

Tolvera Grass Control in Small Grains

Hayden Lee, Kirk Howatt, Joe Mettler

Grass Weed Control in Small Grains

- Postemergence control is limited to Groups 1 and 2
 - Selecting for resistance problems
- Green foxtail has become resistant to both groups
- Now where do we go for in season herbicide control?

- Provides broadleaf and grass weed control labelled in spring and winter wheat, durum, and barley
- Similar to herbicides such as Huskie and Talinor

A.I.

***Tolpyralate**

Bromoxynil

Mode of Action (*Group*)

27 (*HPPD inhibitor*)

6 (*Photosynthesis II inhibitor*)

Tolpyralate is an active ingredient new to the cereals market

Weed control

C - Controlled S - Suppressed

Broadleaf

C Amaranth, Palmer, Powell	S Horseweed/Marestail	C Ragweed, common, giant
C* Bedstraw, catchweed / cleaver	C* Kochia	C Shepherd's-purse
C* Buckwheat, wild	C Lambsquarters, common	C Smartweed, pale, Pennsylvania
C Canola, volunteer	C London rocket	C Sowthistle, annual, spiny
S/C* Chickweed, common	C Mallow, common, low, Venice	S Sowthistle, perennial
S Dock, curly	C Mustard, birdsrape/wild turnip, black, blue, tumble/Jim Hill mustard, white, wild	C Tansy mustard
C Field pennycress	S Pepperweed, Virginia	S Thistle, Canada
C Hawksbeard, narrowleaf	C Pigweed, prostrate, redroot, Russian, smooth	C Thistle, Russian
C Hempnettle, common	S Prickly lettuce (China Lettuce)	C Waterhemp, tall
S Henbit	C Radish, wild	

Grass

C Barnyardgrass	C Crabgrass, large	C* Foxtail, green, yellow
-----------------	--------------------	---------------------------

*For control of plants at more advanced growth stages, use the higher rate of 14.7 fl oz/A

† Chickweed suppressed at 11 fl oz/A and controlled at 14.7 fl oz/A

See label for full details



Tolvera Research Trials

- Field trials conducted summers 2023-2024
 - Testing Tolvera application timing on resistant green foxtail
 - Comparing Tolvera control to Group 1 and 2 herbicides
- Greenhouse trials conducted winter of 2023-2024
 - State green foxtail resistance screening
 - Species dose response experiments on 8 different grass weeds

Field Research

- RCBD with 4 reps, 8.5 gpa, applied at 3 growth stages
 - (1-2 leaf, 2-3 leaf, 4 leaf-tilling)

Trt #	Treatment	Rate	Unit
1	Check		
2	Tolpyralate L (Shieldex)	0.514	fl oz/a
	MSO	0.5	% v/v
3	Tolpyralate H (Shieldex)	0.685	fl oz/a
	MSO	0.5	% v/v
4	Tolvera L	11	fl oz/a
	MSO	0.5	% v/v
5	Tolvera H	14.7	fl oz/a
	MSO	0.5	% v/v
6	Axial Bold	15	fl oz/a
7	TeamMate	1	oz wt/a
	BB	1	% v/v

