**Preliminary Report: Chemical Control of Annual Bluegrass on Athletic Fields**

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**Key Question:** How do Prograss, Xonerate, and Tenacity, as separate, in tank mixes, and timings effect annual bluegrass coverage in a sports turf setting? Because the plot markers were lost from the Spring 2018 trial, a new trial was initiated in September 2018 that followed very similar protocol as the Spring trial.

**Materials and Methods:**

This study was conducted at the Oregon High School practice field in Oregon, WI during the fall of 2018 to evaluate the efficacy of herbicide control on annual bluegrass. The study was designed as a randomized complete block design with eight treatments and four replications. Individual plots measured 6 x 4 feet. The study site was on a native soil football field (2.5 inch mowing height) that had extensive annual bluegrass populations in the existing Kentucky bluegrass and ryegrass. The treatments were designed to evaluate different application intervals and number of applications of Prograss, Tenacity with a non-ionic surfactant, and Xonerate against tank mixes of Xonerate and Tenacity. Treatments were applied using a CO2-powered backpack sprayer calibrated to deliver 86 gallons per acre. Percent plot cover of annual bluegrass, desirable turf, and bare soil was evaluated bi-weekly after spring application. Desired turf injury was assessed visually as needed on a 0 to 9 scale with 0 being no injury and 9 being complete turf death. Visual quality was assessed using the standard NTEP scale of 1 to 9, where 9 represents the highest possible turf quality, and 6 represents the minimally acceptable turf quality. Treatment means were separated using Fisher’s Least Significant Difference at alpha = 0.05.

**Table 1**. Treatments and application rates for the products used in the trial.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Treatment Description** | **Rate** | **Timing** | **Application Interval** | **Application Dates** |
|  |  |  |  |  |  |
| 1 | Prograss | 1.5 oz/1000 | 2 apps fall | 21 days | 20 Sept, 12 Oct |
| 2 | Prograss | 1.5 oz/1000 | 3 apps fall + spring follow up | 21 days | 20 Sept, 12 Oct, 5 Nov |
| 3 | Tenacity + NIS 0.25% | 5.3 oz/acre | 3 apps spring | 14 days | 20 Sept, 4, 19 Oct |
| 4 | Tenacity + NIS 0.25% | 3.2 oz/acre | 5 apps (2 per wk) spring | 3-4 days | 20, 24, 27 Sept, 2, 4 Oct |
| 5 | Xonerate | 2 oz/acre | 2 apps spring | 14 days | 20 Sept, 4 Oct |
| 6 | Xonerate | 1 oz/acre | 4 apps spring | 7 days | 20, 27 Sept, 4, 12 Oct |
| 7 | Xonerate and Tenacity | 1 oz, 4 oz/acre | 2 apps spring | 14 days | 20 Sept, 4 Oct  |
| 8 | Xonerate and Tenacity | 1 oz, 4 oz/acre | 3 apps spring | 14 days | 20 Sept, 4, 19 Oct |
| 9 | Untreated Control | n/a | n/a | n/a | n/a |

**Results:**

The research site had approximately 70% coverage of annual bluegrass at the beginning of the trial. This spot was on the south end of a football field, near a tree line which partially shaded the plots. Averaged over the fall season, the only treatments that significantly reduced annual bluegrass coverage contained Tenacity (Table 2). Of these, the treatment consisting of five applications of Tenacity (treatment #4) was the most effective, having less than 10% annual bluegrass coverage on the last rating date of the season (Table 3). The tradeoff for this relatively good level of control is that the treatments with the highest level of annual bluegrass control also had the highest level of bare soil at the latest rating date (Table 5) and lowest turfgrass quality (Table 6).

While the Xonerate + Tenacity treatments were fairly effective at controlling annual bluegrass (Table 3), the Xonerate treatments alone were not very effective, this suggest that Tenacity is the most important factor in that combination. This study will continue into the spring of 2019, so it will be interesting to see how annual bluegrass populations change among the treatments next season.

