2018 Summer Advisory Board Meeting
Weed Science Research Update
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Current Research Projects for 2018:

1) Weed control and varietal tolerance of safflower to Spartan (sulfentrazone)
    a. Testing five safflower varieties
    b. Three rates of Spartan (sulfentrazone) (2, 3.5, and 5 oz/A) vs weed free control
    c. Trials in Hettinger in 2016, 2017, and 2018 and in Williston in 2016 and 2017
    d. In 2018, more injury observed at 10 days after emergence (DAE) for Hybrids 9049 and 1601 compared with Cardinal and MonDak. Injury was intermediate with NutraSaff. Injury was not severe with some minor leaf bronzing and necrotic spots. No injury was observed at 30 DAE.
    e. There was no difference in stand counts due to Spartan application.
    f. Spartan injury is greater when safflower is planted in high pH soils. The soils at Hettinger are low in pH (around 6)
    g. Safflower added to Spartan Charge 24c label for 2018 with indemnity clause (grower assumes risk for crop injury)
    h. Hail storm destroyed trial on June 26th.

Table 1. Safflower variety response to Spartan (sulfentrazone) herbicide at Hettinger, ND, 2018.

Variety	Safflower visual injury 10 DAE		Stand count	
	(%)		(plants per square meter)	
Cardinal	4	c	47	b
MonDak	5	c	51	ab
NutraSaff	7	bc	51	ab
Hybrid 9049	9	ab	57	a
Hybrid 1601	11	a	56	a
Spartan rate	(%)		(plants per square meter)	
2 oz/A	5	c	51	a
3.5 oz/A	8	b	51	a
5 oz/A	15	a	54	a
Weed free	0	d	52	a

2) Tolerance of flax to herbicides applied preemergence for broadleaf weed control
    a. Evaluation of nine herbicides applied preemergence for flax tolerance using standard application rates and broadleaf weed control
    b. Trials conducted in Hettinger, Minot, and Carrington
    c. Flax was tolerant to most PRE herbicide applied in trial; some injury was observed following application of Warrant (acetochlor) herbicide (minor stunting)
    d. No differences in stand counts or height 26 DAE, although flax height was lowest following application of Warrant (acetochlor).
    e. Hail storm on June 26 severely damaged trial.

Table 2. Flax response to preemergence herbicides at Hettinger, ND in 2018

Treatment	Rate	Flax	Mallow	Kochia	Flax Stand	Height
	oz/A	Injury (%)	control (%)		plants/m^2	cm
Untreated		0 b	0 c	0 e	187 a	20 a
Zidua	3	0 b	0 c	71 b	216 a	21 a
Spartan + Zidua	4+1.5	0 b	76 a	78 ab	221 a	21 a
Warrant	1.5	7.5 a	0 c	66 b	213 a	19 a
Dual II Magnum	1.5	0 b	0 c	74 ab	196 a	20 a
BroadAxe + Dual II Magnum	22.8+5.2	0 b	81 a	84 a	206 a	21 a
Fierce	3	0 b	74 a	74 ab	195 a	21 a
Prowl H2O	3	0 b	76 a	67 b	221 a	20 a
Valor	2	0 b	30 b	46 c	228 a	21 a
Outlook	18	0 b	23 b	21 d	229 a	20 a

3) Flax tolerance to PRE- and POST-applied Group 27 herbicides (pigment inhibitors) Talinor (bicyclopyrone + bromoxynil) and Armezon (topramezone) and to Basagran (bentazon), Raptor (imazamox), and Bison (MCPA+bromoxynil)
   a. Herbicides used in other crops primarily for broadleaf weed control
   b. Trials conducted in Minot and Hettinger
   c. Flax was tolerant to PRE application of Talinor but was severely injured when it was applied POST
   d. Armezon, Bison, and Basagran lightly injured flax (0 to 14%)
   e. Raptor alone injured flax more than the combination of Raptor plus Basagran.
   f. Hailstorm severely damaged plots prior to height measurements.

Table 3. Flax response to pre and postemergence herbicides at Hettinger, ND in 2018

Treatment	Timing	Rate	Flax		Mallow	Kochia
		oz/A	7 DAT	15 DAT	15 DAT	15 DAT
			Injury (%)		control (%)	control (%)
Untreated			0 e	0 f	0 d	0 e
Talinor	PRE	13.7	0 e	0 f	0 d	0 e
Talinor	PRE	18.2	9 d	0 f	0 d	23 d
Talinor	POST	13.7	73 b	61 b	65 b	55 abc
Talinor	POST	18.2	81 a	78 a	74 a	66 ab
Armezon	POST	0.5	14 cd	0 f	64 bc	63 ab
Armezon	POST	0.75	12 d	13 de	65 b	42 c
Bison	POST	16	10 d	14 d	55 c	50 abc
Basagran	POST	16	3 e	6 ef	63 bc	48 bc
Raptor	POST	4	18 c	29 c	80 a	70 a
Basagran+Raptor	POST	16+4	11 d	18 d	80 a	66 ab