Treatments for
each application
timing

Prosper Location '23

-Group 1 resistant green foxtail -Late tillering application timing



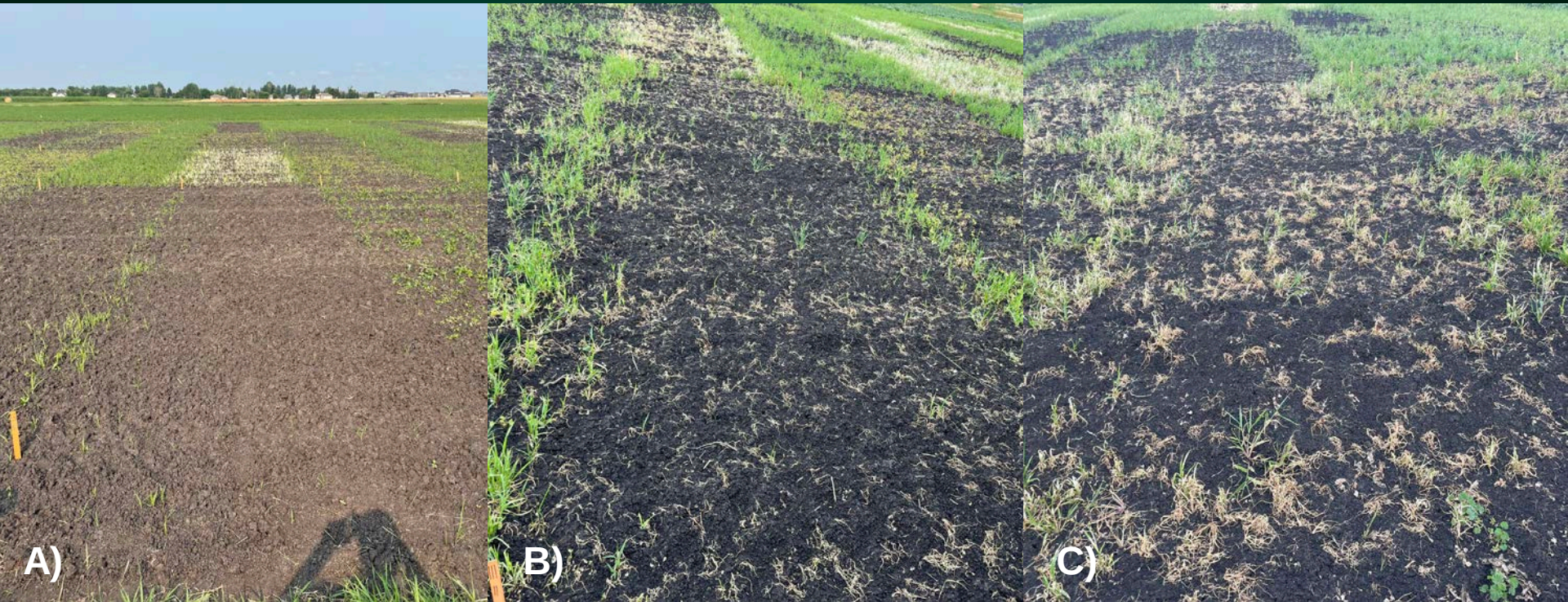
Tolvera 14.7 fl oz/A



Axial Bold 15 fl oz/A

Fargo Location '24

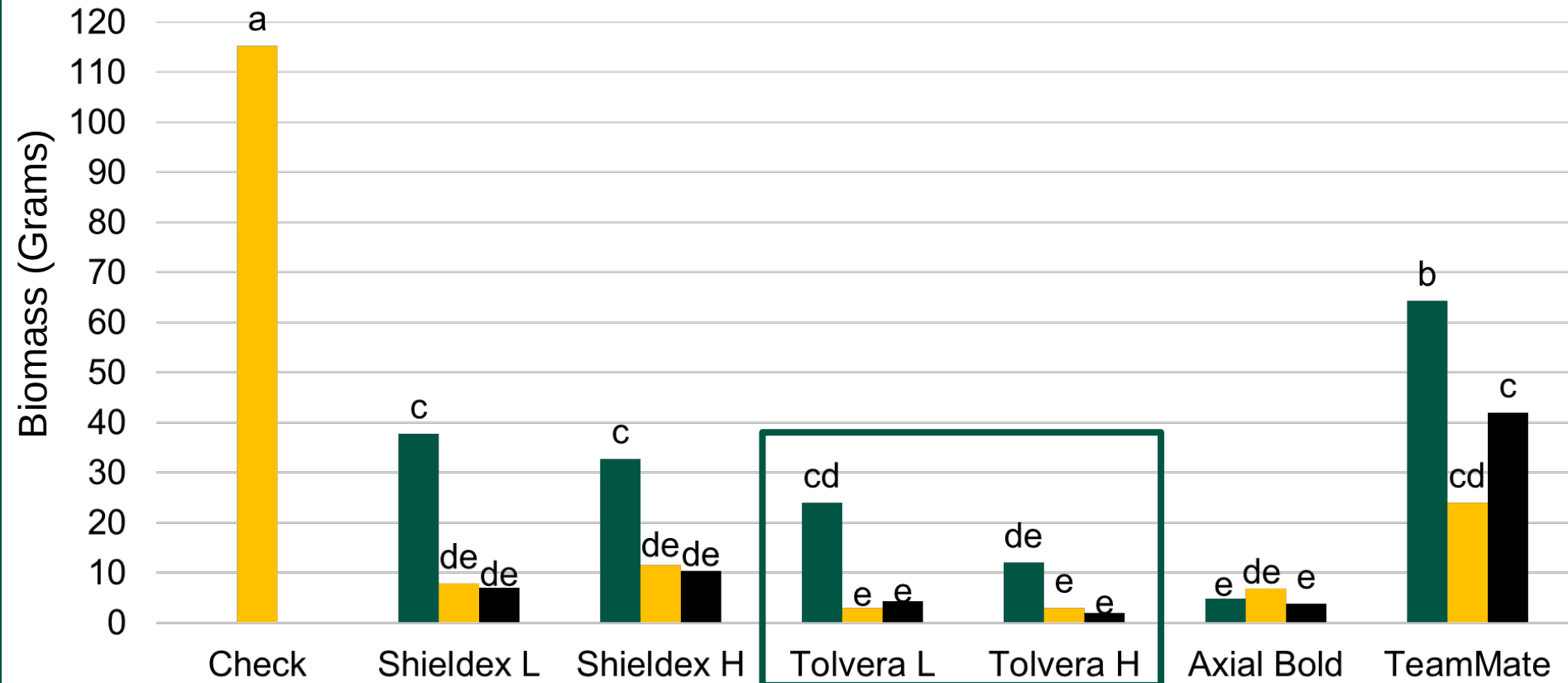
Tolvera 14.7 fl oz/A



21 DAT for application timing A (1-2 leaf), B (3-4 leaf), and C (4 leaf-tillering)

Green foxtail biomass at Fargo

■ 1-2 leaf ■ 3-4 leaf ■ tillering



Green Foxtail State Screening

- RCBD with 4 reps,
17 gpa, 37 problematic
ecotypes

*Oil adjuvant for Group
1's, NIS + AMSOL for
Group 2's

Trt #	Treatment	Rate	Unit
1	Check		
2	Tacoma	10.7	fl oz/a
3	Axial XL	16.4	fl oz/a
4	Select	6	fl oz/a
5	Assure II	8	fl oz/a
6	Everest 3.0	2	fl oz/a
7	Varro	6.85	fl oz/a
8	TeamMate	1	oz wt/a
9	Beyond Extra	4	fl oz/a
10	Tolvera	14.7	fl oz/a
11	Tolpyralate (Shieldex)	0.685	fl oz/a
12	PowerMax3	32	fl oz/a

