

Management of *Poa annua* on Overseeded Fairways

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Summary: Studies conducted in 1997/98 indicated that pre-emerge herbicides such as oxadiazon (Ronstar) and prodiamine (Barricade) provided effective control of annual bluegrass -- with applications made as late in the year as four weeks prior to overseeding -- without damage to ryegrass. However, ryegrass damage did develop if product rates were too high and/or if ryegrass was stressed due to weather conditions, poor irrigation coverage or other factors. In 1998/99, the best performing treatments from the previous year were tested again to confirm results, and to identify optimal rates and timing for oxadiazon. Key results include the following:

- Currently, the commercial standard for poa control on overseeded fairways is ethofumesate (Prograss). Our tests confirmed that when this product is used at the right time, at the right frequency, and at the right rate, long-term poa control at levels reaching 99% can be achieved without any damage to ryegrass. In our tests, 2 post-emerge applications (November and December) of 0.5 gallons Prograss per acre achieved this level of control.
- Good poa control also resulted from a single pre-emerge application of Barricade (1.5 lb/A, 8 weeks before overseeding).
- Moderately good control resulted from Ronstar (100 lb/A, 8 weeks before overseeding) or Barricade (2 applications at 0.75 lb/A: 8 wks before and 8 wks after overseeding).
- If pre-emerge herbicides such as Ronstar or Barricade are used, a single application at the full rate before overseeding appears to perform better than split applications divided between one pre- and one post-overseeding application.
- There was no damage to rye or bermudagrass from any of the treatments tested. However, under higher stress

conditions (windy and/or dry conditions due to poor irrigation uniformity), we have seen damage to ryegrass with high rates of Ronstar and Barricade.

- In areas where ryegrass is under stress (due to poor irrigation uniformity, disease or other factors), Prograss may be the best option for good poa control, without the threat of phytotoxicity.
- Where stress to ryegrass is not an issue, use of other products, such as Barricade or Ronstar, in alternate years may help avoid development of poa resistance to Prograss.
- If Prograss is applied while bermudagrass is still actively growing, the spring/summer transition back to bermudagrass may be significantly slowed. For this reason, Prograss cannot be applied on a calendar schedule -- air temperatures and bermudagrass growth and appearance must be closely monitored to determine the onset of dormancy, and therefore the optimal application timing.

Materials and Methods:

Location: The trial was conducted on an overseeded bermudagrass fairway at Sun City West, Palm Desert, CA. The bermudagrass fairway was overseeded with perennial ryegrass on October 12, 1998.

Experimental design and application: Plots (measuring 8 by 10 feet) were replicated three times in a randomized design (see diagram below). A portion of this plot was treated (a 3-foot X 10 foot swath for granular products, and a 5 foot by 10 foot swath for sprayable products). A non-treated strip was left adjacent to each treated plot for the purpose of comparison.

Sprayable products were applied with a backpack sprayer using a single boom and 8004 flat fan nozzles on a 12 inch spacing, powered by CO₂ to

deliver 28 psi at the boom and 0.98gallons/1000 square feet. Calibration of each nozzle was confirmed prior to each application to be within 5% of the desired nozzle flow rate. The boom height was 17 inches. The spray swath was 5 feet. The spray tank was agitated by shaking 20 times prior to charging with compressed CO₂. The spray lines were purged with CO₂ and then water prior to changing treatments.

Ronstar G was applied with a Gandy drop spreader, forming a 33-inch swath. Calibration to

deliver 50 lb/A Ronstar G resulted in a Gandy setting of 14. To apply 100 lb/A of Ronstar, two passes were made over the same swath at the "14" setting. The accuracy of calibration was confirmed to be within + 5% of the desired rate by conducting 3 passes of 15 linear feet each at the specified settings, collecting the product in question and weighing it. All treatments (except Prograss) were irrigated with 1/10" water immediately following application.

PLOT PLAN

Houses

5	7	9	3	2	8	6	10	1	No trt	4
8	4	10	5	9	1	2	7	6	No trt	3
1	2	3	4	5	6	7	8	9	No trt	10

Treatments: A listing of the products tested, their active ingredients and the dates of application is listed in Table 1 below. Overseeding took place on October 12, 1998.

