**Evaluation of ProStar and ProStar Plus for Control of Fairy Ring on Golf Course Greens**

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**Summary:** Both ProStar (6 oz/1000 square feet) and ProStar Plus (7.5 oz/1000 square feet) provided good to excellent curative control of fairy ring caused by *Agrocybe pediades* on a bentgrass green. A thirty day application interval resulted in control equal to that with a 15 day application interval. The addition of Bayleton to ProStar, in the form of ProStar Plus, did not improve the control offered by ProStar alone. In addition, ProStar Plus caused some reduction in turf quality. Applications were not followed by irrigation, a factor which may have aided in control.

**Background:** There are currently no effective products registered in California for control of fairy ring, a disease which occurs on golf course turf. Fifty-four different species of fungi have been reported to cause the symptoms associated with fairy ring, making it difficult to develop a single management and control strategy for this disease. Characteristic symptoms include the appearance of a dark green circle of stimulated turf plant growth, surrounded by a dead ring of turf. Fruiting structures of the fungal pathogen (usually in the form of mushrooms or puffballs) may appear surrounding the area of dark green turf. Turf death may be caused by pathogen production of toxic materials (such as hydrogen cyanide) and by the development of a hydrophobic area that forms at the soil surface due to mycelial growth. The mycelium effectively repels water, allowing the formation of localized dry spots and preventing water from reaching turfgrass roots.

Previous studies conducted by the PACE Turfgrass Research Institute indicated that both ProStar and ProStar Plus had only moderate activity on fairy ring caused by *Bovista plumbea.* However, the placement of ProStar within the soil profile may have been too deep, and it was suggested that future trials investigate efficacy of ProStar applied with little or no watering-in following application.

**Materials and Methods:**

Location: Research plots were located on a bentgrass green (Green 12) at Del Mar Country Club in Rancho Santa Fe, CA. At the initiation of the trial, the green showed severe symptoms of fairy ring.

Treatments:

| | PRODUCT | RATE/1000 SQ FT | TIMING AND FREQUENCY |
|---|---|---|---|
| 1. | ProStar 50WP | 6 oz | 2 applications, spaced 30 days apart |
| 2. | ProStar Plus | 7.5 oz | 2 applications, spaced 30 days apart |
| 3. | Non-treated Control | | |
| 4. | ProStar 50WP | 6 oz | 3 applications, spaced 15 days apart* |
| 5. | ProStar Plus | 7.5 oz | 3 applications, spaced 15 days apart* |

* treatment added by PACE Turfgrass Research Institute at no additional cost

 

Treatment and Evaluation Schedule:

| DATE | EVENT |
|---|---|
| 5/10/96 | Trial initiated; applications made to treatments 1, 2, 4, 5 |
| 5/29/96 | First evaluation made; applications made to treatments 4 and 5 only |
| 6/10/96 | Second evaluation made; applications made to treatments 1, 2, 4, 5 |
| 6/25/96 | Third evaluation made |
| 7/10/96 | Final evaluation made |

A pre-treatment visual assessment of fairy ring incidence was made prior to the first treatment, at which point disease incidence was rated as severe throughout the test area. Subsequent assessments were made approximately 15 days after each treatment. Each assessment consisted of evaluation of overall turf quality and damage ratings (fairy ring incidence).

Plots initially measured 7 feet by 40 feet, but were reduced to 7 feet by 20 feet on 5/29/96 to accommodate the addition of treatments 4 and 5. Treatments were replicated three times, in a randomized design. All treatments were applied with a $CO_2$ powered bicycle sprayer delivering 2.1 gallons of water per 1000 square feet, and 40 psi at the boom. Nozzles were 8008 VS flat fan, and were spaced 20" apart. Treatments were not watered in post-application.

Data was subjected to analysis of variance, and treatment means separated using Fisher's LSD, where $P<0.05$ (data print-out attached).

**Results and Discussion:**

Identity of causative organism: The causative organism was identified as *Agrocybe pediades*. Identifying characteristics included fruiting bodies (mushrooms) with yellowish-brown caps (2.5 - 5.0 cm wide), thin stalks, absence of a veil and brown spore prints.

