

## Bicyclopyrone: crop tolerance and weed control efficacy in green onion

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### Methods

Two experiments were established at the OARDC Muck Crops Agricultural Research Station, Willard and Zeller's Farm, Hartville to test crop tolerance and weed control efficacy of bicyclopyrone on direct seeded green onion. The experimental design was a randomized complete block with four replications. Different rates of bicyclopyrone were sprayed at either pre-emergence, early post-emergence or late post-emergence to green onion (Table 1). Data were analyzed statistically to detect treatment differences. In the result tables, means followed by same letter do not significantly differ ( $P=0.05$ , LSD).

**Table 1: Treatment list of bicyclopyrone on green onion at Willard and Hartville**

	Treatment	Rate		Timing
1	Control			
2	Bicyclopyrone	2.57 fl oz/a		pre
3	Bicyclopyrone	3.42 fl oz/a		pre
4	Bicyclopyrone	2.57 fl oz/a		1st leaf
5	Bicyclopyrone	3.42 fl oz/a		1st leaf
6	Bicyclopyrone	2.57 fl oz/a		1st leaf
	NIS	0.25 % v/v		
7	Bicyclopyrone	3.42 fl oz/a		1st leaf
	NIS	0.25 % v/v		
8	Bicyclopyrone	2.57 fl oz/a		2nd Leaf
9	Bicyclopyrone	3.42 fl oz/a		2nd Leaf
10	Bicyclopyrone	2.57 fl oz/a		late post
11	Bicyclopyrone	3.42 fl oz/a		late post
12	Commercial Standard			
13	Bicyclopyrone	2.57 fl oz/a		2nd Leaf
	NIS	0.25 % v/v		
14	Bicyclopyrone	2.57 fl oz/a		late post
	NIS	0.25 % v/v		

### Take home message

Bicyclopyrone provided good control of galinsoga when sprayed before galinsoga emerged. However, it provided limited control of other weeds, mainly purslane (Table 2, 4). The addition of non-ionic surfactant to the spray solution increased the risk of crop injury (Table 3, 5). Bicyclopyrone with surfactant also adversely affected green onion yield. Late-post application of bicyclopyrone with surfactant caused severe chlorosis, making the crop unmarketable. However, pre-emergence application of bicyclopyrone was safe to green onion.

**Table 2: Weed response to bicyclopyrone at Hartville**

Treatment	Timing	Date	8/6/2018 %	8/13/2018 %
1 Control			0 a	0 c
2 Bicyclopyrone 2.57 oz/a	PRE	7/12/2018	0 a	0 c
3 Bicyclopyrone 3.42 oz/a			0 a	0 c
4 Bicyclopyrone 2.57 oz/a	1st-leaf	8/6/2018		18 b
5 Bicyclopyrone 3.42 oz/a				20 b
6 Bicyclopyrone + NIS 2.57 oz/a				30 a
7 Bicyclopyrone + NIS 3.42 oz/a				30 a

Maintenance:

7/11/18: Spray Outlook at 21oz/a to all plots

8/13/18: Hand weed all plots

8/13/18: Spray Dual Magnum at 1.3pt/a to all plots

9/4/18: Spray Outlook at 21oz/a to all plots

**Table 3: Response of green onion to bicyclopyrone at Hartville**

Treatment	Timing	Date	8/6/18	8/13/18	8/20/18	8/27/18	9/4/18	9/10/18	9/18/18	9/24/18	9/25/18	9/25/18	
			Injury									stand	average
			%									count	weight/plant
												#	g
1 Control			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	91 a	25 a	
2 Bicyclopyrone 2.57 oz/a	PRE	7/12/18	0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	62 a	20 a-e	
3 Bicyclopyrone 3.42 oz/a			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	67 a	21 a-e	
4 Bicyclopyrone 2.57 oz/a			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	67 a	23 abc	
5 Bicyclopyrone 3.42 oz/a	1st-leaf	8/6/18	0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	102 a	19 b-e	
6 Bicyclopyrone + NIS 2.57 oz/a			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	58 a	18 cde	
7 Bicyclopyrone + NIS 3.42 oz/a			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	55 a	18 cde	
8 Bicyclopyrone 2.57 oz/a	2nd-leaf	8/13/18	0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	73 a	22 a-d	
9 Bicyclopyrone 3.42 oz/a			0 a	0 a	0 b	3 b	0 b	0 b	0 c	0 c	105 a	17 de	
10 Bicyclopyrone 2.57 oz/a	Late POST	9/4/18	0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	32 a	19 a-e	
11 Bicyclopyrone 3.42 oz/a			0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	60 a	24 ab	
12 Chateau Prowl H2O 2 pt/a	3rd-leaf	8/20/18	0 a	0 a	0 b	0 c	0 b	0 b	0 c	0 c	72 a	24 a	
13 Bicyclopyrone + NIS 2.57 oz/a	2nd-leaf	8/13/18	0 a	0 a	25 a	45 a	45 a	38 a	23 b	23 b	79 a	9 f	
14 Bicyclopyrone + NIS 2.57 oz/a	Late POST	9/4/18	0 a	0 a	0 b	0 c	0 b	0 b	35 a	33 a	67 a	16 e	

Maintenance:

7/11/18: Spray Outlook at 21oz/a to all plots

8/13/18: Hand weed all plots

8/13/18: Spray Dual Magnum at 1.3pt/a to all plots

9/4/18: Spray Outlook at 21oz/a to all plots

9/25/18: One 10' section was harvested from the center row of each plot. Fresh weight and stand count was recorded

