**ENTOMOLOGY RESEARCH UPDATE**

David Smitley
Michigan State University

## Turf Resistance/Tolerance to Grubs.

After two years of experiments with potted turfgrass in the greenhouse, we found European chafer grub survival was poorest on cultivars of tall fescue (Bughrara et al. 2004). We also found that above ground damage to turf was not visible until about 70% of the root mass had been consumed by grubs. Even with that level of root damage, dead turf did not appear on the surface unless there was water stress. In 2002 Dr. Bughrara worked with us to establish field plots at the Hancock Turf Research Farm to test the same10 cultivars of turfgrass that we had previously tested in the greenhouse.

## Material and Methods

Before the plots were seeded, four 6"-diam. plastic cylinders were driven into the soil in each plot. The plots were then seeded and the turf allowed to grow and establish for 16 months under daily irrigation and a standard fertility program with 3 lbs N/A. Each turf type was replicated 6 times. In September of 2003, European chafer grubs were collected from the rough at the Country Club of Jackson for this experiment. Fifteen grubs were placed on the surface of one cylinder in each plot. Any grubs that did not successfully tunnel into the soil were replaced with healthy grubs. The irrigation for these plots was turned off in late September. No damage was visible by the end of October, so the experiment was continued through the winter to the following spring. In April of 2004 we received very little rain in Lansing, Michigan. The soil in our test plots became very dry and dead turf began to appear in some of the turf cylinders. In late April we photographed all the cylinders and rated the turf from 0 (healthy) to 10 (100% dead). The cylinders were then pulled-up and the grubs in each cylinder counted. Soil was washed from roots, and the roots were dried and weighed. This was done for one experimental cylinder with grubs in each plot and for one control cylinder without grubs in each plot.

## Results

Like in the previous greenhouse test, grub survival was poorest in the tall fescue plots (5.3) followed by perennial ryegrass (6.9), Kentucky bluegrass and fine fescue (7.7). The size of the turf root mass varied considerably among the turf types with the tall fescues having the smallest root mass (101 g), followed by perennial ryegrass (130 g), fine fescue (133 g) and Kentucky bluegrass (191 g). Damage to turf roots was estimated by comparing the root mass of turf in control cylinders to the same in cylinders with grubs. The greatest level of root loss due to grub feeding was in the perennial ryegrass cylinders where the grubs

consumed 85% of the turf roots. Tall fescue turf types lost 82%, fine fescue 75%, and Kentucky bluegrasses 63% of their roots due to grub feeding. As a result of extensive root loss, ratings of the perennial ryegrass turf types indicated an average of 52% of the turf was dead in late April, compared with 48% dead turf in tall fescue turf, and 34% dead turf in cylinders with Kentucky bluegrass or fine fescue.

## Conclusions

Results of the field test confirm observations from the greenhouse study where grub survival was poorest in the tall fescue turf types. The field plots also confirm that more than 70% of the turf root mass must be consumed before damage is noticeable above ground. The field shows very clearly that turf types with the largest root mass tend to be the most tolerant of grub feeding. This appears to be even more important than how well the grubs survive. This test suggests that under optimum irrigation and good fertility, Kentucky bluegrass is the most tolerant of European chafer grubs feeding, and the least likely to show visible damage on the surface. However, this test needs to be repeated under low maintenance conditions. We will be doing that the next 2 years by turning off the irrigation in our research plots. European chafer grubs will be added again in fall of 2005 or 2006. We anticipate that turf root masses and % root damage due to European chafer grub feeding will be different among these turf cultivars after 2 years of low maintenance conditions.

Table 1. Survival of European chafer grubs in replicated field plots of 10 different turf types maintained with daily irrigation and a standard fertility program. Above ground visual ratings for control plots with no grubs and for plots with grubs were made in late April, 2004. The visual rating goes from 0 (no visible damage) to 10 (100% dead turf). Turf roots were washed and weighed in late April at the end of the experiment.

| Grass Type | Survival European Chafer Larvae | Control Visual Rating | +European Chafer Larvae Visual Rating | Control Root Weights (g) | +European Chafer Larvae Root Weights (g) |
|---|---|---|---|---|---|
| Tall Fescue KY31 | 4.5 a | 0.1 | 5.0 | 110.1 | 14.66 |
| Tall Fescue Bonsai | 5.6 ab | 0.1 | 5.3 | 113.6 | 17.95 |
| Tall Fescue Falcon | 5.8 ab | 0.0 | 4.1 | 80.7 | 22.04 |
| Ryegrass Palmer III | 7.7 bc | 0.1 | 5.1 | 156.4 | 14.71 |
| Ryegrass Premier | 6.2 bc | 0.2 | 6.0 | 88.4 | 16.84 |
| Ryegrass Affinity | 6.8 bc | 0.1 | 4.4 | 146.1 | 27.41 |
| Ky Bluegrass Brilliant | 9.0 c | 0.1 | 2.8 | 190.1 | 96.72 |
| Ky Bluegrass Midnite | 7.2 bc | 0.8 | 5.1 | 195.1 | 59.91 |
| Ky BluegrassChampaign | 7.0 bc | 0.2 | 2.2 | 187.3 | 55.83 |
| Fine Fescue Dawson | 7.2 bc | 0.1 | 3.4 | 132.5 | 33.46 |
| Means for all Cultivars | | | | | |
| Tall Fescue | 5.3 a | 0.0 | 4.8 | 101.5 | 18.2 |
| Ryegrass | 6.9 b | 0.1 | 5.2 | 130.3 | 19.7 |
| Ky Bluegrass | 7.2 b | 0.4 | 3.4 | 190.8 | 70.8 |
| Fine Fescue | 7.7 b | 0.1 | 3.4 | 132.5 | 33.5 |

**Ant Mounding on Golf Course Fairways, 2004**

An irrigated bentgrass section of the ninth fairway at McQuire's Resort in Cadillac, MI was divided into sixty 12 ft X 12 ft plots with a 3 ft buffer between plots. Plots were blocked based on precounts taken on 6/17/04 by counting the number of active ant mounds. The treatments were applied on 6/17/04 with a $CO_2$ powered R&D backpack boom sprayer at 175 gal finished spray/acre at 50 psi with four 8008. Plots were evaluated on 17 Jun, 23 Jun, 1 Jul, 14 Jul and 20 Jul, by counting active ant mounds in each plot.

The chemical treatments reduced ant mounding 23-39% one week after application although statistical analysis indicated no significance. Two weeks after application all of the chemical treatments were lower than the Control treatment and the Scimitar and Dursban treatments were significantly different from the Control. At 3 weeks postspray only the Dursban treatment was significantly different from the Control. Throughout the final 2 sample periods,