Group 1

Group 2

Population		21 DAT Visual Evaluations (% injury)											% injury
		Group 1				Group 2							
		Tacoma	Axial XL	Select	Assure II	Everest	Varrow	TeamMate	Beyond	Tolvera	Shieldex	Roundup	
D		0	0	51	0	10	0	12	40	95	95	100	0-35
J		10	20	51	60	61	51	59	95	90	90	100	36-55
C		0	0	51	10	61	61	59	90	95	95	100	56-79
I		100	97	92	100	51	61	71	95	95	90	100	80-100
P		20	31	87	75	41	0	29	40	95	95	100	
A		0	0	77	60	0	0	12	85	98	98	100	
FF		99	30	63	99	84	100	47	0	99	94	100	
EE		100	100	100	100	0	0	0	100	98	100	100	
O		90	90	89	95	63	80	59	100	98	100	100	
M		100	100	100	99	0	0	0	100	95	100	100	
Q		0	20	63	0	79	67	59	100	95	100	100	
GG		95	95	100	97	84	35	13	84	95	100	100	
LL		98	95	100	100	95	100	100	95	95	95	100	
6		0	0	87	10	89	59	50	89	89	89	98	
15		10	21	92	82	89	100	100	95	95	95	100	
4		10	21	87	61	95	59	63	95	95	95	100	
11		0	11	87	66	89	47	63	89	89	89	100	
YY		0	20	87	41	92	89	89	87	100	100	100	
QQ		61	31	87	87	87	89	89	87	95	94	98	
ZZ		82	71	92	82	0	0	0	92	100	100	100	
UU		0	0	92	77	61	74	67	92	100	100	100	
3		0	0	100	0	97	74	56	97	100	100	100	
13		0	0	92	0	92	79	56	100	100	100	100	
20		10	20	87	71	87	89	83	92	100	100	100	
OO		0	71	100	11	100	100	100	94	100	100	100	
PP		0	0	100	0	100	50	57	100	100	100	100	
RR		0	100	100	11	0	50	57	100	100	100	100	
SS		0	94	100	16	19	19	0	100	100	100	100	
TT		0	71	94	32	100	94	100	100	100	100	100	
VV		71	59	94	53	50	50	57	100	100	100	100	
II		0	0	21	0	84	78	78	89	95	95	100	
NN		0	11	89	21	89	83	67	95	100	100	100	
XX		0	0	95	42	0	0	0	100	100	100	100	
30		32	53	100	74	84	67	56	89	100	95	100	
31		42	32	63	68	100	100	100	100	100	100	100	
32		53	0	89	21	79	44	44	95	100	100	100	
33		53	0	89	89	79	44	44	95	95	95	100	

Population	21 DAT Visual Evaluations (% injury)												% injury
	Group 1				Group 2								
	Tacoma	Axial XL	Select	Assure II	Everest	Varrow	TeamMate	Beyond	Tolvera	Shieldex	Roundup		
D	0	0	51	0	10	0	12	40	95	95	100	0-35	
J	10	20	51	60	61	51	59	95	90	90	100	36-55	
C	0	0	51	10	61	61	59	90	95	95	100	56-79	
I	100	97	92	100	51	61	71	95	95	90	100	80-100	
P	20	31	87	75	41	0	29	40	95	95	100		
A	0	0	77	60	0	0	12	85	98	98	100		
FF	99	30	63	99	84	100	47	0	99	94	100		
EE	100	100	100	100	0	0	0	100	98	100	100		
O	90	90	89	95	63	80	59	100	98	100	100		
M	100	100	100	99	0	0	0	100	95	100	100		
Q	0	20	63	0	79	67	59	100	95	100	100		
GG	95	95	100	97	84	35	13	84	95	100	100		
LL	98	95	100	100	95	100	100	95	95	95	100		
6	0	0	87	10	89	59	50	89	89	89	98		
15	10	21	92	82	89	100	100	95	95	95	100		
4	10	21	87	61	95	59	63	95	95	95	100		
11	0	11	87	66	89	47	63	89	89	89	100		
YY	0	20	87	41	92	89	89	87	100	100	100		
QQ	61	31	87	87	87	89	89	87	95	94	98		
ZZ	82	71	92	82	0	0	0	92	100	100	100		
UU	0	0	92	77	61	74	67	92	100	100	100		
3	0	0	100	0	97	74	56	97	100	100	100		
13	0	0	92	0	92	79	56	100	100	100	100		
20	10	20	87	71	87	89	83	92	100	100	100		
OO	0	71	100	11	100	100	100	94	100	100	100		
PP	0	0	100	0	100	50	57	100	100	100	100		
RR	0	100	100	11	0	50	57	100	100	100	100		
SS	0	94	100	16	19	19	0	100	100	100	100		
TT	0	71	94	32	100	94	100	100	100	100	100		
VV	71	59	94	53	50	50	57	100	100	100	100		
II	0	0	21	0	84	78	78	89	95	95	100		
NN	0	11	89	21	89	83	67	95	100	100	100		
XX	0	0	95	42	0	0	0	100	100	100	100		
30	32	53	100	74	84	67	56	89	100	95	100		
31	42	32	63	68	100	100	100	100	100	100	100		
32	53	0	89	21	79	44	44	95	100	100	100		
33	53	0	89	89	79	44	44	95	95	95	100		

