Wonderful World of Potatoes and Herbicides!

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Staff Recognition

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- Eric Brandvik Research specialist
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- Mitch Bauske postdoctoral





Herbicide injury in potato

- Plant injury affected by
 - Herbicide dose (Colquhoun et al. 2014;Hatterman-Valenti 2017; Hutchinson et al. 2014; Wall 1994)
 - Potato growth stage at time of exposure (Hutchinson et al 2014; Crook 2016)
 - Ambient temperature affects movement in the plant (Masiunas and Weller 1988)





Plant back of seed tubers containing herbicide residues

- Dicamba rates of 0.005, 0.01, 0.02 pt a⁻¹ caused symptoms (Wall 1994)
- Growth stage of exposure the previous year affected seed (Hutchinson et al. 2014; Crook 2016)
- Glyphosate contamination adversely affected growth by germination inhibition (Worthington 1985)





Objective

 To determine the effects of planting 'Russet Burbank' potato seed tubers that were exposed to dicamba, glyphosate and the combination of dicamba and glyphosate the previous year.



Treatments

- Planted: 2015-2016
- Planted back: 2016-2017
- Location: Oakes & Inkster, ND
- Measured: emergence, height, graded yield

Treatments	Rate (fl oz/a)
1. Non-treated	0
2. Glyphosate	5
3. Glyphosate	1
4. Glyphosate	0.2
5. Dicamba	2.8
6. Dicamba	0.6
7. Dicamba	0.1
8. Glyphosate	5
Dicamba	2.8
9. Glyphosate	1
Dicamba	0.6
10. Glyphosate	0.2
Dicamba	0.1



Emergence

			Environment 1			Environment 2				
Treatment	Glyphosate	Dicamba	5 W	/AP	8 N	ΛP	5 W	AP	8 W	AP
	- oz a ⁻¹	oz a ⁻¹	Plant en			nergence (%) ———				
1	0	0	88	abª	95	а	90	а	97	a
2	5	0	85	b	96	а	85	ab	90	ab
3	1	0	80	bc	86	ab	85	ab	90	ab
4	0.2	0	25	f	49	d	53	е	68	с
5	0	2.8	93	a	94	а	83	b	95	a
6	0	0.6	76	cđ	89	ab	77	bc	83	b
7	0	0.1	40	е	79	bc	70	d	78	bc
8	5	2.8	91	ab	95	а	86	ab	95	а
9	1	0.6	73	d	83	b	78	b	90	ab
10	0.2	0.1	25	f	67	с	65	d	80	b

^aNumbers followed by the same letter in a column are not significantly different according to Tukey pair-wise comparison at P = 0.05



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Height

			Environment 1				Em	vironment 2		
Trt	Glyphosate	Dicamba	5 W	/AP	8 V	/AP	5 W	ΊAΡ	8 W	AP
	oz a ⁻¹	$oz a^{-1}$				Plant i	height (cm)			
1	0	0	17	a ^a	50	ab	36	а	65	a
2	5	0	17	а	54	а	36	а	65	a
3	1	0	14	ab	52	ab	36	а	62	ab
4	0.2	0	5	d	34	d	21	с	50	с
5	0	2.8	16	а	51	ab	34	а	63	ab
6	0	0.6	12	b	48	bc	31	b	61	ab
7	0	0.1	8	с	44	с	30	b	57	b
8	5	2.8	17	а	54	а	34	а	62	ab
9	1	0.6	12	b	49	abc	30	b	58	b
10	0.2	0.1	4	d	40	dc	30	b	56	b

^aNumbers followed by the same letter in a column are not significantly different according to Tukey pair-wise comparison at P=0.05.



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Yield

			Environment 1				Envir	onment 2		
Trte	Glyphosate	Dicamba	Tota	ıl Yield	TM	ſY ^b	Total	Yield	TN	ΛY
	oz a ⁻¹	oz a ⁻¹					– T ha ⁻¹ —			
1	0	0	53	a ^a	49	а	61	а	53	a
2	5	0	54	а	49	а	56	ab	48	ab
3	1	0	51	a	46	а	54	с	47	Ъ
4	0.2	0	27	с	21	с	39	e	31	d
5	0	2.8	56	a	52	а	60	ab	53	a
6	0	0.6	38	b	33	b	55	bc	49	ab
7	0	0.1	26	с	22	с	47	đ	41	с
8	5	2.8	55	а	50	а	60	ab	52	a
9	1	0.6	40	Ъ	36	b	52	cd	45	с
10	0.2	0.1	26	с	23	с	38	е	33	d

^aNumbers followed by the same letter in a column are not significantly different according to Tukey pair-wise comparison at P=0.05.

^bTotal marketable yield includes U.S. No. 1 and U.S. No. 2 tubers

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^eAbbreviations: trt, treatment



Lessons learned

- Russet Burbank potato was sensitive to glyphosate and dicamba as residues were translocated to tubers and affected seed.
- Dicamba treatments were found to be more damaging compared to glyphosate.
- Environmental conditions during herbicide treatments influenced the amount of herbicide stored in potato seed.



Potato Blight app

- Search: NDAWN Potato Blight
 - Apple store or Google Play (z.umn.edu/spud)
- Uses predictive model to determine favorable conditions for late blight and early blight.
- NDAWN weather (updated every 5 minutes)
- Inversion alerts





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Thank you!