4) Chickpea tolerance to Tough herbicide (pyridate) and broadleaf weed control
   a. No postemergence herbicides labelled for broadleaf weed control in chickpea
   b. PRE herbicides are not always reliable for weed control in Southwest ND.
   c. Adjuvant comparison: Tough herbicide applied with crop oil concentrate vs methylated seed oil vs no adjuvant
   d. Spray volume comparison: Tough herbicide applied at spray volumes of 10, 20, and 30 gallons per acre

e. Trials conducted in Minot and Hettinger
f. Funded by the North Dakota Crop Protection Product Harmonization and Registration Board minor crops fund
g. No injury to chickpea from herbicide with or without adjuvants (crop oil or MSO)
h. Fairly good control of kochia, common lambsquarters, and Russian thistle at 30 days after treatment.

Table 4. Response of kochia, common lambsquarters, and Russian thistle to Tough herbicide (pyridate) at Hettinger, 2018 at 30 DAT. Application timings: A, June 5; B, June 14.

Treatment	Rate	Timing	Kochia	Lambsquarters	Russian thistle
	– oz/A –		control (%)		
Untreated			0 g	0 e	0 g
Tough	12	A	42 f	41 d	49 f
Tough	16	A	58 e	76 bc	66 e
Tough	24	A	71 cd	90 a	80 cd
Tough+COC	24+32	A	79 bc	88 ab	78 cd
Tough+MSO	24+32	A	79 bc	89 a	85 bc
Tough+Select+COC	24+6+32	A	75 c	87 ab	82 cd
Tough+Select+MSO	24+6+32	A	77 c	87 ab	81 cd
Tough+Select+MSO	24+6+32	A	88 a	95 a	98 a
Tough+COC	24+32	B			
Tough+Select+COC	12+6+32	A	66 d	70 c	71 de
Tough+COC	12+32	B			
Tough+Select+COC	24+6+32	A	85 ab	89 a	93 ab
Tough+COC	12+32	B			

Table 5. Response of kochia and Russian thistle to Tough herbicide (pyridate) at Hettinger, 2018 at 30 DAT with spray volumes of 10, 20, and 30 gallons per acre.

Treatment	Rate	Spray volume	Kochia	Russian thistle
	– oz/A –	Gal/Acre	control (%)	
Untreated			0 e	0 b
Tough	24	10	73 bcd	85 a
Tough+COC	24+20	10	75 abc	83 a
Tough	24	20	64 cd	81 a
Tough+COC	24+20	20	77 ab	81 a
Tough	24	30	63 d	86 a
Tough+COC	24+20	30	71 bcd	87 a
Tough+COC	24+40	30	87 a	89 a

5) Oat tolerance to PRE and POST applied herbicides
   a. Oats were planted on May 23 and ten PRE herbicides were applied the next morning.
   b. Rainfall after herbicide application included 0.09 inches on May 28 and 0.33 inches on May 30; Oats emerged on May 30
   c. Postemergence application of Armezon (topramezone) was applied to oats with 2 to 3 leaves on June 4 and 4 to 6 leaves on June 14
   d. No injury to oats was observed from PRE herbicides
   e. POST application of Armezon at 2 to 3 leaves caused slight injury that diminished by 25 DAT; Armezon applied at 4 to 6 leaves caused major injury (46%, 15 DAT)

6) Evaluation of new herbicides for weed control and crop safety for crops grown in southwest North Dakota. The desired outcome is to increase the number of herbicides labelled for use in these crops when data shows treatments are beneficial for weed control and crop production (includes trials described above).
    a. Spring wheat: Ten trials conducted in 2018
    b. Oats: One trial conducted in 2018
    c. Canola: two trials conducted in 2018
    d. Flax: two trials conducted in 2018
    e. Field pea: five trials conducted in 2018
    f. Lentils: three trials conducted in 2018
    g. Chickpea: Two trials conducted in 2018
    h. Safflower: one trial conducted in 2018
    i. Sunflower: one trial conducted in 2018
    j. Dicamba and 2,4-D carryover to peas, lentils, chickpea, and sunflowers
    k. Evaluation of preharvest desiccants for wheat and durum

Presentations and Outreach:

- Best of Best in Wheat, Dickinson and Minot. February 2018
- Wild world on weeds workshop at Fargo, ND. January 2018
- Western Dakota Crops Day at Hettinger, ND. December 2017
- North Central Weed Science Society, St. Louis, MO, December 2017
- Western Society of Weed Science, Garden Grove, CA, March 2018
- 2018 North Dakota Weed Control Guide contributor