Population		21 DAT Visual Evaluations (% injury)											% injury
		Group 1				Group 2							
		Tacoma	Axial XL	Select	Assure II	Everest	Varrow	TeamMate	Beyond	Tolvera	Shieldex	Roundup	
D		0	0	51	0	10	0	12	40	95	95	100	0-35
J		10	20	51	60	61	51	59	95	90	90	100	36-55
C		0	0	51	10	61	61	59	90	95	95	100	56-79
I		100	97	92	100	51	61	71	95	95	90	100	80-100
P		20	31	87	75	41	0	29	40	95	95	100	
A		0	0	77	60	0	0	12	85	98	98	100	
FF		99	30	63	99	84	100	47	0	99	94	100	
EE		100	100	100	100	0	0	0	100	98	100	100	
O		90	90	89	95	63	80	59	100	98	100	100	
M		100	100	100	99	0	0	0	100	95	100	100	
Q		0	20	63	0	79	67	59	100	95	100	100	
GG		95	95	100	97	84	35	13	84	95	100	100	
LL		98	95	100	100	95	100	100	95	95	95	100	
6		0	0	87	10	89	59	50	89	89	89	98	
15		10	21	92	82	89	100	100	95	95	95	100	
4		10	21	87	61	95	59	63	95	95	95	100	
11		0	11	87	66	89	47	63	89	89	89	100	
YY		0	20	87	41	92	89	89	87	100	100	100	
QQ		61	31	87	87	87	89	89	87	95	94	98	
ZZ		82	71	92	82	0	0	0	92	100	100	100	
UU		0	0	92	77	61	74	67	92	100	100	100	
3		0	0	100	0	97	74	56	97	100	100	100	
13		0	0	92	0	92	79	56	100	100	100	100	
20		10	20	87	71	87	89	83	92	100	100	100	
OO		0	71	100	11	100	100	100	94	100	100	100	
PP		0	0	100	0	100	50	57	100	100	100	100	
RR		0	100	100	11	0	50	57	100	100	100	100	
SS		0	94	100	16	19	19	0	100	100	100	100	
TT		0	71	94	32	100	94	100	100	100	100	100	
VV		71	59	94	53	50	50	57	100	100	100	100	
II		0	0	21	0	84	78	78	89	95	95	100	
NN		0	11	89	21	89	83	67	95	100	100	100	
XX		0	0	95	42	0	0	0	100	100	100	100	
30		32	53	100	74	84	67	56	89	100	95	100	
31		42	32	63	68	100	100	100	100	100	100	100	
32		53	0	89	21	79	44	44	95	100	100	100	
33		53	0	89	89	79	44	44	95	95	95	100	