**Table 4: Weed response to bicyclopyrone at Willard**

Treatment	Timing	Date	8/23/2018	9/27/2018		10/12/2018	
			Overall	Galinsoga	Overall	Galinsoga	Overall
			Control %				
1 Control			0 c	0 d	0 d	0 e	0 e
2 Bicyclopyrone 2.57 oz/a	PRE	8/10/18	30 b	8 d	8 d	30 cd	30 cd
3 Bicyclopyrone 3.42 oz/a			27 b	40 c	40 c	53 bc	53 bc
4 Bicyclopyrone 2.57 oz/a			97 a	94 a	93 a	93 a	
5 Bicyclopyrone 3.42 oz/a	1st-leaf	8/30/28	100 a	97 a	97 a	97 a	97 a
6 Bicyclopyrone + NIS 2.57 oz/a			100 a	94 a	98 a	92 a	
7 Bicyclopyrone + NIS 3.42 oz/a			100 a	97 a	98 a	93 a	
8 Bicyclopyrone 2.57 oz/a	2nd-leaf	9/5/2018	64 b	63 b	53 bc	53 bc	
9 Bicyclopyrone 3.42 oz/a			83 ab	80 ab	73 ab	73 ab	
10 Bicyclopyrone 2.57 oz/a	Late POST	10/1/2018			38 cd	33 cd	
11 Bicyclopyrone 3.42 oz/a					28 cde	28 cde	
12 Chateau Prowl H2O 2 pt/a	3rd-leaf	9/18/2018		85 a	87 a	88 a	88 a
13 Bicyclopyrone + NIS 2.57 oz/a			87 a	85 a	73 ab	73 ab	
14 Bicyclopyrone + NIS 2.57 oz/a	Late POST	10/1/2018			10 de	10 de	
15 Lorox 2 lb/a	PRE	8/10/2018	67 a	0 d	0 d	17 de	17 de

Maintenance:

8/10/18: Spray Prowl H2O at 2pt/a to all plots

8/10/18: Spray Roundup at 32oz/a to all plots

8/27/18- 8/29/18: Hand weed all plots

9/7/18: Spray Dual magnum at 1.3pt/a to all plots

10/3/18: Spray Outlook at 21oz/a to all plots

**Table 5: Response of green onion to bicyclopyrone at Willard**

Treatment	Timing	Date	Injury %							Stand count	Fresh weight/plant
			8/23/18	8/30/18	9/5/18	9/18/18	9/27/18	10/12/18	10/18/18		
1 Control			0 a	0 a	0 c	0 c	0 d	0 c	0 d	212 a	13 ab
2 Bicyclopyrone 2.57 oz/a	PRE	8/10/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d	197 a	11 a-d
3 Bicyclopyrone 3.42 oz/a			0 a	0 a	0 c	0 c	0 d	0 c	0 d	212 a	13 a
4 Bicyclopyrone 2.57 oz/a	1st-leaf	8/30/18	0 a	0 a	3 c	7 c	12 c	7 c	7 cd	183 a	9 c-f
5 Bicyclopyrone 3.42 oz/a			0 a	0 a	0 c	0 c	0 d	0 c	0 d	169 a	11 a-d
6 Bicyclopyrone + NIS 2.57 oz/a			0 a	0 a	20 b	43 b	33 b	17 b	17 c	158 a	7 efg
7 Bicyclopyrone + NIS 3.42 oz/a			0 a	0 a	30 a	55 a	53 a	45 a	45 b	141 a	3 g
8 Bicyclopyrone 2.57 oz/a			2nd-leaf	9/5/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d
9 Bicyclopyrone 3.42 oz/a	2nd-leaf	9/5/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d	199 a	10 a-e
10 Bicyclopyrone 2.57 oz/a	Late POST	10/1/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d	200 a	11 a-d
11 Bicyclopyrone 3.42 oz/a	Late POST	10/1/18	0 a	0 a	0 c	0 c	0 d	8 bc	13 c	173 a	8 def
12 Chateau Prowl H2O 2 pt/a 1.5 oz/a	3rd-leaf	9/18/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d	229 a	11 a-d
13 Bicyclopyrone + NIS 2.57 oz/a	2nd-leaf	9/5/18	0 a	0 a	0 c	0 c	0 d	0 c	0 d	175 a	12 abc
14 Bicyclopyrone + NIS 2.57 oz/a	Late POST	10/1/18	0 a	0 a	0 c	0 c	0 d	45 a	73 a	165 a	6 fg
15 Lorox 2 lb/a	PRE	8/10/18	0 a	0 a	0 c	0 c	0 d	0 c	7 cd	206 a	9 b-f

**Maintenance:**

8/10/18: Spray Prowl H2O at 2pt/a to all plots

8/10/18: Spray Roundup at 32oz/a to all plots

8/27/18- 8/29/18: Hand weed all plots

9/7/18: Spray Dual magnum at 1.3pt/a to all plots

10/3/18: Spray Outlook at 21oz/a to all plots

10/22/18: One 10' section was harvested from the center row of each plot. Fresh weight and stand count was recorded

**Figure 1: Bicyclopyrone sprayed with surfactant caused stunting when applied at 1-leaf stage at Willard**



Control



Bicyclopyrone at 3.42oz/a with surfactant