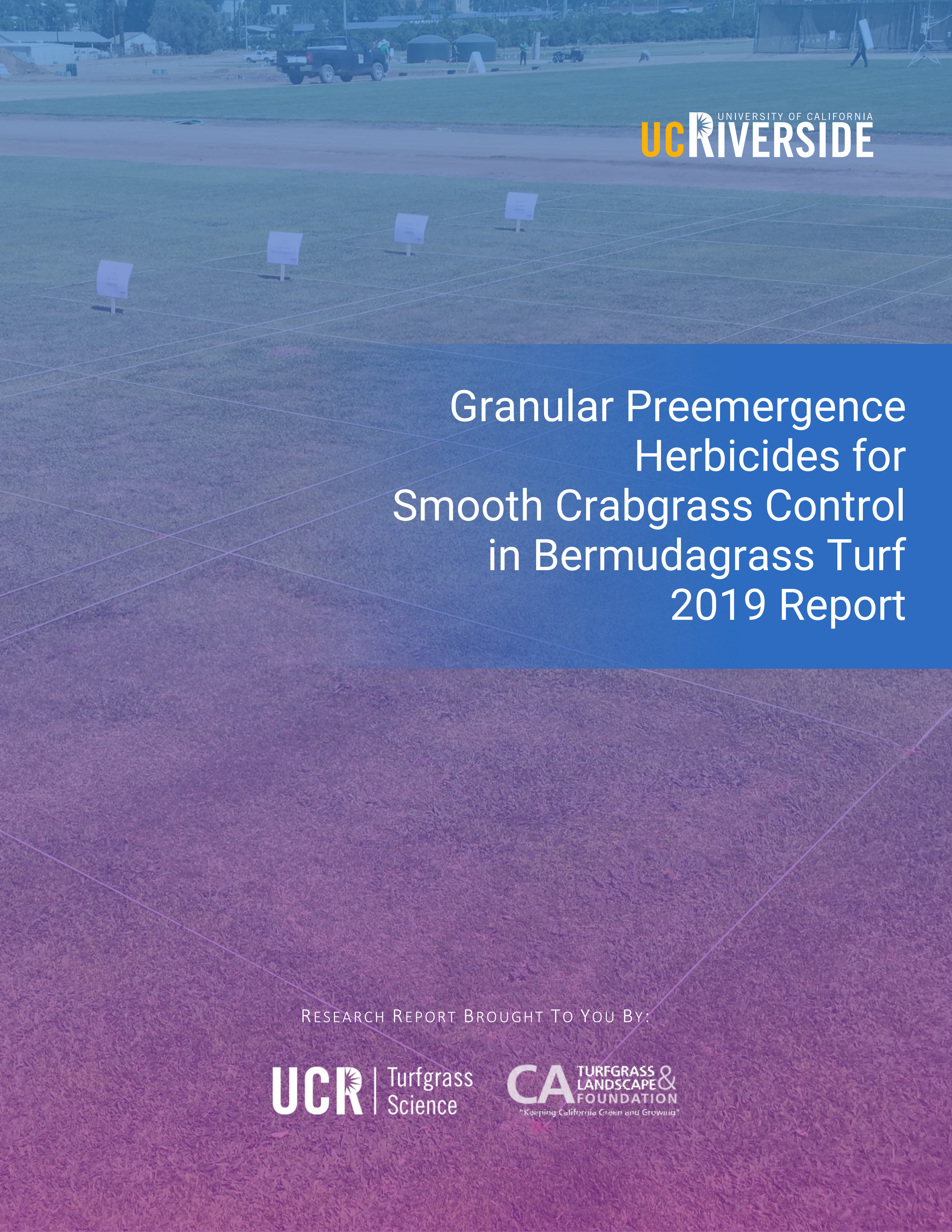

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# Granular Preemergence Herbicides for Smooth Crabgrass Control in Bermudagrass Turf 2019 Report

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# Granular Preemergence Herbicides for Smooth Crabgrass Control in Bermudagrass Turf 2019 Report