Population		21 DAT Visual Evaluations (% injury)												% injury
		Group 1				Group 2								
		Tacoma	Axial XL	Select	Assure II	Everest	Varrow	TeamMate	Beyond	Tolvera	Shieldex	Roundup		
D		0	0	51	0	10	0	12	40	95	95	100	0-35	
J		10	20	51	60	61	51	59	95	90	90	100	36-55	
C		0	0	51	10	61	61	59	90	95	95	100	56-79	
I		100	97	92	100	51	61	71	95	95	90	100	80-100	
P		20	31	87	75	41	0	29	40	95	95	100		
A		0	0	77	60	0	0	12	85	98	98	100		
FF		99	30	63	99	84	100	47	0	99	94	100		
EE		100	100	100	100	0	0	0	100	98	100	100		
O		90	90	89	95	63	80	59	100	98	100	100		
M		100	100	100	99	0	0	0	100	95	100	100		
Q		0	20	63	0	79	67	59	100	95	100	100		
GG		95	95	100	97	84	35	13	84	95	100	100		
LL		98	95	100	100	95	100	100	95	95	95	100		
6		0	0	87	10	89	59	50	89	89	89	98		
15		10	21	92	82	89	100	100	95	95	95	100		
4		10	21	87	61	95	59	63	95	95	95	100		
11		0	11	87	66	89	47	63	89	89	89	100		
YY		0	20	87	41	92	89	89	87	100	100	100		
QQ		61	31	87	87	87	89	89	87	95	94	98		
ZZ		82	71	92	82	0	0	0	92	100	100	100		
UU		0	0	92	77	61	74	67	92	100	100	100		
3		0	0	100	0	97	74	56	97	100	100	100		
13		0	0	92	0	92	79	56	100	100	100	100		
20		10	20	87	71	87	89	83	92	100	100	100		
OO		0	71	100	11	100	100	100	94	100	100	100		
PP		0	0	100	0	100	50	57	100	100	100	100		
RR		0	100	100	11	0	50	57	100	100	100	100		
SS		0	94	100	16	19	19	0	100	100	100	100		
TT		0	71	94	32	100	94	100	100	100	100	100		
VV		71	59	94	53	50	50	57	100	100	100	100		
II		0	0	21	0	84	78	78	89	95	95	100		
NN		0	11	89	21	89	83	67	95	100	100	100		
XX		0	0	95	42	0	0	0	100	100	100	100		
30		32	53	100	74	84	67	56	89	100	95	100		
31		42	32	63	68	100	100	100	100	100	100	100		
32		53	0	89	21	79	44	44	95	100	100	100		
33		53	0	89	89	79	44	44	95	95	95	100		

Species Dose Response

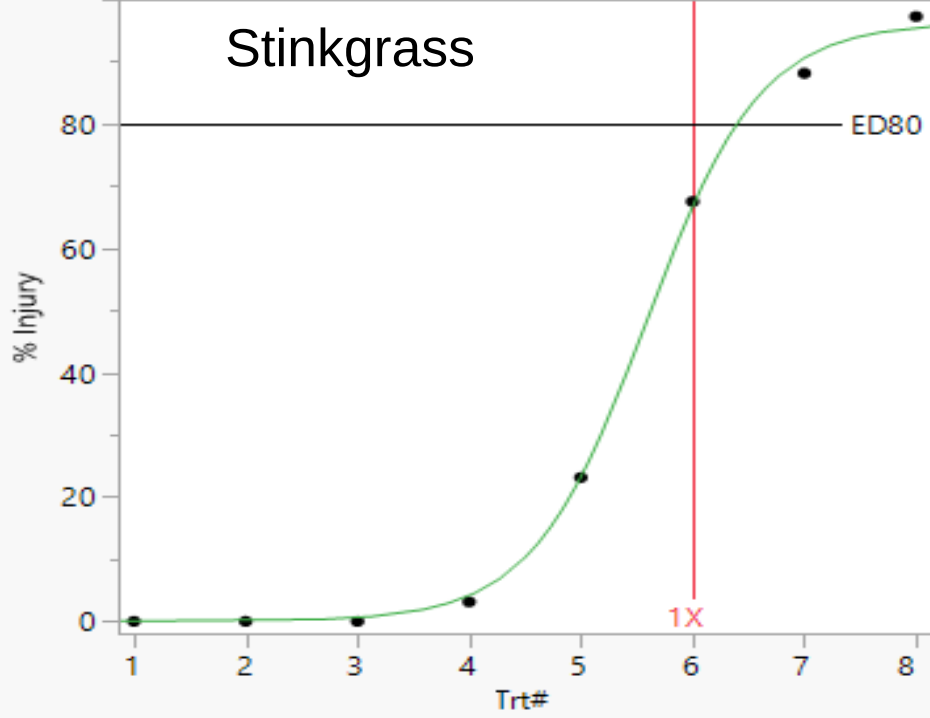
- RCBD with 4 reps, 17 gpa, 7 different Tolvera rates, 8 different grass weeds