Table 1.

	Product	Active Ingredient	Rate/A	Timing before or after overseeding	Dates of Application
1	No treatment				
2	Ronstar 2 G	2% oxadiazon	100 lb	8 wk before	8/18/98
3	Ronstar 2 G	2% oxadiazon	50 lb	8 wk before	8/18/98
4	Ronstar 2G	2% oxadiazon	50 lb	8 wk before/8 wk after	8/18/98, 12/11/98
5	Barricade 65G	65% prodiamine	0.75 lb	8 wk before /8 wk after	8/18/98, 12/11/98
6	Barricade 65G	65% prodiamine	1.5 lb	8 wk before	8/18/98
7	Ronstar 2G	2% oxadiazon	100 lb	6 wk before	9/3/98
8	Ronstar 2G	2% oxadiazon	50 lb	6 wk before	9/3/98
9	Ronstar 2G	2% oxadiazon	50 lb	6 wk before /6 wk after	9/3/98, 11/24/98
10	Prograss	19% ethofumesate	0.5 ga	6 wk after /8 wk after	11/24/98, 12/11/98

Evaluations: Turf was rated for overall quality (color and density) on a 0-7 scale (where 7 was the highest quality fairway turf and 0 was the worst quality turf) on a monthly basis, beginning in November, 1998 and ending in April, 1999. Percent poa control was rated on the same dates. All data was subjected to analysis of variance, and treatments means separated using Fisher's LSD, where $P < 0.05$. A final evaluation of the effect of treatments on the spring/summer transition was made on July 16, 1999, where the percent ryegrass and bermudagrass stands were evaluated in each plot.

Results and Discussion

Turf Quality (phytotoxicity to ryegrass and bermudagrass): Turf quality ratings did not differ significantly among treatments on any of the rating dates, with values between 6.0 – 7.0 observed for all treatments, for both ryegrass and bermudagrass. Under the conditions of this trial, where irrigation uniformity was good, and wind (although significant) was not severe, ryegrass was not under the same level of stress as was encountered in last year's tests at Desert Dunes Country Club. However, it is important to remember that high rates of pre-emerge herbicides Ronstar (100 – 200 lb/A) and Barricade (2 lb/A) caused damage to ryegrass under the more stressful conditions at Desert Dunes in 1997/98. This discrepancy between results observed at two different locations highlights the fact that pre-emerge herbicides can cause damage to ryegrass under certain conditions, especially high rates and stressed ryegrass. If these products are to be used for the first time, superintendents should proceed cautiously and consider testing in small areas with low rates.

Control of *Poa annua* (see Table 2): Very high (>50% in most plots) poa infestations were observed in the non-treated plots beginning 12/8/98. The treatments that produced the best control of poa most consistently were Prograss (2 applications at 0.5 ga/A) and Barricade (1.5 lb/A, 8 weeks before overseeding) (Figures 1 and 2).

Prograss (Figure 1): Currently, the commercial standard for poa control on overseeded fairways is ethofumesate (Prograss). Our tests confirmed that when this product is used at the right time (when bermudagrass has ceased actively growing – usually November or December in the West), at

the right frequency (2 monthly applications) and at the right rate (0.5 gallons/acre was sufficient), long-term poa control, at levels reaching 99%, can be achieved (Table 2, Figure 1) without any damage to ryegrass. These results confirm the current commercial practices, as well as our results from 1997/98.

Despite its excellent performance, there are some concerns when using Prograss. These include:

- If Prograss is applied while bermudagrass is still actively growing, the spring/summer transition back to bermudagrass may be significantly slowed (figure 4). For this reason, Prograss cannot be applied on a calendar schedule – air temperatures and bermudagrass growth and appearance must be closely monitored to determine the optimal application timing.
- Long-term use of Prograss, or any other single herbicide, will likely lead to resistance. In other words, poa biotypes that can tolerate the product will eventually come to predominate. A good, long-term poa control program will therefore rely on a variety of different products – rotated from one year to the next – to insure optimal control.