**Table 2.** Average ground cover of poa, bluegrass, and bare soil, and visual quality, and turf injury from 10 May – 10 July 2018. Results followed by different letters within each column are statistically different according to Fisher’s Least Significant Difference (alpha=0.05).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **Annual Bluegrass** | **Desirable Turf** | **Bare Soil** | **Quality** | **Desirable Turf Injury** |
|  |  | -------------------- % of plot cover --------------------- | 1-9, 9 is best | 0-9, 0 is no injury, 9 is death |
| 1 | Prograss 2 apps | 61.8 ab | 27.8 ab | 9.3 b | 5.8 a | 0.2 c |
| 2 | Prograss 3 apps | 57.0 ab | 33.8 a | 9.3 b | 5.6 ab | 0.3 bc |
| 3 | Tenacity + NIS 0.25% 3 apps | 53.5 bc | 11.6 d | 34.9 a | 4.5 bcd | 0.7 abc |
| 4 | Tenacity + NIS 0.25% 5 apps | 41.0 c | 15.8 cd | 43.0 a | 3.9 d | 1.4 a |
| 5 | Xonerate 2 apps | 60.8 ab | 26.0 ab | 13.3 b | 5.3 ab | 0.1 c |
| 6 | Xonerate 4 apps | 58.8 ab | 21.8 bc | 19.5 b | 5.2 abc | 0.3 bc |
| 7 | Xonerate and Tenacity 2 apps  | 41.0 c | 24.3 bc | 34.8 a | 4.1 cd | 0.5 bc |
| 8 | Xonerate and Tenacity 3 apps | 40.8 c | 16.3 cd | 42.8 a | 4.1 d | 1.0 ab |
| 9 | Untreated Control | 70.8 a | 23.5 bc | 5.3 b | 6.2 a | 0.3 bc |

**Table 3.** Visual estimate of annual bluegrass cover by date during the study. Different letters indicate statistically significant differences (p = 0.05)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **20 Sept** | **4 Oct** | **16 Oct** | **2 Nov** | **16 Nov** | **Spring TBD** |  |
|  |  | ------------------------------------------------------------ % of plot cover ------------------------------------------------------------- |
| 1 | Prograss 2 apps | 77.5 | 53.8 c | 65.0 ab | 55.0 ab | 57.5 a |  |  |
| 2 | Prograss 3 apps | 67.5 | 67.5 abc | 70.0 ab | 43.8 bc | 36.3 abc |  |  |
| 3 | Tenacity + NIS 0.25% 3 apps | 77.5 | 82.5 a | 57.5 b | 30.0 bcd | 20.0 cd |  |  |
| 4 | Tenacity + NIS 0.25% 5 apps | 72.5 | 81.3 a | 18.8 c | 23.8 cd | 8.8 d |  |  |
| 5 | Xonerate 2 apps | 77.5 | 76.3 ab | 67.5 ab | 33.8 bcd | 48.8 a |  |  |
| 6 | Xonerate 4 apps | 80.0 | 77.5 ab | 67.5 ab | 26.3 cd | 42.5 ab |  |  |
| 7 | Xonerate and Tenacity 2 apps  | 67.5 | 63.8 bc | 35.0 c | 17.5 d | 21.3 bcd |  |  |
| 8 | Xonerate and Tenacity 3 apps | 72.5 | 71.3 ab | 35.0 c | 10.0 d | 15.0 cd |  |  |
| 9 | Untreated Control | 73.8 | 73.8 ab | 82.5 a | 70.0 a | 53.8 a |  |  |

**Table 4.** Visual estimate of desirable grass cover by date during the study. Different letters indicate statistically significant differences (p = 0.05).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **20 Sept** | **4 Oct** | **16 Oct** | **2 Nov** | **16 Nov** | **Spring TBD** |  |
|  |  | ------------------------------------------------------------ % of plot cover ------------------------------------------------------------- |
| 1 | Prograss 2 apps | 20.0 | 38.8 a | 22.5 | 25.0 abc | 32.5 ab |  |  |
| 2 | Prograss 3 apps | 28.8 | 28.8 ab | 22.5 | 37.5 ab | 51.3 a |  |  |
| 3 | Tenacity + NIS 0.25% 3 apps | 22.5 | 10.0 c | 12.5 | 4.3 d | 8.8 c |  |  |
| 4 | Tenacity + NIS 0.25% 5 apps | 27.5 | 6.3 c | 16.3 | 5.0 d | 23.8 bc |  |  |
| 5 | Xonerate 2 apps | 21.3 | 17.5 bc | 15.0 | 41.3 a | 35.0 ab |  |  |
| 6 | Xonerate 4 apps | 18.8 | 17.5 bc | 20.0 | 22.5 bc | 30.0 abc |  |  |
| 7 | Xonerate and Tenacity 2 apps  | 32.5 | 17.5 bc | 25.0 | 17.5 cd | 28.8 bc |  |  |
| 8 | Xonerate and Tenacity 3 apps | 27.5 | 11.3 c | 13.8 | 11.3 cd | 17.5 bc |  |  |
| 9 | Untreated Control | 26.3 | 13.8 bc | 17.5 | 23.8 bc | 36.3 ab |  |  |

