

# Research Report

## Title: Watermelon tolerance to bicyclopyrone, 2019

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### Experiment I (transplanted June 3)

#### Methods

Fertilizer was banded at planting at 350 lb/A of 12-29-10 with a John Deere Planter with seed hoppers turned off. Watermelon seedlings (var. Sugar Baby) were then transplanted into the vacant seed row with a Stand&Plant Seeder&Planter on 2-foot centers. Plots were 40 f.t long and 10 ft. wide with one row per plot. Experimental design was a RCB with 3 replications. Plots were cultivated after the June 18 weed control evaluation. Section 2EC (clethodim) herbicide was applied to control grasses. Urea fertilizer was banded next to row at 50 lb N/A after cultivation. Watermelon fruit were harvested on Sept 5 and 12 after the tendril nearest the fruit had dried down.

**Table 1.** Journal of activities for two weeks following transplanting.

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5/23	Plots tilled	
5/24	0.71 inches of rainfall	
5/31	Made rows on 10 foot centers when field dried	
6/2	Applied Pre-trans plant herbicides	1 qt/A sulfosate walked on to kill already emerged weeds
6/3	Transplanted on 2 foot spacing in rows 10 feet apart. Completed by 10:30 AM; irrigated 0.66 in.	Seedlings were grown in 1 in dia by 2-inch deep cells, one true leaf, 4 weeks old when transplanted.
6/5	Irrigation 1 hour	0.52 in
6/6	Applied Sevin 1 qt/A to control stripped cucumber beetle	
6/8	Irrigation 1 hour	0.52 in
6/10	Irrigation 1 hour	0.52 in
6/12	98F, irrigated 1.5 hrs	0.78 in
6/13	85F	
6/14	75F	

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**Table 2.** Herbicide application data for Exp I.

Date	Sunday, June 02, 2019	Friday, August 16, 2019
Crop stage	1 DB Trans	Small fruit in some plots
Weeds and growth stage		
Barnyardgrass	-	≤ 2 feet in ht.
Herbicide/treatment	PRETRANS	Section 2EC (clethodim) 8 oz/A + COC
Application timing	PRETRANS Surface	POST
Start/end time	8:45-9:30 AM	4:00- 4:30PM
Air temp/soil temp (2")/surface	68/74/68	78
Rel humidity	62%	44%
Wind direction/velocity	E 1-3	NE 3 to 6
Cloud cover	0%	0%
Soil moisture	0	Dry
Plant moisture	-	Dry
Sprayer/PSI	BP CO <sub>2</sub> 25 PSI	BP CO <sub>2</sub> 25 PSI
Mix size	2100 ml	2100 ml
Gallons H <sub>2</sub> O/acre	20	15
Nozzle type	5-XR8003	6-XR8002
Nozzle spacing and height	20/20	20/20
Soil inc. method/implement	Irrigation immediately after transplanting 6-2	

## Results

- Two experiments were conducted. In this first experiment, watermelon was damaged by either herbicides that entered the plots with floodwater in mid-April, or salt damage from a fertilizer band that was too close to the row.
- Additionally, Strategy caused more damage than anticipated and the BANDDIR treatments were not applied. The crop was taken to yield, however, to evaluate the effects of bicyclopyrone PRE with Reflex and Strategy on watermelon. A second trial was planted in early July.
- Crop stand was unaffected by herbicides.
- Strategy herbicide significantly reduced growth of watermelon transplants.
- Bicyclopyrone caused excessive injury and reduced crop growth early in the season.
- Despite glaring injury early in the season, the bicyclopyrone + Reflex/Strategy plots yielded very well with exceptional control of weed species present.

**Table 3.** Watermelon tolerance to herbicides.

Herbicide	Rate		Timing	Placement	Obs	Stand	PhyStu	PhyGen	PhyStu	PhyGen	PhyStu	
						6/13	6/18	6/18	6/24	6/24		
		<i>product rate</i>	<i>lb ai/A</i>			<i>no./plot</i>	----- % -----					
1	Untreated				3	17	7	3	35	17	42	
2	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL	3	19	27	23	17	30	42
3	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	19	8	13	30	33	33
	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL							
4	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	18	30	23	40	40	43
	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL							
5	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL	12	18	19	28	47	40	62
FPLSD (0.05)						ns	ns	16	ns	ns	ns	

