Effects of Herbicides on Bermudagrass Growth

Cassandra Santos and Kai Umeda
University of Arizona Cooperative Extension

Abstract

All of the sulfonylurea herbicides caused bermudagrass injury when all of the treatments showed that grass clipping weights decreased for up to 2 weeks after the application. Revolver, Certainty, SedgeHammer, and the untreated check had bermudagrass that started to recover after the 2nd week and grass clipping weights increased at the third and fourth week after application. Manor, TranXit, both Katana treatments, and both Monument treatments showed a decreasing trend for grass clipping weights each week. These declining weights showed that the bermudagrass growth was still being affected even after 4 weeks. There was a trend between the high and low treatment rates of Monument. For 4 weeks, the average clipping weight of the higher rate of Monument was less than the lower rate of Monument. For the higher rate of Monument, the bermudagrass growth was stunted more than the lower rate. The high and low rates of Katana did not show any significant difference for the effect on bermudagrass. Throughout the experiment, Certainty affected the bermudagrass growth the least. At 5 weeks after application, the bermudagrass treated by all the herbicides had recovered.

Introduction

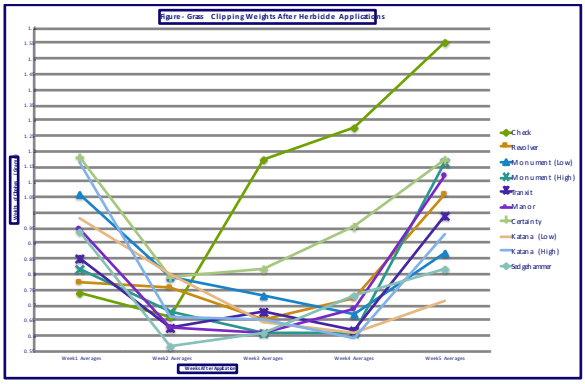
The sulfonylurea (SU) class of herbicides is used especially for spring transition to remove ryegrass from bermudagrass turf and for weed control in Arizona. These herbicides affect plants' ability to produce three specific amino acids needed in the growing of the plants. Seven SU herbicides were evaluated and used in this experiment including: Revolver (foramsulfuron), Monument (trifloxysulfuron), TranXit (rimsulfuron), Manor (metsulfuron), Certainty (sulfosulfuron), Katana (flazasulfuron), and SedgeHammer (halosulfuron). All of these herbicides except halosulfuron specialize in the removal of cool-season, perennial ryegrass. The removal of cool season, perennial ryegrass is a process called spring transition. This process involves the transition from the winter ryegrass back to the summer bermudagrass. During the winter, overseeded ryegrass flourishes because of the cool weather, and bermudagrass goes into dormancy. When the weather starts to get warmer, the bermudagrass comes out of dormancy and the ryegrass starts to die out, as the ryegrass cannot survive in the heat. From June through the rest of the summer, the turf will be fully green with bermudagrass. Sometimes this process can take a long time, and the ryegrass does not die so quickly due to thick overseeding in the winter, shady areas under trees, or taller grass like golf course roughs. Because these conditions favor the ryegrass, it becomes harder to remove it from the turf area. Many superintendents of golf courses, and managers of sports stadiums and high schools then look to these herbicides to aid them in the removal of the ryegrass. These six herbicides speed up the process of the ryegrass removal, so the bermudagrass can grow without the need to compete with the ryegrass. Though these herbicides speed up the process, some can affect the bermudagrass, and there can be side effects. The herbicides can stunt the growth of the bermudagrass or sometimes cause discoloration. Many of the SU herbicides can also control different turf weeds such as purple nutsedge (*Cyperus rotundus*). Purple nutsedge is a very common weed in Arizona turfgrasses and crops that resembles grass. It is a much lighter-green color and it is a perennial summer weed that reproduces from tubers more so than from seed. It usually appears in wetter turf areas that have poor drainage, leaky sprinklers, or too frequent irrigation. Nutsedge is one of the weeds that Monument, Certainty, Katana, and SedgeHammer can control, and there are more weeds that they may control. The purpose of this experiment is to test these seven different herbicides at their commonly used rates for transition and weed control to see if they affect the bermudagrass. Past experiments have shown these SU herbicides to be effective in removing ryegrass but have also shown to slow the growth and stunt bermudagrass in the spring during transition. Also when higher rates of Monument and Katana have been used for nutsedge control, bermudagrass was discolored. The objective is to apply the SU herbicides to bermudagrass to determine if growth is affected or

