

Strawberry Tolerance to Chateau

Nathan S. Boyd and Jialin Yu

Summary

Chateau (a.i. flumioxazin) is a preemergence herbicide that can be applied under the plastic mulch or in row middles for control of broadleaf weeds. It is safe for use when applied at the label rate of 3 oz/acre. Trials were conducted to determine what Chateau rate would damage strawberry. We found that Chateau applied under the plastic mulch at rates less than 12 oz/acre did not damage strawberry plants or reduce yield. Rates in excess of 12 oz/acre caused severe damage. Our results indicate that Chateaus is safe when applied at label rates, and damage will only occur at very high rates.

Methods

An experiment was conducted from August 2017 to February 2018 at the Gulf Coast Research and Education (27°N, 82°W) in Balm, Florida, to evaluate strawberry tolerance to flumioxazin applied as a PRE herbicide on the bed top. Soils at the site are a Myakka fine sand (Sandy, Siliceous Hyperthermic Oxyaquic Alorthod) with a pH of 6.0, 1.5% organic matter and 98, 1, and 1 % sand, silt, and clay, respectively.

The experiment was arranged as a randomized complete block design in four blocks. Each plot was 7.6 m long with 0.7 m width. Raised beds were formed with bed-pressing equipment (Kennco Manufacturing, Ruskin, FL) on 1.2-m centers, a height of 30.5 cm, and a bed-top width of 66 cm. The soil was fumigated with 336 kg ha⁻¹ of 63.4% 1,3-dichloropropene + 34.7% chloropicrin (Telone C-35, Dow AgroSciences LLC, Indianapolis, IN) on August 15, 2017. Fumigants were injected with a two-shank fumigation rig (Kennco) at a 20-cm depth. A single

drip tape with emitters every 30 cm and a flow rate of 0.95 L min⁻¹ per 30.5 m (Jain Irrigation Inc., Haines City, FL) was installed in the center of the bed and the beds covered with virtually impermeable film plastic mulch (Berry Plastics Crop, Evansville, IN).

The treatment list is shown in Table 1. Herbicide treatments were applied after raising the bed and fumigating the bed immediately prior to laying the plastic mulch. All herbicide treatments were applied in 187 L ha⁻¹ of water with a backpack sprayer (Bellspray Inc., Opelousa, LA) equipped with a single 8002VS nozzle (Teejet Technologies, Wheaton, IL) and a pressure of 0.24 MPa. Two rows of strawberry ‘Radiance’ were transplanted per bed with 38-cm spacing between plants on October 10, 2017. All plots were irrigated and fertilized throughout the growing season as per industry standards (Vallad et al. 2014).

Table 1. Herbicide treatments in field experiments conducted at the Gulf Coast Research and Education Center in Balm, FL.

Common name	Trade name	Rate --oz/acre--
Nontreated	-	0
Flumioxazin	Chateau	1.5
Flumioxazin	Chateau	3
Flumioxazin	Chateau	6
Flumioxazin	Chateau	12
Flumioxazin	Chateau	24
Flumioxazin	Chateau	48
Flumioxazin	Chateau	96
Flumioxazin	Chateau	192

Strawberry crop injury where 0 is no injury and 100 represents complete shoot death was evaluated November 6 and November 15 in 2017. The percentage of dead strawberry plants was

determined in each plot. Five strawberry plants in each plot were harvested and dry weight was determined. Berries were harvested twice per week from December 11, 2017 to February 22, 2018.

Data were analyzed in SAS (version 9.2, SAS Institute Inc., Cary, NC) using the mixed procedure with block as the random factor. Data were checked for normality and constant variance prior to analysis. Means were separated using the least squares means statement in SAS with the Tukey adjustment at $P = 0.05$. Data collected on multiple dates, such as strawberry damage and yield, were analyzed using the repeated statement.

Results

The herbicide treatment by time interaction was not significant ($P = 0.0066$) for strawberry injury, and as a result the strawberry injury data are presented separately by rating dates (Table 3). Flumioxazin at 1.5 to 6 oz/acre caused $\leq 18\%$ strawberry injury but 12 oz/acre caused 51% strawberry injury on November 6, 2017. On November 15, flumioxazin at 1.5 to 6 oz/acre caused minimal strawberry injury ($< 5\%$). Flumioxazin at 12 oz/acre caused 11% injury, while rates at 24 oz/acre caused 54% injury.

Strawberry yields in plots treated with flumioxazin at 1.5 to 12 oz/acre were statistically equivalent to the nontreated control. However, flumioxazin at 24 oz/acre had significantly reduced strawberry yield compared to the nontreated control. No strawberries were harvested in plots treated with flumioxazin at 192 oz/acre.

Flumioxazin at 1.5 to 24 oz/acre did not reduce strawberry biomass, while 48, 96, and 192 oz/acre substantially reduced strawberry biomass compared to the nontreated control. Similar trends were observed for the percentage of dead strawberry plants. Flumioxazin applied at ≥ 24 oz/acre significantly reduced the strawberry stands compared to the nontreated control, while lower rates were safe and did not reduce strawberry stands compared to the nontreated control.

Conclusion

Flumioxazin applied at rates ≤ 12 oz/acre was safe for strawberry plants. Flumioxazin applied at rates ≤ 12 oz/acre did not significantly injure strawberry, and

reduce strawberry yield, individual plant biomass, or strawberry stands compared to the nontreated control.

Contact

Dr. Nathan S. Boyd

UF/IFAS Gulf Coast Research and Education Center

P: 813-419-6613

E: nsboyd@ufl.edu

Table 2. Strawberry yield in field experiments conducted at the Gulf Coast Research and Education Center in Balm, FL.

Common name	Rate	Strawberry injury				Strawberry yield		Strawberry weight		Dead strawberry	
		Nov 6, 2017		Nov 15, 2017							
		--oz/acre-	-----%-----				----kg ha ⁻¹ ---	---g plant ⁻¹ --		-----%-----	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
Nontreated	-	0	0.0	0c	0.0	18480a	1424	38a	8.0	9c	6.2
Flumioxazin	1.5	0	0.0	0c	0.0	19622a	935	38ab	3.3	3c	3.6
Flumioxazin	3	18	10.5	0c	0.4	16746ab	1734	44a	1.1	6c	2.7
Flumioxazin	6	1	0.0	2c	2.3	16344ab	1773	47a	8.9	15c	7.5
Flumioxazin	12	51	27.9	11c	7.6	17646a	3614	36ab	3.2	6c	2.1
Flumioxazin	24	52	27.2	54b	8.7	11017b	3704	24bc	3.5	25b	13.9
Flumioxazin	48	84	9.3	97a	0.6	2156c	983	12cd	2.5	60b	6.2
Flumioxazin	96	27	14.8	95a	1.0	2081c	974	9cd	6.3	77a	8.6
Flumioxazin	192	25	23.4	100a	0.0	0c	0	0d	0.0	100a	0.0
		0.0583		<0.0001		<0.0001		<0.0001		<0.0001	

¹Berries were picked twice per week from December 11, 2017 to February 22, 2018.

Abbreviation: SE, standard error.