**Table 4.** Weed control in watermelon with bicyclopyrone and Reflex.

Herbicide	Rate		Timing	Placement	Obs	Weed control (18-Jun)						
						Overall	Crab-grass	Barnyard-grass	Hairy night-shade	Pig-weed	Lambs-quarters	
		<i>product rate</i>	<i>lb ai/A</i>			----- % -----						
1	Untreated				3	0	0	0	0	0	0	
2	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL	3	88	87	93	100	100	100
3	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	88	88	80	100	100	97
	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL							
4	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	99	99	100	100	100	100
	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL							
5	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL	12	92	91	98	100	98	100
FPLSD (0.05)						11	11	15	0	7	3	

**Table 5.** Watermelon yield response to bicyclopyrone and Reflex herbicides.

Herbicide	Rate		Timing	Placement	Obs	Harvest 1		Harvest 2		Total yield			
						Fruit no	Fruit yield	Fruit no	Fruit yield	Fruit no	Fruit yield	Avg. fruit wt	
		<i>lb ai/A</i>				<i>no/ 16.4 ft</i>	<i>t/A</i>	<i>no/ 16.4 ft</i>	<i>t/A</i>	<i>no/ 16.4 ft</i>	<i>t/A</i>	<i>kg</i>	
1	Untreated				3	1.7	0.8	2.7	3.1	4.3	3.9	2.5	
2	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL	3	6.0	6.3	3.3	4.7	9.3	10.9	3.8
3	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	9.3	11.4	6.7	9.6	16.0	21.0	4.5
	Reflex	0.748 pt/a	0.187	PRETRANS	BROSOIL								
4	Bicyclopyrone	3.42 fl oz/a	0.045	PRETRANS	BROSOIL	3	4.0	6.6	11.0	12.6	15.0	19.2	4.4
	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL								
5	Strategy	4 pt/a	1.05	PRETRANS	BROSOIL	12	2.7	2.7	3.3	3.4	5.9	6.1	2.3
FPLSD (0.05)						4.0	5.7	3.8	5.6	6.7	9.6	ns	

## Experiment II (transplanted July 8)

### Methods

Fertilizer was banded at planting at 187 lb/A 12-29-10 next to the row before transplanting. Sugar Baby seedlings were transplanted with a Stand&Plant Seeder&Planter on 2-foot centers in plots that were 40 foot long and 7.5 ft wide with one row per plot. Experimental design was a RCB with 3 replications. BANDDIR applications were made on July 27 by blocking one nozzle that was centered over the row. Plots were cultivated after the August 3 weed control evaluation. Section 2EC herbicide (1 pt/A) was applied to control grasses on August 16. Urea fertilizer was banded next to row at 50 lb N/A after cultivation. Watermelon fruit were harvested October 5 and 12 after the tendril nearest the fruit had dried down and before the first hard frost.

**Table 6.** Journal of activities.

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7/2	Worked soil
7/5	Applied Prefar and incorporated 1-2 in deep with vertical tine (Kuhn) tiller Made rows, with John Deer planter; set fertilizer opener 4 in from row, banded 187 lb/A 12-10-10 next to the seed row.
7/7	Applied PRETRANS herbicides
7/8	Transplanted on 2 foot spacing and irrigated immediately (0.4 inches) followed by rainfall
7/16	Sevin 1 qt/A to control cucumber beetle
7/23	Irrigation 1.4 inches
7/27	POSTDIR applications applied
8/3	Plots cultivated leaving a 1 foot uncultivated band over the row.
8/16	Section 2EC herbicide applied to entire plot to control grasses.

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**Table 7.** Herbicide application data.

Date	Friday, July 5, 2019	Sunday, July 07, 2019	Saturday, July 27, 2019	Friday, August 16, 2019
Crop stage	3 DB transplanting	1 DB transplanting	4 to 5 leaves, a few runners forming	Small fruit in some plots
Weeds and growth stage				
Hairy nightshade	-	-	2-4 lv, 2 in tall	
Pigweed	-	-	2-4 lv, 2 in tall	
Barnyardgrass	-	-		up to 2 feet tall
Herbicide/treatment	Prefar	all PRETRANS	BANDDIR	POST Section 2EC, 8 oz/A+ COC
Application timing	Pre Transplant	Pre Transplant	4 to 5 leaf	Flowering with some fruit visible
Start/end time	11-12PM	8:45-9:30	8:15-8:45 AM	4:00- 4:30
Air temp/soil temp (2")/surface		68/74/68	79	78
Rel humidity		62%	66%	44%
Wind direction/velocity		E 1-3	SE 0-1	NE 3 to 6
Cloud cover		0%	0%	0%
Soil moisture		0	Damp	Dry
Plant moisture		-	Dry	Dry
Sprayer/PSI		BP CO2 25 PSI	BP CO2 25 PSI	BP CO2 25 PSI
Mix size		2100	2100	2100
Gallons H2O/acre		20	20	15
Nozzle type		5-XR8003	4-XR8003 (blocked middle nozzle over the row leaving about a 4 inch untreated band next to the watermelon.	6-XR8002
Nozzle spacing and height		20/20	20/20)	20/20
Soil inc. method/implement		Irrigation after transplanting; Prefar	-	-