Control of fairy ring symptoms: Control of fairy ring symptoms (as assessed by visual observation of the number and size of fairy rings) was not significantly different among all four treatments (Figure 1). Thus, the addition of a third treatment and a 15 day frequency of application (treatments 4 and 5) did not appear to enhance control, nor did the addition of Bayleton to the product mix. Control was not acceptable for any of the treatments at the first evaluation date (19 days after treatment), with control levels ranging from 48 to 53%. This is not surprising, since turf is required to regrow in affected areas before symptoms are fully alleviated. By 31 days after treatment, control levels had reached 80% or higher, however. Control remained high throughout the duration of the trial (61 days), with some slight loss of control observed at the last rating date.

Turf Quality Ratings: Turf quality (color and density) was assessed by visual examination of the treated areas. All treatments were significantly better than the non-treated control (Figure 2). ProStar consistently showed superior turf quality when compared to plots treated with ProStar Plus. This may be due to the addition of Bayleton to ProStar Plus, since Bayleton (as well as other DMI fungicides) has been implicated in the past in turf thinning and other undesirable effects. Once again, there was no advantage to the use of three applications spaced 15 days apart, compared to two application spaced 30 days apart.

Both ProStar and ProStar Plus provided successful curative control of fairy ring caused by *Agrocybe pediades* when the products were applied without watering in. There was no advantage observed with the ProStar Plus, however, and the addition of Bayleton may have contributed to the poorer turf quality observed in the ProStar Plus plots. An application interval of 15 days did not provide any additional control vs. a 30 day application interval. For this reason, monthly applications of ProStar at the 6 oz/1000 square foot rate are expected to provide good to excellent control of fairy ring caused by *Agrocybe pediades.*

In an informal follow-up visit to the plot site on August 21, 1996 (approximately 11 weeks after the last treatment), treated plots were still noticeably superior in appearance to non-treated plots. There was, however, evidence of a resurgence of fairy ring symptoms in treated plots. For this reason, it will be necessary in some cases for superintendents to make several monthly applications of ProStar per year for optimum results.

 

Figure 1. Control of fairy ring caused by *Agrocybe pediades* with Prostar and ProStar Plus. Del Mar Country Club, Rancho Santa Fe, CA. Products were either applied twice (2), with 30 days between treatments or three times (3), with 15 days between treatments. Treatments were initiated on May 10, 1996. Control was assessed through visual observation of fairy ring symptoms. No significant differences were observed among treatments (Fisher's LSD, P<0.05).

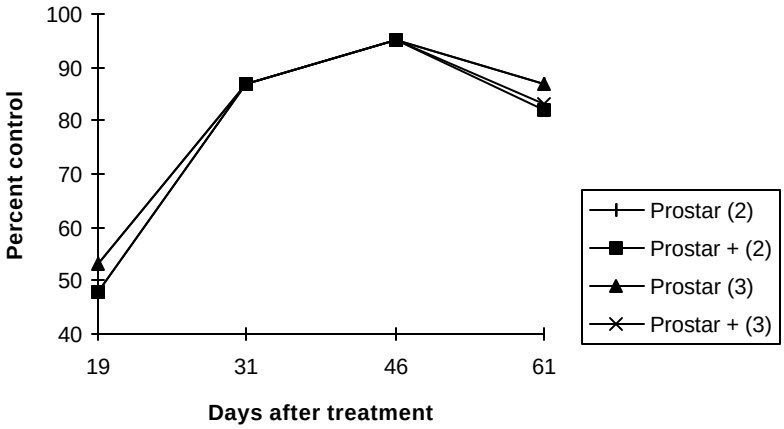


Figure 2. Control of fairy ring caused by *Agrocybe pediades* with Prostar and ProStar Plus. Del Mar Country Club, Rancho Santa Fe, CA. Products were either applied twice (2), with 30 days between treatments or three times (3), with 15 days between treatments. Treatments were initiated on May 10, 1996. Quality was assessed through visual observation of turf color and density. Values followed by the same letter are not significantly different (Fisher's LSD, P<0.05).