Precision Application of an Organic Herbicide for Weed Control in Strawberry Row Middles

Nathan S. Boyd and Laura Reuss

Summary

Managing weeds in row middles in organic strawberry fields can be challenging. Trials conducted at GCREC found that cultivation is the most effective option. Weed Zap was not effective. 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 set 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 CO_2 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 reduced broadleaf and total weed density by 75-88% (Tables 1 and 2). Weed Zap alone did not adequately control broadleaf or total weeds, and the combination of organic herbicide plus cultivation was no better then cultivation alone. Grass and nutsedge density were not significantly reduced by any of the treatments compared to the nontreated control.

Use of the precision applicator reduced herbicide usage by 7%, but additional training is needed to improve detection accuracy. However, this technology may not be a viable option for organic growers if organic herbicides are not effective.

Conclusions

Broadleaf weeds were adequately controlled by cultivation but not Weed Zap. We conclude that cultivation is the best weed management option for organic strawberry row middles, but cultivation may not adequately control grass or nutsedge species.

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.

Contact

Dr. Nathan S. Boyd
UF/IFAS Gulf Coast Research and Education Center
P: 813.419.6605
E: nsboyd@ufl.edu

Table 1. The effects of cultivation, broadcast herbicide applications, and precision herbicide applications on broadleaf weed density after the first (November 6) and second treatment (November 29) in organic strawberry row middles at GCREC in 2019.

Treatment	November 7	December 6	December 17
	----------#/m^2----------		
Nontreated control	11 ab[1]	18 a	16 ab
Cultivation	2 c	2 b	4 d
Broadcast Weed Zap	14 a	22 a	18 a
Precision Weed Zap	14 a	15 a	15 abc
Cultivation fb[2] broadcast Weed Zap	3 bc	7 b	10 bcd
Cultivation fb precision Weed Zap	2 c	6 b	8 cd
P value	0.0169	0.0001	0.0073

[1]Means within columns followed by different letters are significantly different at $p<0.1$.
[2]followed by: fb

Table 2. The effects of cultivation, broadcast herbicide applications, and precision herbicide applications on total weed density after the first (November 6) and second treatment (November 29) in organic strawberry row middles at GCREC in 2019.

Treatment	November 7	December 6	December 17
	----------#/m^2----------		
Nontreated control	14 a	32 a	27
Cultivation	2 b	4 b	12
Broadcast Weed Zap	18 a	32 a	24
Precision Weed Zap	16 a	34 a	31
Cultivation fb[2] broadcast Weed Zap	4 b	13 b	18
Cultivation fb precision Weed Zap	2 b	11 b	14
P value	0.0016	0.0051	0.1050

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

[2]followed by: fb