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**The Bottom Line:** Three commercially available granular herbicide products were tested alone against an untreated control for preemergence control of smooth crabgrass (*Digitaria ischaemum*) in bermudagrass turf maintained as a golf course fairway or athletic field. Study was conducted at the Turfgrass Research Facility in Riverside. Treatments were applied once in March or twice in April 2019. All herbicide treatments significantly suppressed smooth crabgrass emergence, providing satisfactory control (below 10% cover) until the beginning of June. Following that period, all treatments applied once at 150 lbs/A slowly started to surrender under the crabgrass pressure starting with FreeHand 1.75G followed by Specticle G, ending with Crew. By 22$^{nd}$ week after initial treatment (WAIT) crabgrass cover within plots treated with Crew, Specticle G and FreeHand 1.75G was 39%, 51% and 66%, respectively and differences between those treatments were significant. Ultimately, at final rating date, target weed cover within same plots was 59%, 52% and 70%, respectively although differences were not significant. Furthermore, Crew herbicide when applied either once at 200 lbs/A or twice at 150 lbs/A, performed better than if applied only once at 150 lbs/A. Those treatments withheld crabgrass encroachment at satisfactory levels for one month longer than Crew at 150 lbs/A, resulting in crabgrass suppression exceeding 50% when compared to untreated control.

## Acknowledgments

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## Introduction

Smooth or small crabgrass (*Digitaria ischaemum*) is a common summer annual weed in a variety of turfgrass settings such as: golf courses, athletic fields, and landscape turf throughout the United States. It is a low-growing warm-season grass that can spread by either seed or occasional rooting of the lowest stem nodes. Its spreading growth habit tends to crowd out desirable turfgrasses, especially when their growth rate is reduced e.g.: due to dormancy. In bermudagrass (*Cynodon* spp.) it can negatively affect aesthetic and functional turf quality due to its light green color, coarse leaf texture, and unsightly seedheads. Furthermore, smooth crabgrass aggressively competes with bermudagrass for resources such as: light, water, and nutrients. It can be selectively controlled using either pre- or postemergence herbicides although established crabgrass can be very difficult to eradicate. Therefore, prevention of the infestation is the foundation for effective weed control.

Generally speaking, preemergence herbicides are available in either liquid or granular formulations; however, this study focused on granular formulations only. Their main advantages are ease and speed of application. They are applied to the ground and subsequently taken up by emerging shoots and seedling

Cover photo taken by P. Petelewicz
on September 12, 2019. Riverside, CA.

roots. As all preemergence herbicides, they require activation with water before the initiation of weed seed germination. It is needed to ensure the development of an active chemical barrier that will be present in the soil layer/solution when the target weed seeds absorb water during germination. It can be achieved by either immediate irrigation or rainfall following application.

A variety of preemergence herbicides targeting crabgrass are available for warm-season grasses, including dithiopyr, pendimethalin, dimethenamid, indaziflam and isoxaben. First two are microtubule assembly inhibitors (group 3 herbicides), members of pyridine and dinitroaniline families respectively. Indaziflam (group 29 herbicide) a member of alkylazine family and isoxaben (group 21 herbicide; benzamide family) are both inhibitors of cell wall biosynthesis (site C and B respectively). Lastly dimethenamid is a mitosis inhibitor (group 15 herbicide) in chloroacetamide family.

## Objectives

This study was conducted to evaluate and compare the efficacy of three granular formulations of preemergence herbicides for control of smooth crabgrass (*Digitaria ischaemum*) in hybrid bermudagrass (*Cynodon* spp.) maintained as a golf course fairway or athletic field.

## Materials and Methods

The study was conducted on mature hybrid bermudagrass (*Cynodon* spp.) 'GN-1' turf on a Hanford fine sandy loam. Turf was mowed 3 days/wk at 0.5 inches and received no fertilizer in 2019 season, either prior to the study initiation or throughout the trial. Herbicide treatments were applied on March 7, 2019 and April 18, 2019. Treatments were applied manually using hand-shakers to ensure uniform distribution within each plot area. Immediately following application, plots were irrigated to provide moisture required for their activation. Experimental design was a complete randomized block with 4 replications. Plot size was 5×7 ft with 1-ft alleys. Starting from March 7, 2019 plots were evaluated weekly for smooth crabgrass cover (0-100%) other weeds present at the study initiation, and injury caused by treatments (0-10; 10=highest). Data collected throughout the study was analyzed using analysis of variance for each evaluated trait separately and the means have been compared using the Fisher's protected least significant difference (LSD) test at the 0.05 probability level ($P \leq 0.05$).

## Results

First crabgrass plants started emerging within the trial area after third week following initial application, mainly in untreated plots. By the fourth week, target weed cover within those plots already exceeded 15%. Starting from that date, crabgrass plants developed quite rapidly and after another month the weed cover among those plots was already above 50% and increasing. Ultimately, crabgrass approached full cover in the untreated area after twenty weeks from the time of initial treatment application (Figure 1, Table 2).

