

FINAL REPORT

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Chip Lafferty
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Mr. Lafferty,

On May 21, 2015 I visited Rye Golf Course to examine widespread injury to greens. I observed that all of the bentgrass on the RGC greens had turned an unusual shade of purple and appeared to be under significant plant growth regulation. Purpling is a common temporary symptom when the plant growth regulator (PGR) Proxy is applied to creeping bentgrass in cool weather. At the time, it appeared that damage was primarily the result of the Proxy application and the lengthy recovery was a result of cool weather.

On June 1, 2015, I returned to Rye Golf Course. When I arrived, I was stunned to see that between 40-60% of the creeping bentgrass on greens appeared to have been killed with an herbicide. In addition, 100% of the ryegrass in collars had been killed. It was apparent by the pattern of damage that whatever chemical had killed the turf was applied by a boom sprayer during normal greens pesticide/fertilizer applications. Only greens were affected (and approaches where greens sprays were applied) and damage followed straight lines. However, none of the pesticides or fertilizers applied during the spring of 2015 were capable of the damage observed. The material that killed the turf was specific to ryegrass and bentgrass and left bluegrass unharmed (an extremely unusual level of specificity). It seemed certain that one of the chemicals applied to RCG was contaminated with an herbicide.



Figure 1 and 2: Typical damage to Rye Golf Course greens observed on June 1, 2015. Ryegrass is completely dead and 40-60% of creeping bentgrass is dead. An untreated temporary bentgrass green in excellent condition can be observed towards the back of Figure 2.

On the same day, I was able to visit Woodway Golf Course in Darien, CT where I observed similar damage. Both golf courses sprayed a number of different pesticides in the weeks leading up to injury but the only identical chemicals both golf courses applied were Alt70 and Floratine P-48. Based on the fact that damage more closely followed Alt70 application dates and that larger amounts of Alt70 were applied, I obtained a sample of the material from Woodward Country Club (lot #6112302) and undertook a number of different assays to identify if the product was contaminated. Simultaneously, the manufacturer (NovaSource) supplied a case of newer material

for additional testing. In the interim, NovaSource found evidence of contamination from the herbicide sulfometuron methyl in the 2013 lots of Alt70 and Viceroy. Sulfometuron methyl is an extremely potent herbicide used for the management of all types of vegetation primarily along roadsides, railways and power lines. It was developed by DuPont and originally sold under the trade name "Oust". The material has been reported to be active at concentrations 1000 times below labeled rates. As such, it can cause significant damage to most plants at very small rates. In order to determine if the Alt70 was contaminated, a greens study was undertaken using the 6112302 material and the 7120607 material. The trial protocol was as follows:

1. Alt 70 - 4.6 oz. at 7 Days (1X rate)
2. Alt 70 - 9.2 oz. at 7 Days (2X rate)
3. Alt 70 - 4.6 oz., Daconil Weatherstick 7.2 fl. oz., Primo MAXX 0.26 fl. oz. and Banol 4.0 oz. at 7 Days
4. Signature - 4.0 oz., Daconil Weatherstick 7.2 fl. oz., Primo MAXX 0.26 fl. oz. and Banol 4.0 oz. at 7 Days
5. AgraRouse - 0.36 fl. oz. at 7 Days
6. AgraRouse - 0.36 fl. oz. and Alt 70 - 4.6 oz. at 7 Days
7. Alt 70 - 4.6 oz. at 14 Days

Applications were made either weekly or biweekly for 28 days, for a total of 4 applications.

No damage was observed in any of treatments using the 7120607 material. In the trial using the contaminated 6112302 material, small amounts of damage were eventually observed from all treatments utilizing Alt70 at the 1X rate at 7 day intervals and a significant amount of damage from Alt70 at the 2X rate at 7 day intervals. No damage was observed from the 6112302 material when Alt70 was applied on a 14 day schedule at the 1X rate.



Figure 3 and 4: Typical progression of damage caused by Alt70 Lot. No. 6112302 to creeping bentgrass. Left hand picture shows 1X, 2X and tankmix treatment caused after first application. Right hand picture shows dead areas as fluorescent green patches in 2X treatment, with 1X treatment on right, 5 weeks after first application. Alt70 dye appears to stick more strongly to dead plant tissue, likely because the turf is no longer growing and the material is not being regularly mowed. Close inspection of bright green turf demonstrates complete foliar collapse.



Figure 5 and 6: Left hand picture shows death to bentgrass at fairway height from a single overspray at the beginning of an application pass using the 6112302 lot material. Right hand picture shows healthy turf after 4 applications of 7120607 material at the 1X and 2X application rates.

In addition to the greens trial, both materials were applied to a mixed stand of fairway height bentgrass and clover and a mixed stand of fairway height ryegrass and clover at the 4X rate. The materials were also applied to lettuce grown in the growth chamber as a bioassay plant.



Figure 7 and 8: Left hand picture shows death to clover, 5 days after a single 4X application of contaminated Alt70. Ryegrass in the affected patch was also severely damaged, losing at least 50% of foliage. Right hand picture shows uncontaminated Alt70 treatment (left) and contaminated Alt70 treatment (right) at 4X rate 5 days after application. Clover is completely killed from contaminated Alt70 and fairway height bentgrass is showing signs of injury and reduced growth rate.



Figure 9 and 10: Left hand picture shows same area as in Figure 8, 14 days after second 7 day application. Right hand picture shows damage to lettuce variety Ithaca used in the bioassay from a single 4X rate application of contaminated Alt70 (left) and no damage from uncontaminated Alt70.

Summary: With the announcement by the manufacturer that the 2013 lots of Alt70 and Viceroy were contaminated with sulfometuron methyl, it would seem that the cause of the damaged turf at Rye Golf Course, Woodway and many other golf courses has been identified. For the sake of independent empirical evidence, I chose to continue the trial I had initiated to determine if Alt70 was contaminated. The 6112302 lot of Alt70 tested in this study was able to significantly damage bentgrass and ryegrass and kill clover and lettuce at the 2X and 4X rates. The uncontaminated Alt70 did not produce any damage at any of the rates tested. Obviously, none of the golf courses that used the contaminated Alt70 or Viceroy applied the material at rates above 1X, yet they still observed significant damage. In the current study, only a small amount of damage was observed when applications were made at the 1X rate. The most reasonable conclusion from this result is that the 6112302 lot was only slightly contaminated with sulfometuron methyl while other contaminated lot numbers are likely to have contained much higher levels of the herbicide. Other 2013 lot numbers that were not tested in this study but are known to have been used at golf courses which experienced damage include: 6112207, 6112208, 6111606, 6101701, 6112401, 6101703, 6111703 and 6111702. Additionally, golf courses that applied contaminated product typically used multiple different lot numbers simultaneously. Considering the potency of sulfometuron methyl, the inclusion of a single, highly contaminated bag into a greens spray is all that would have been required to cause large-scale turf loss.