Barricade (Figures 2 and 3): When applied at a relatively high rate (1.5 lb/A), 8 weeks before overseeding, Barricade 65 WG resulted in 58% - 85% control of poa. There was no phytotoxicity observed. However, as mentioned above, this relatively high rate has some risk associated with it at locations where ryegrass is stressed. A split application of Barricade, which used 0.75 lb/A product applied 8 weeks before and 8 weeks after overseeding, resulted in somewhat lower levels of control. However, the risk of phytotoxicity should be decreased with the split application approach.

Ronstar: Not surprisingly, the 100 lb rate/A rate of Ronstar performed significantly better than the 50 lb/A rate, when single applications were made either 6 or 8 weeks prior to overseeding. And as was observed with Barricade, a single application of herbicide provided better poa control than did split applications, where half of the product was applied before overseeding, and half of the product was applied after overseeding. The best performing Ronstar treatment was a single application, made 8 weeks before overseeding, at 100 lb/A, with control levels ranging from 33% - 78%. This level of control would be considered

fair. At golf courses with moderate levels of poa infestation, this level of control could be considered adequate. However, at high end

courses with high poa infestation levels, this level of control would probably be judged to be commercially unacceptable.

Table 2. Percent Poa Control, Sun City West, Palm Desert, CA, Nancy Dickens, superintendent. Bermudagrass fairways were overseeded with on 10/12/98 with ryegrass. The best performing treatments on each rating date are highlighted in green. Values followed by the same letter are not significantly different (Fisher's LSD, $P < 0.05$). All treatments had high quality turf (ratings of 6.0 – 7.0) on all rating dates, with no phytotoxicity to ryegrass or bermudagrass observed.

	PRODUCT	RATE/A	TIMING BEFORE OR AFTER OVERSEEDING	Percent Poa Control			
				12/8/98	1/8/99	2/18/99	4/6/99
1	No treatment			0.0a	0.0a	0.0a	0.0a
2	Ronstar 2 G	100 lb	8 wk before	33.3abc	48.3c	78.3cd	43.3de
3	Ronstar 2 G	50 lb	8 wk before	25.0abc	6.7a	26.7b	11.7ab
4	Ronstar 2G	50 lb	8 wk before/8 wk after	8.3ab	18.3ab	35.0b	26.7bcd
5	Barricade 65G	0.75 lb	8 wk before /8 wk after	58.3c	53.3c	75.0c	58.3ef
6	Barricade 65G	1.5 lb	8 wk before	58.3c	81.7d	85.0cd	78.3fg
7	Ronstar 2G	100 lb	6 wk before	58.3c	40.0bc	71.7c	36.7cde
8	Ronstar 2G	50 lb	6 wk before	8.3ab	8.3a	18.3ab	21.7abcd
9	Ronstar 2G	50 lb	6 wk before /6 wk after	8.3ab	6.7a	35.0b	18.3abc
10	Prograss	0.5 ga	6 wk after /8 wk after	41.7bc	90.0d	99.0d	97.7g

Spring/summer transition issues with Prograss (figure 4): On July 16, 1999, plots were evaluated for a final time to determine the effect of treatments on the success of the spring/summer transition back to bermudagrass. With the exception of plots treated with Prograss, there were low levels (0-20%) of ryegrass in all plots, and a good stand of bermudagrass present. However, in plots treated with Prograss, there was a significant (50% or more) level of ryegrass present, and evidence that the bermudagrass stand was negatively affected. Whether the major effect of Prograss was to create a vigorous ryegrass stand that was able to better compete with the bermudagrass, or to actually directly damage the bermudagrass, is unclear. However, this observation, which has been made elsewhere in the country, highlights the key watch-out when using Prograss – bermuda green-up may be negatively impacted. In the case of this trial, a warm winter and cool spring and summer conspired to favor ryegrass at the expense of bermudagrass, throughout the Coachella Valley, even in areas where Prograss was not used. Under these conditions, the chances that Prograss would exaggerate this effect were magnified. To avoid this situation in the future,

care should be taken to make Prograss applications only when bermudagrass is dormant, and to include other poa control products in the yearly rotation.