All, of the herbicide treatments evaluated in the study provided satisfactory crabgrass suppression (below the threshold of 10% weed cover) for twelve weeks after initial treatment application. Furthermore, there were no significant differences among herbicide treatments for thirteen weeks from the beginning of the study. First treatment that succumbed to crabgrass pressure was FreeHand 1.75 G allowing target weed to exceed the threshold level ca. fourteen weeks after the study began. The week after, Crew at 150 lbs/A and Specticle G broke down under growing crabgrass pressure. Treatments that kept crabgrass emergence below the threshold level for the longest time were Crew at 200 lbs/A and the same product used at 150 lbs/A twice on a 6-week interval. Those two treatments were capable of withstanding crabgrass pressure for 18 weeks from the study initiation, being at the same time the most effective treatments in terms of the herbicidal longevity resulting in more than 50% crabgrass suppression in comparison to untreated control. Target weed cover in remaining treatments ranged from 52% to 70% (Figure 1, Table 2).

Other weeds identified within the trial area in the beginning of the study were: wild celery (*Cyclospermum leptophyllum*), lesser swinecress (*Lepidium didymum*), clumpy ryegrass (*Lolium perenne*) and annual bluegrass (Poa annua). Most of those species checked out naturally within ten weeks from the trial initiation. Besides severe injury to annual bluegrass caused by FreeHand 1.75G and Specticle G, no other herbicide effects were observed on these species (data not shown).

In addition, no phytotoxicity was observed with Crew treatments while there was some occurrence of thinning and green up inhibition caused by FreeHand 1.75G and Specticle G (data not shown).

## Tables and Figures

**Table 1.** Granular herbicide treatments tested in the preemergence smooth crabgrass control trial in Riverside, CA. 2019.

| No. | Treatment | Active ingredient(s) | Company | Rate (lbs/A) | Timing |
|---|---|---|---|---|---|
| 1 | Untreated Control | - | - | - | - |
| 2 | Crew | dithiopyr, isoxaben | Corteva | 150 | A |
| 3 | Crew | dithiopyr, isoxaben | Corteva | 200 | A |
| 4 | Crew | dithiopyr, isoxaben | Corteva | 150 | AB |
| 5 | FreeHand 1.75G | dimethenamid-P, pendimethalin | BASF | 150 | A |
| 6 | Specticle G | indaziflam | Bayer | 150 | A |

Application codes (timing):

A – 03/07/2019
B – 04/18/2019

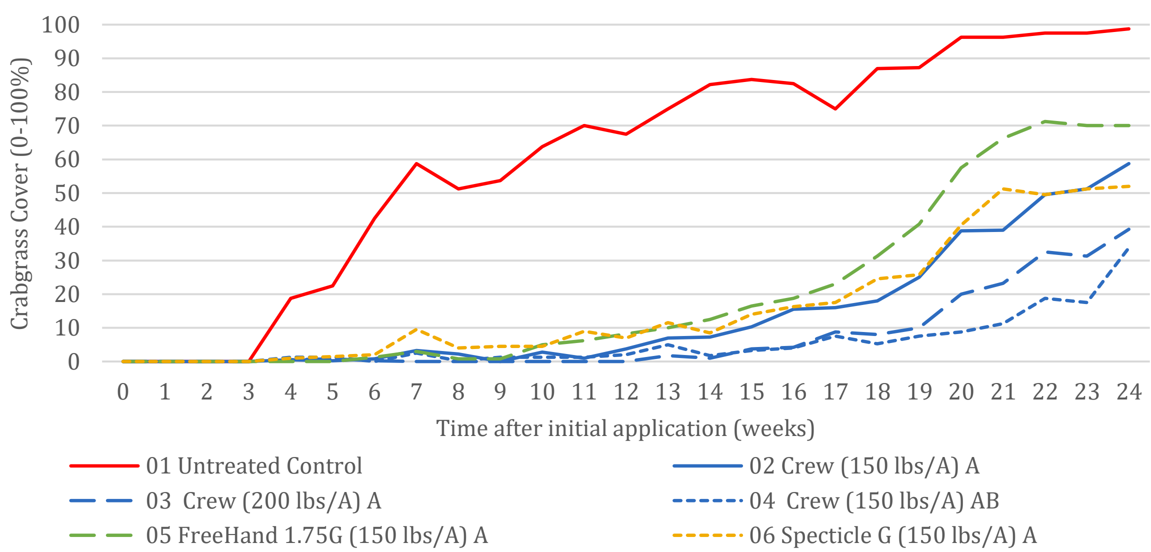


**Figure 1.** The effect of granular preemergence herbicide treatments on smooth crabgrass (*Digitaria ischaemum*) cover (0-100%). Riverside, CA. 2019.