**Table 5.** Visual estimate of bare soil cover during the study. Different letters indicate statistically significant differences (p = 0.05). \*aeration occurred on (probably around 16 october, maybe a touch before)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **20 Sept** | **4 Oct** | **16 Oct** | **2 Nov** | **16 Nov** | **Spring TBD** |  |
|  |  | ------------------------------------------------------------ % of plot cover ------------------------------------------------------------- |
| 1 | Prograss 2 apps | 2.5 ab | 6.3 bc | 7.5 e | 20.0 c | 10.0 b |  |  |
| 2 | Prograss 3 apps | 3.8 a | 3.8 c | 7.5 e | 18.8 c | 12.5 b |  |  |
| 3 | Tenacity + NIS 0.25% 3 apps | 0 b | 7.5 abc | 30.0 cd | 65.8 ab | 71.3 a |  |  |
| 4 | Tenacity + NIS 0.25% 5 apps | 0 b | 10.0 abc | 66.3 a | 71.3 a | 67.5 a |  |  |
| 5 | Xonerate 2 apps | 1.3 ab | 6.3 bc | 17.5 de | 25.0 c | 16.3 b |  |  |
| 6 | Xonerate 4 apps | 1.3 ab | 5.0 bc | 12.5 de | 51.3 b | 27.5 b |  |  |
| 7 | Xonerate and Tenacity 2 apps  | 0 b | 18.8 a | 40.0 bc | 65.0 ab | 50.0 a |  |  |
| 8 | Xonerate and Tenacity 3 apps | 0 b | 16.3 ab | 51.3 ab | 78.8 a | 67.5 a |  |  |
| 9 | Untreated Control | 0 b | 10.0 abc | 0 e | 6.3 c | 10.0 b |  |  |

**Table 6.** Visual estimate of turf quality during the study. Different letters indicate statistically significant differences (p = 0.05). Data collection not conducted on 16 Nov

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **20 Sept** | **4 Oct** | **16 Oct** | **2 Nov** | **16 Nov** | **Spring TBD** |  |
|  |  | ------------------------------------------------------------ 1-9, 9 is best ------------------------------------------------------------ |
| 1 | Prograss 2 apps | 6.3 ab | 6.3 a | 6.0 ab | 4.5 ab | - |  |  |
| 2 | Prograss 3 apps | 6.0 b | 6.5 a | 5.8 ab | 4.0 bc | - |  |  |
| 3 | Tenacity + NIS 0.25% 3 apps | 7.0 a | 5.5 ab | 3.3 c | 2.3 f | - |  |  |
| 4 | Tenacity + NIS 0.25% 5 apps | 6.8 ab | 4.0 c | 2.5 c | 2.3 f | - |  |  |
| 5 | Xonerate 2 apps | 6.5 ab | 5.8 a | 5.3 b | 3.5 cd | - |  |  |
| 6 | Xonerate 4 apps | 6.5 ab | 6.0 a | 5.0 b | 3.3 de | - |  |  |
| 7 | Xonerate and Tenacity 2 apps  | 7.0 a | 3.8 c | 3.0 c | 2.8 ef | - |  |  |
| 8 | Xonerate and Tenacity 3 apps | 6.8 ab | 4.5 bc | 2.5 c | 2.5 f | - |  |  |
| 9 | Untreated Control | 6.8 ab | 6.0 a | 7.0 a | 5.0 a | - |  |  |

**Table 7.** Visual estimate of desirable turf injury by date during the study. Different letters indicate statistically significant differences (p = 0.05)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Treatment** | **20 Sept** | **4 Oct** | **16 Oct** | **2 Nov** | **16 Nov** | **Spring TBD** |  |
|  |  | ---------------------------------------- 0-9, 0 is no injury 9 is turf death ---------------------------------------- |
| 1 | Prograss 2 apps | 0 | 0 | 0.5 e | 0.3 ab | 0 |  |  |
| 2 | Prograss 3 apps | 0 | 0 | 0.3 e | 1.0 ab | 0 |  |  |
| 3 | Tenacity + NIS 0.25% 3 apps | 0 | 0 | 3.3 bc | 0 b | 0 |  |  |
| 4 | Tenacity + NIS 0.25% 5 apps | 0 | 0 | 6.3 a | 0.5 ab | 0 |  |  |
| 5 | Xonerate 2 apps | 0 | 0 | 0.0 e | 0.5 ab | 0 |  |  |
| 6 | Xonerate 4 apps | 0 | 0 | 0.8 de | 0.5 ab | 0 |  |  |
| 7 | Xonerate and Tenacity 2 apps  | 0 | 0 | 2.3 cd | 0 b | 0 |  |  |
| 8 | Xonerate and Tenacity 3 apps | 0 | 0 | 4.0 b | 1.0 ab | 0 |  |  |
| 9 | Untreated Control | 0 | 0 | 0 e | 0 b | 0 |  |  |