## Results

- Bicyclopyrone tankmixed with Reflex herbicide reduced watermelon growth by an estimated 60% one month after planting.
- Bicyclopyrone did not control barnyardgrass or crabgrass.
- Bicyclopyrone applied over Preplant Incorporated Prefar provided exceptional weed control but also caused excessive injury and reduced crop growth by 56% one month after planting.
- The greatest yield was Prefar followed by a directed application of bicyclopyrone without AMS. Bicyclopyrone whitened watermelon shoot tips when contacted by the herbicide, but injury was transient and did not suppress crop growth at seasons end.
- Prefar alone did not control hairy nightshade, but when followed by BANDDIR bicyclopyrone, hairy nightshade control was good to exceptional.
- The addition of AMS to bicyclopyrone BANDDIR may have reduced yield.

- Sandea BANDDIR caused a slight amount of injury but did not control hairy nightshade, and yield was very poor.
- Yield in EXP II was much less than in EXP I because of late planting and a very early fall that reduced growth.

**Table 8.** Watermelon tolerance to bicyclopyrone herbicide.

Herbicide	Rate		Timing	Placement	PhyGen 7/16	PhyGen 7/23	PhyGen 7/30	PhyStu 7/30	PhyGen 8/3	PhyStu 8/3	PhyGen 9/21	PhyStu 9/21	
	Product rate	lb ai/A											
1 Untreated					0.0	20.0	3.3	16.7	0.0	16.7	0.0	50.0	
2 Reflex	0.74	pt/a	0.187	PRETRANS	BROSOIL	3.3	16.7	16.7	20.0	11.7	23.3	0.0	13.3
3 Bicyclopyrone Reflex	3.42	fl oz/a	0.045	PRETRANS	BROSOIL	3.3	30.0	26.7	48.3	30.0	60.0	6.7	30.0
	0.74	pt/a	0.187	PRETRANS	BROSOIL								
4 Bicyclopyrone Prefar	3.42	fl oz/a	0.045	PRETRANS	BROSOIL	0.0	23.3	23.3	48.3	16.7	56.7	0.0	28.3
	5	qt/a	5.000	PRETRANS	PPI								
5 Prefar	5	qt/a	5.000	PRETRANS	PPI	0.0	6.7	0.0	6.7	6.7	0.0	3.3	43.3
6 Prefar Bicyclopyrone NIS 0.25%	5	qt/a	5.000	PRETRANS	PPI	0.0	10.0	10.0	0.0	8.3	26.7	0.0	3.3
	3.42	fl oz/a	0.045	POSPOS	BANDDIR								
7 Prefar Bicyclopyrone NIS 0.25% N-PAK AMS LIQUID 2.5%	5	qt/a	5.000	PRETRANS	PPI	0.0	23.3	16.7	8.3	13.3	10.0	6.7	16.7
	3.42	fl oz/a	0.045	POSPOS	BANDDIR								
				POSPOS	BANDDIR								
8 Prefar Sanda NIS 0.25%	5	qt/a	5.000	PRETRANS	PPI	0.0	6.7	23.3	40.0	20.0	56.7	0.0	20.0
	1	oz/a	0.047		BANDDIR								
					BANDDIR								
FPLSD (0.05)					ns	ns	19	29	13	36	ns	20	