**Table 2.** Effect of granular herbicide treatments on crabgrass cover (0-100%) evaluated on bermudagrass turf. Riverside, CA, 2019.

| No. | Treatment | Crabgrass Cover (0-100%) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 11 WAIT | 12 WAIT | 13 WAIT | 14 WAIT | 15 WAIT | 16 WAIT | 17 WAIT |
| 1 | Untreated Control | 70.0 a* | 67.5 a | 75.0 a | 82.3 a | 83.8 a | 82.5 a | 75.0 a |
| 2 | Crew (150 lbs/A) 1 app. | 1.0 b | 3.8 b | 7.0 b | 7.3 bc | 10.3 bc | 15.5 b | 16.0 bc |
| 3 | Crew (200 lbs/A) 1 app. | 0.0 b | 0.0 b | 1.8 b | 1.0 c | 3.8 c | 4.3 c | 8.8 c |
| 4 | Crew (150 lbs/A) 2 apps. | 1.3 b | 2.0 b | 5.0 b | 1.8 bc | 3.3 c | 4.0 c | 7.5 c |
| 5 | FreeHand 1.75G (150 lbs/A) 1 app. | 6.3 b | 8.3 b | 10.0 b | 12.5 b | 16.5 b | 18.8 b | 23.0 b |
| 6 | Specticle G (150 lbs/A) 1 app. | 9.0 b | 7.0 b | 11.5 b | 8.5 bc | 14.0 b | 16.3 b | 17.5 bc |
| | | 18 WAIT | 19 WAIT | 20 WAIT | 21 WAIT | 22 WAIT | 23 WAIT | 24 WAIT |
| 1 | Untreated Control | 87.0 a* | 87.3 a | 96.3 a | 96.3 a | 97.5 a | 97.5 a | 98.8 a |
| 2 | Crew (150 lbs/A) 1 app. | 18.0 bc | 25.0 c | 38.8 c | 39.0 d | 49.5 c | 51.3 c | 58.8 bc |
| 3 | Crew (200 lbs/A) 1 app. | 8.0 c | 10.0 d | 20.0 d | 23.3 e | 32.5 cd | 31.3 d | 39.3 c |
| 4 | Crew (150 lbs/A) 2 apps. | 5.3 c | 7.5 d | 8.8 d | 11.3 e | 18.8 d | 17.5 d | 33.8 c |
| 5 | FreeHand 1.75G (150 lbs/A) 1 app. | 31.3 b | 40.8 b | 57.5 b | 66.3 b | 71.3 b | 70.0 b | 70.0 b |
| 6 | Specticle G (150 lbs/A) 1 app. | 24.5 b | 25.8 c | 40.5 c | 51.3 c | 49.5 c | 51.3 c | 52.0 bc |

* WAIT – weeks after initial treatment

**Means followed by the same letter in a column are not significantly different (P=0.05).

**Figure 2.** General view of the study showing target weed pressure and difference between treated and untreated plots. Photo taken by P. Petelewicz on June 19, 2019. Riverside, CA.

**Figure 3.** Comparison of plot treated with Crew at 150 lbs/A (1 app.; left) to plot treated with Crew at 200 lbs/A (1 app.; right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.

**Figure 4.** Comparison of plot treated with Crew at 150 lbs/A (2 apps.; left) to plot treated with FreeHand 1.75G at 150 lbs/A (1 app.; right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.

**Figure 5.** Comparison of untreated plot (left) to plot treated with Crew at 150 lbs/A (2 apps.; right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.

**Figure 6.** Comparison of plot treated with Specticle G at 150 lbs/A (1 app.; left) to untreated plot (right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.

**Figure 7.** Comparison of plot treated with Specticle G at 150 lbs/A (1 app.; left) to plot treated with Crew at 200 lbs/A (1 app.; right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.

**Figure 8.** Comparison of untreated plot (left) to plot treated with FreeHand 1.75G at 150 lbs/A (1 app.; right). Photo taken by P. Petelewicz on September 12, 2019. Riverside, CA.