, 1, 2, 4 MAA.

Conditions were dry after application – 2.8 inches 1st 4 WAA.

Peterson – Manhattan, KS

	Lacg	Paam	Vele
	---------- % control ----------		
KIH-485			
2.4 oz ai/A	90-94	91-98	65-75
*3 oz ai/A	91-96	94-97	78-81
4.8 oz ai/A	98-99	95-98	83-85
6 oz ai/A	97-99	99	88-91
Untreated	0	0	0
LSD (0.05)	6-7	5-8	15-22

* = x rate for soil type.

Control ratings averaged over 0.75, 1, 2, 4 MAA

Conditions were dry after application – 2.8 inches after 1st 4 WAA.

Moechnig/Deneke – Highmore, SD

		Sunflower	
	Rate	injury	yield
KIH-485	2.8 oz ai/A	0	-
	*3.5 oz ai/A	0	-
	5.6 oz ai/A	0	-
	7 oz/A	0	-
Control		0	-
LSD (0.05)		ns	-

* = x rate for soil type

Injury data averaged over 1 and 4 MAA

Conditions were dry after application.

Moechnig/Deneke – Highmore, SD

	Grft	Koch
	---- % control ----	
KIH-485		
2.8 oz ai/A	85	89
*3.5 oz ai/A	88	88
5.6 oz ai/A	93	87
7 oz ai/A	94	93
Untreated	0	0
LSD (0.05)	7	ns

* = x rate for soil type.

Control ratings Sept 4, 2006 = 112 DAA

Conditions were dry after application – 2.8 inches after 1st 4 WAA.

Jenks – Minot, ND

	Sunflower			
	pl/2 row	Jul 13	Aug 16	Yield
		-- % injury --		lb/A
KIH-485				
2.4 oz ai/A	48	2	2	814
*3.0 oz ai/A	43	10	8	599
4.8 oz ai/A	37	23	17	852
6 oz ai/A	41	24	20	1082
Untreated	48	0	0	255
LSD (0.05)	6	6	6	670

* = x rate for soil type.

Conditions were very dry after application.

Zollinger – Prosper, ND

		Sunflower	
	Rate	injury	yield
KIH-485	2.8 oz ai/A	0	-
	*3.5 oz ai/A	0	-
	4.2 oz ai/A	0	-
	7 oz/A	0	-
Control		0	-
LSD (0.05)		ns	-

* = x rate for soil type

Injury data averaged over 9, 21, and 35 DAA

Conditions were dry after application.

Zollinger – Prosper, ND

	Yrft	Rrpw	Colq	Hans	Corw
	---------- % control ----------				
KIH-485					
2.8 oz ai/A	75	70	77	80	42
*3.5 oz ai/A	78	91	92	88	62
4.2 oz ai/A	88	96	96	91	78
7 oz ai/A	86	97	97	94	83
Untreated	0	0	0	0	0
LSD (0.05)	9	4	8	7	6

* = x rate for soil type.

Control ratings averaged over 9, 21, and 35 DAA.

Conditions were dry after application.

Zollinger – Valley City, ND

	Snfl	Mael
	% injury	% control
KIH-485		
2.8 oz ai/A	0	82
*3.5 oz ai/A	0	91
4.2 oz ai/A	0	92
7 oz ai/A	5	93
Untreated	0	0
LSD (0.05)	ns	ns

* = x rate for soil type.

Injury and control ratings averaged over 7, 14, and 42 DAA

Conditions were dry after application.

Zollinger – Valley City, ND

	Rate	Sunflower			Mael
		7 DAA	14 DAA	42 DAA	
	(/A)	---------- % injury ----------			% control
KIH-485 + Spartan	2.8 oz 3 fl oz	11	8	0	94
KIH-485 + Spartan	3.5 oz 3 fl oz	8	3	0	93
KIH-485 + Spartan	2.8 oz 4 fl oz	22	18	0	91
KIH-485 + Spartan	3.5 oz 4 fl oz	12	9	0	94
Untreated		0	0	0	0
LSD (0.05)		6	10	0	4

Summary

- Sunflower injury from KIH-485 at
  - x rate was <3% (10% at Minot)
  - 2x rate was <10% (24% at Minot)

- Weeds controlled (80-99%):

foxtail	kochia	russian thistle
crabgrass	pigweed sp	amaranth
	velvetleaf	puncture vine
	lambsquarters	nightshade
	c. ragweed	marshelder

Summary

- Studies should be repeated in 2007:
  - KIH-485 activity compromised by dry conditions in Plains and Upper Plains.
  - Sunflower response should be documented under conditions where herbicide is activated.
  - Explore combinations with Spartan.
- Adequate safety is required before proceeding with registrations efforts through IR-4 and Kumiai.