**Table 9.** Weed control with bicyclopyrone in watermelon.

Herbicide	Rate	Timing	Placement	23-Jul				30-july				3-August				21-Sept						
				Hairy nightshade	Pigweed	Barnyardgrass	Overall	Hairy nightshade	Pigweed	Barnyardgrass	Overall	Hairy nightshade	Pigweed	Crabgrass	Barnyardgrass	Overall	Hairy Nightshade	Pigweed	Lambsquarters	Overall		
1	Untreated	-	-	-	-	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0
2	Reflex	0.748	pt/a	PRETRANS	BROSOIL	97	100	43	93	98	99	20	75	95	98	30	32	80	77	97	96	75
3	Bicyclopyrone Reflex	3.42 0.748	fl oz/a pt/a	PRETRANS PRETRANS	BROSOIL BROSOIL	99	99	95	97	100	100	45	91	96	98	83	90	90	97	97	98	94
4	Bicyclopyrone Prefar	3.42 5	fl oz/a qt/a	PRETRANS PRETRANS	BROSOIL PPI	100	100	100	100	100	100	100	98	100	100	98	100	98	70	97	100	95
5	Prefar	5	qt/a	PRETRANS	PPI	32	32	53	37	32	32	96	30	0	33	60	60	28	23	72	100	23
6	Prefar Bicyclopyrone NIS 0.25%	5 3.42	qt/a fl oz/a	PRETRANS POSPOS POSPOS	PPI BANDDIR BANDDIR	83	88	90	90	30	66	65	68	95	98	93	93	94	78	97	100	70
7	Prefar Bicyclopyrone NIS 0.25% N-PAK AMS LIQUID 2.5%	5 3.42	qt/a fl oz/a	PRETRANS POSPOS POSPOS POSPOS	PPI BANDDIR BANDDIR BANDDIR	93	93	85	92	63	81	60	65	95	98	95	98	95	95	97	100	90
8	Prefar Sanda NIS 0.25%	5 1	qt/a oz/a	PRETRANS	PPI BANDDIR BANDDIR	93	95	97	95	71	83	92	83	95	97	94	95	91	50	93	100	70
FPLSD (0.05)						34	33	37	29	46	41	37	34	7	36	49	51	32	46	25	4	31

**Table 10.** Watermelon yield response to bicyclopyrone herbicide.

Herbicide	Rate		Timing	Placement	Harvest 1		Harvest 2		Total			
					Fruit number	Weight	Fruit number	Weight	Fruit number	Weight	Avg. fruit wt.	
	<i>Product rate</i>		<i>lb ai/A</i>			<i>no./20 ft</i>	<i>t/A</i>	<i>no./20 ft</i>	<i>t/A</i>	<i>no./20 ft</i>	<i>t/A</i>	<i>kg</i>
1 Untreated						1.3	0.5	0.3	0.2	1.7	0.7	0.9
2 Reflex	0.748	pt/a	0.187	PRETRANS	BROSOIL	3.7	3.4	3.7	3.0	7.3	6.4	2.6
3 Bicyclopyrone	3.42	fl oz/a	0.045	PRETRANS	BROSOIL	5.7	3.6	2.3	2.2	8.0	5.8	2.2
Reflex	0.748	pt/a	0.187	PRETRANS	BROSOIL							
4 Bicyclopyrone	3.42	fl oz/a	0.045	PRETRANS	BROSOIL	4.7	2.1	4.7	3.5	9.3	5.6	1.8
Prefar	5	qt/a	5.000	PRETRANS	PREPLANT INC							
5 Prefar	5	qt/a	5.000	PRETRANS	PREPLANT INC	4.7	2.2	1.3	0.9	6.0	3.1	1.5
6 Prefar	5	qt/a	5.000	PRETRANS	PREPLANT INC	7.3	7.8	4.7	5.7	12.0	13.5	3.4
Bicyclopyrone	3.42	fl oz/a	0.045	POSPOS	BANDDIR							
NIS				POSPOS	BANDDIR							
7 Prefar	5	qt/a	5.000	PRETRANS	PREPLANT INC	7.3	6.7	1.7	2.0	9.0	8.8	3.1
Bicyclopyrone	3.42	fl oz/a	0.045	POSPOS	BANDDIR							
NIS 0.25%				POSPOS	BANDDIR							
N-PAK AMS LIQUID 2.5%					BANDDIR							
8 Prefar	5	qt/a	5.000	PRETRANS	PREPLANT INC	3.0	1.9	3.0	2.5	6.3	4.4	2.1
Sandea	1	oz/a	0.047		BANDDIR							
NIS 0.25%					BANDDIR							
FPLSD (0.05)						3.6	3.8	2.5	2.5	3.3	4.9	1.1