Materials and Methods

Hybrid bermudagrass cultivar Tifway 419 sod was used for this experiment. Forty 6-inch diameter pots contained a soil mixture of 10% loamy soil from the Maricopa Agricultural Center and 90% greenhouse potting mix from the extension office greenhouse. The sod was then cut, rinsed, and planted into all 40 pots. They were grown for two weeks and watered once a day everyday. At 2 days after the planting, the plants were fertilized once with 0.5 lb of nitrogen per 1000 sq. ft. to help with the growth and establishment of the sod. After two weeks, the grass in the pots was trimmed to a height at the edge of the pot, and on June 17, 2014, the pots were sprayed with the different herbicides (Table). Each treatment was replicated four times with an individual pot. All four pots were placed in an area of 2.5 feet by 5 feet for spraying. They were then sprayed with their specific treatment with a CO_2 backpack sprayer with a hand-held boom and 2 flat fan 8003LP nozzles spaced 20 inches apart. All of the sprays were applied in the equivalent of 278 gallons per acre of water that was pressurized to 30 pounds per square inch. A non-ionic surfactant Latron CS-7 was also added at 0.25% volume to volume. On the day of the spraying, the air temperature was 106.8° F, the sky was clear, an average soil temperature of 80° F in each pot, and wind speed was an average of 2.4 mph with a maximum wind speed of 3.1 mph. After the spray was allowed to dry, the plants were watered once a day everyday. A week after the spraying, all of the pots were trimmed again, and the clippings of the grass were collected and weighed. The pots were trimmed weekly for the next four weeks as well, and the weights were recorded, data was analyzed, and means were separated using Tukey's HSD.

Table- Weekly Average Weights of Grass Clippings (Grams)

Trt #	Treatment	A.I. Rate (lb/A)	Product Rate (oz./A)	Week 1 Averages 6/23	Week 2 Averages 6/30	Week 3 Averages 7/7	Week 4 Averages 7/14	Week 5 Averages 7/21
1.	Untreated Check			0.74 A	0.66 A	1.17 A	1.28 A	1.55 A
2.	Revolver foramsulfuron	0.026	17.4	0.77 A	0.76 A	0.65 A	0.72 B	1.06 AB
3.	Monument trifloxysulfuron	0.016	0.35	1.06 A	0.79 A	0.73 A	0.67 B	0.87 AB
4.	Monument trifloxysulfuron	0.025	0.53	0.82 A	0.68 A	0.61 A	0.61 B	1.16 AB
5.	TranXit rimsulfuron	0.031	2.0	0.85 A	0.63 A	0.68 A	0.62 B	0.99 AB
6.	Manor metsulfuron	0.037	1.0	0.95 A	0.63 A	0.61 A	0.69 B	1.12 AB
7.	Certainty sulfosulfuron	0.094	2.0	1.18 A	0.79 A	0.82 A	0.96 AB	1.17 AB
8.	Katana flazasulfuron	0.023	1.5	0.98 A	0.80 A	0.64 A	0.61 B	0.71 AB
9.	Katana flazasulfuron	0.047	3.0	1.16 A	0.66 A	0.65 A	0.59 B	0.93 B
10.	Sedgehammer halosulfuron	0.061	1.3	0.94 A	0.57 A	0.61 A	0.73 B	0.82 AB



Results & Discussion

During the first three weeks after the herbicide applications there was no significant difference between the grass clipping weights of each of the treatments (Table). At 4 weeks after the application, the untreated check had a grass clipping weight that was significantly greater than the other treatments. There was a trend between the high and low treatment rates of Monument. For 4 weeks, the average clipping weight of the higher rate of Monument was less than the lower rate of Monument, but at the 5th week, the lower rate of Monument was less than the higher rate of Monument. For the higher rate of Monument, the bermudagrass growth was stunted more than the lower rate for the majority of this experiment, which was what was expected. The high and low rates of Katana did not show any difference for the effect on bermudagrass. Manor, TranXit, both Katana treatments, and both Monument treatments showed a decreasing trend for grass clipping weights each week (Figure). These declining weights showed that the bermudagrass growth was still being affected even after 4 weeks, but at 5 weeks, the bermudagrass treated by all the herbicides had recovered. All of the treatments showed that grass clipping weights decreased for up to 2 weeks after the application. Revolver, Certainty, SedgeHammer, and the untreated check had bermudagrass that started to recover after the 2nd week and grass clipping weights increased at the third and fourth week after application. The untreated check showed an increase in clipping weight at 3 weeks after application and a significant increase at 4 weeks. Revolver, Certainty, and SedgeHammer all showed an increase in clipping weight. Certainty showed the greatest increase in grass clipping weight of the three. These results indicated that at 3 weeks after the application, the bermudagrass started to recover and resumed growing normally. This trend showed that all of the SU herbicides affected bermudagrass similarly except that Revolver, Certainty, and SedgeHammer had a lesser effect on the bermudagrass growth. At 5 weeks after application, Certainty affected the bermudagrass growth the least and the high rate of Katana stunted the bermudagrass growth the most. The decrease of the grass clipping weights indicated that the SU herbicides negatively affected the bermudagrass growth. The bermudagrass treated by Revolver, Certainty, and SedgeHammer showed recovery after 3 to 4 weeks. Manor, TranXit, Monument and Katana injured bermudagrass and clipping weights did not indicate recovery at 4 weeks, but the clipping weights indicated recovery at 5 weeks after application.

Turf Quality at spring transition and weed infestations can be monitored by using a remote camera.

References

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