

Cultivation and Organic Herbicides for Weed Control in Organic Strawberry Row Middles

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Summary

Managing weeds in row middles in organic strawberry fields can be challenging. Trials conducted at GCREC found that cultivation is an effective way to control weeds within row middles. Organic herbicides are also effective but more costly. Combinations of cultivation and herbicides did not improve overall weed control compared to cultivation alone.

Methods

An experiment was conducted in the fall of 2019 at the Gulf Coast Research and Education Center (27°N, 82°W) in Balm, Florida, to evaluate organic herbicides for post-emergence weed control in Florida strawberry. Soil type at the center is 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 site is in the process of being certified for organic production and cover crops had been grown the previous season. The site had been a pasture for more than 10 years previous.

The experiment was conducted as a randomized complete block design with four blocks. The treatments were as follows: 1) nontreated control, 2) 1 pass with cultivator on November 6 (cult-N6), 3) one pass with a cultivator on November 6 and 29 (cult-N6+29), 4) 13.3% Avenger® (Avenger Products, LLC, Gainesville, GA), 5) cult-N6 plus Avenger, 6) cult-

N6+29 plus Avenger, 7) 48% Weed Zap® (JH Biotech, Ventura, CA), 8) cult-N6 plus Weed Zap, 9) cult-N6+29 plus Weed Zap, 10) 100% Weed Pharm® (Pharm Solutions, Destin, FL), 11) cult-N6 plus Weed Pharm, 12) cult-N6+29 plus Weed Pharm. Avenger and Weed Zap were applied in a total volume of 60 GPA and Weed Pharm was applied at 30 GPA. All organic herbicides were applied with a CO₂ pressurized sprayer equipped with a single 8002 EVS nozzle at a pressure of 240 kPa. Natural Wet was applied as a surfactant at 0.002%. Herbicides were applied on December 16 in treatments with two cultivations followed by a herbicide.

Plot size was 75 feet of a row middle. Beds were spaced 5 feet apart and were 32 inches at the base, 28 inches at the top and 8 inches tall. Beds were shaped on August 20, 2019. A single drip tape with emitters every 30 cm and a flow rate of 1.57 L min⁻¹ were buried 2.5 cm beneath the soil surface.

The number of broadleaf, grass, and nutsedge weeds that emerged were counted within the row middles on November 6, November 7, November 21, November 27, December 6, and December 17, 2019.

Data were analyzed with proc mixed procedure in SAS (version 9.4; SAS Institute, Cary, NC). Block was considered a random variable and cultivation and herbicide treatments a fixed variable. Data were checked for normality and constant variance prior to analysis. Treatment means were separated using the

least squares means statement in SAS with the Tukey adjustment at P = 0.05.

Results

Cultivation consistently reduced broadleaf weed density compared to the nontreated control at all time periods, with a single cultivation being as effective as two cultivations (Table 1). An early application of Avenger or Weed Pharm tended to be more effective than cultivation alone. Cultivation followed by later herbicide applications did not reduce broadleaf weed density compared to cultivation alone. Though not always significant, similar trends were observed with grasses (Table 2). Cultivation reduced total weed density as did early organic herbicide applications (Table 3). Complete control was not achieved with any of the treatments.

Conclusions

Cultivation is an effective way to control weeds within organic row middles in strawberry. Organic

herbicides are also effective but more costly. Combinations of cultivation and herbicides did not improve overall weed control compared to cultivation alone.

Disclaimer

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and reference to them in this publication does not signify our approval to the exclusion of other products of suitable composition.

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Table 1. The effects of cultivation and herbicide combinations on broadleaf weeds after the first treatment (November 7), the second treatment (December 6) and the third treatment (December 17) in organic strawberry row middles at GCREC in 2019.

Treatment	November 7	December 6	December 17
	-----#/m ² -----		
Nontreated control	10 ab ¹	15 a	18 a
1 cultivation (cult)	4 c	10 ab	12 b
2 cult	4 c	6 bcd	10 bc
Avenger	6 abc	2 d	3 e
1 cult fb ² Avenger	9 abc	9 bc	9 bcd
2 cult fb Avenger	8 abc	9 bc	9 bcd
Weed Zap	11 a	9 bc	13 ab
1 cult fb Weed Zap	4 c	9 bc	9 bcd
2 cult fb Weed Zap	7 bc	4 cd	9 bcd
Weed Pharm	12 a	6 bcd	5 de
1 cult fb Weed Pharm	6 abc	5 bcd	9 bcd
2 cult fb Weed Pharm	6 abc	5 bcd	9 bcd
P value	0.0840	0.0132	0.0005

¹Means within columns followed by different letters are significantly different at p<0.1.

²followed by: fb

Table 2. The effects of cultivation and herbicide combinations on grass weeds after the first treatment (November 7), the second treatment (December 6) and the third treatment (December 17) in organic strawberry row middles at GCREC in 2019.

Treatment	November 7	December 6	December 17
		-----#/m ² -----	
Nontreated control	0	12	15 a
1 cultivation (cult)	0	3	11 ab
2 cult	0	1	9 b-e
Avenger	0	4	4 e
1 cult fb ² Avenger	0	1	8 b-e
2 cult fb Avenger	0	3	9 b-e
Weed Zap	0	3	10 bc
1 cult fb Weed Zap	0	7	9 b-e
2 cult fb Weed Zap	0	1	6 cde
Weed Pharm	0	5	4 de
1 cult fb Weed Pharm	0	4	8 b-e
2 cult fb Weed Pharm	0	1	6 cde
P value	-	0.3059	0.0043

¹Means within columns followed by different letters are significantly different at p<0.1.

²followed by: fb

Table 3. The effects of cultivation and herbicide combinations on total weed density after the first treatment (November 7), the second treatment (December 6) and the third treatment (December 17) in organic strawberry row middles at GCREC in 2019.

Treatment	November 7	December 6	December 17
		-----#/m ² -----	
Nontreated control	16	28 a ¹	45 a
1 cultivation (cult)	6	20 ab	32 ab
2 cult	5	9 bcd	25 bcd
Avenger	12	7 cd	12 d
1 cult fb ² Avenger	13	11 bcd	24 bcd
2 cult fb Avenger	11	13 bcd	24 bcd
Weed Zap	15	14 bcd	29 b
1 cult fb Weed Zap	8	18 abc	28 bc
2 cult fb Weed Zap	8	11 bcd	20 bcd
Weed Pharm	17	12 bcd	13 cd
1 cult fb Weed Pharm	14	10 bcd	23 bcd
2 cult fb Weed Pharm	8	7 d	17 bcd
P value	0.1382	0.0315	0.0101

¹Means within columns followed by different letters are significantly different at p<0.1.

²followed by: fb