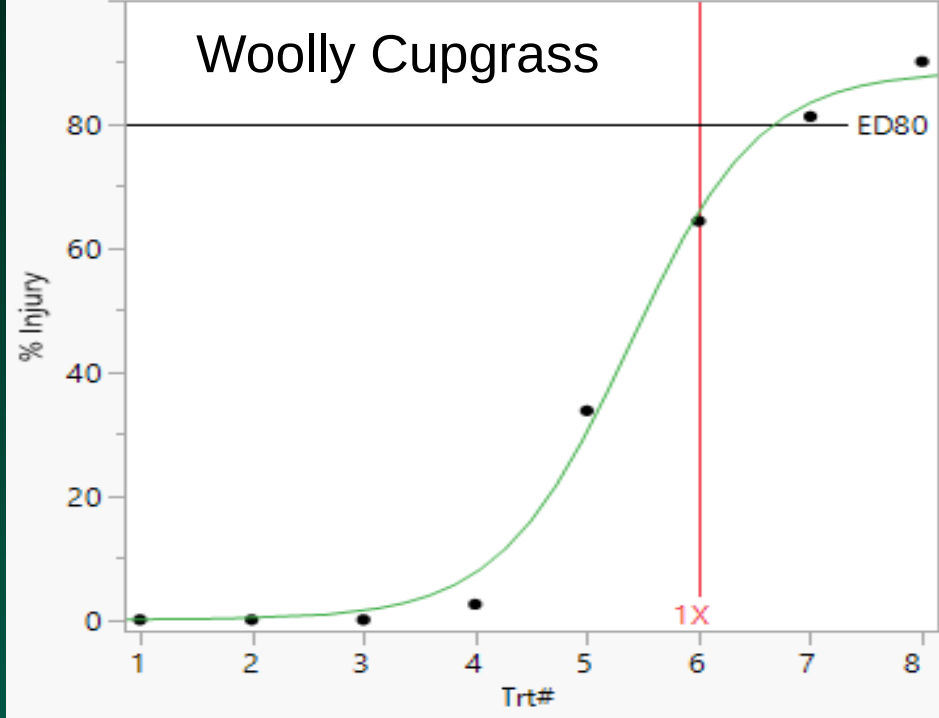
*Treatment 6 is highest labelled rate

Trt #	Treatment	Rate	Unit
1	MSO	1	% v/v
2	Tolvera 0.01X	0.147	fl oz/a
	MSO	1	% v/v
3	Tolvera 0.0317X	0.467	fl oz/a
	MSO	1	% v/v
4	Tolvera 0.1X	1.47	fl oz/a
	MSO	1	% v/v
5	Tolvera 0.317X	4.67	fl oz/a
	MSO	1	% v/v
6	Tolvera 1X	14.7	fl oz/a
	MSO	1	% v/v
7	Tolvera 3.17X	46.7	fl oz/a
	MSO	1	% v/v
8	Tolvera 10X	147	fl oz/a
	MSO	1	% v/v