Figure 1. Control of *Poa annua* on overseeded fairways, following two applications (11/23 and 12/7/98) of Prograss at 0.5 gallons/acre. The turf inside the string lines, which is labeled “10” was treated with Prograss, and contains ryegrass that is 99% free of poa. The lighter colored turf in the foreground and background (outside the string) was not treated with any herbicide, and was covered with poa seedheads. Photo taken on April 14, 1999, 5 months after the last Prograss application.



Figure 2. Barricade 65G, 1.5 lb/A, applied 8 weeks before overseeding (Treatment 6). Photo taken April 6, 1999. Note significant reduction in poa seedheads in the treated plot.

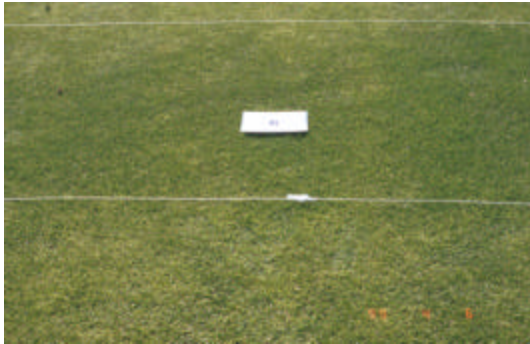


Figure 3. Barricade 65 G, 0.75 lb/A, split applications, applied 8 weeks before overseeding and 8 weeks after overseeding (Treatment 5). Photo taken April 6, 1999. Note the relatively lower level of poa control when compared to Figure 2.

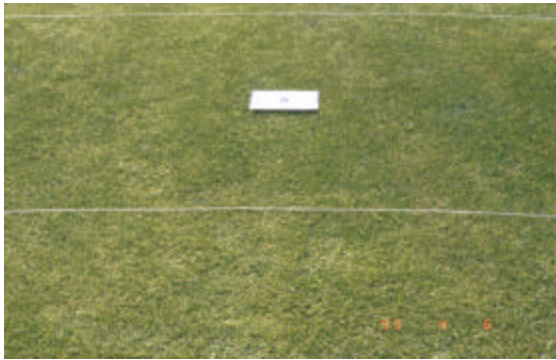


Figure 4. Delayed spring transition with Prograss. July 16, 1999. Note that the lighter colored turf in the Prograss treated area is composed primarily of ryegrass, while the adjacent turf is primarily bermudagrass. Prograss was applied to this plot twice -- in November and December of 1998, at a rate of 0.5 gallon/A.

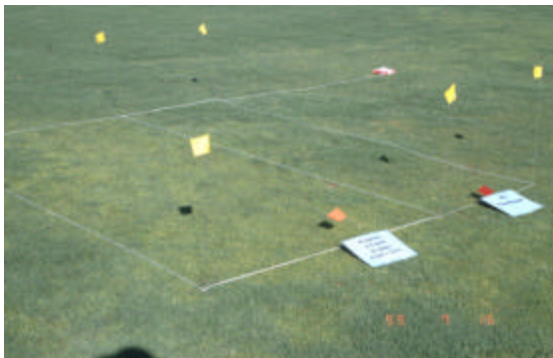


Figure 5. Ronstar 2G, 100 lb/A, applied 8 weeks before overseeding (Treatment 2). Photo taken April 6, 1999.

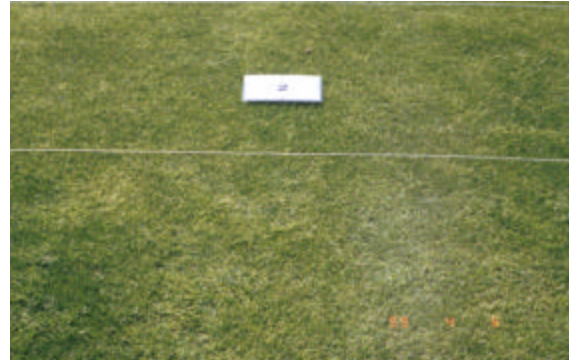


Figure 6. Ronstar 2G, 50 lb/A, split applications, applied 8 weeks before overseeding and 8 weeks after overseeding (Treatment 3). Photo taken April 6, 1999.