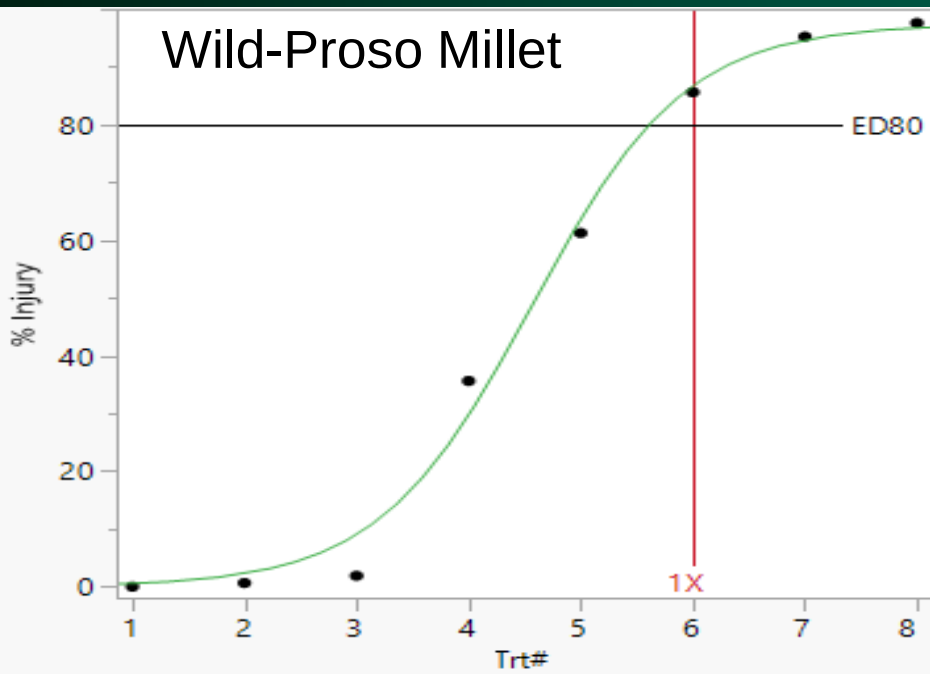
Stinkgrass



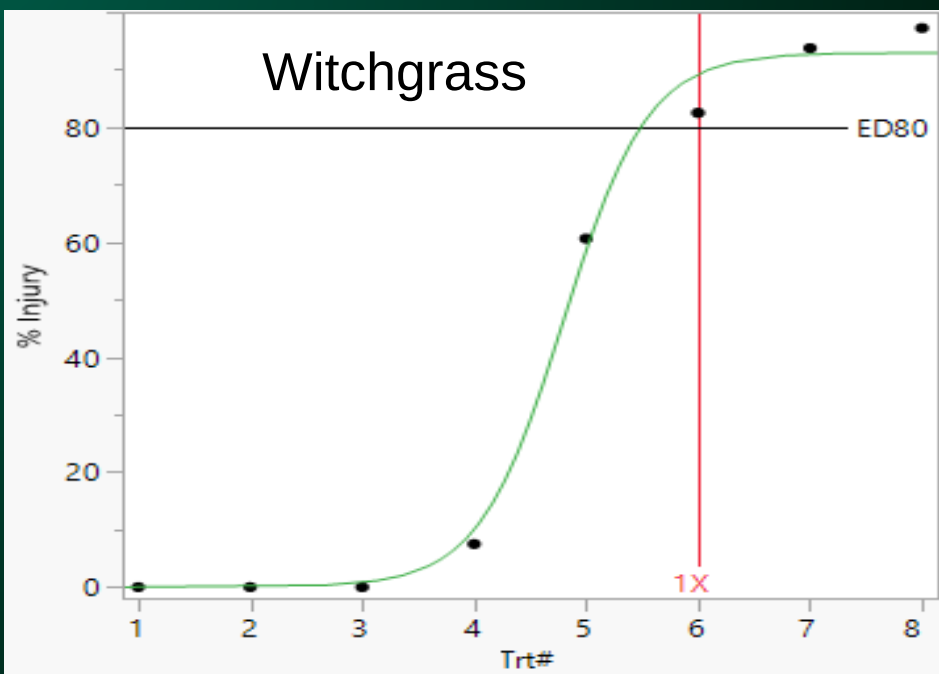
Woolly Cupgrass



Wild-Prosop Millet



Witchgrass



Questions?