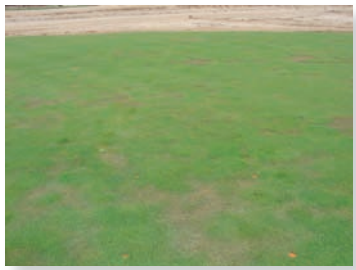
More FAQs about LDS: Hot spots and label rates

Superintendents often wonder whether it's all right to treat only the areas that show localized dry spot rather than the entire green and if more of a good thing is better when it comes to wetting agents.



Keith Karnok, Ph.D.
Kevin Tucker

Approximately 98% of all superintendents use wetting agents to some extent as part of their turf management program, yet there are probably more questions regarding the use of wetting agents than any other chemical or management tool in the superintendent's arsenal. Questions arise about wetting agents because their effectiveness can be significantly influenced by many factors, including the site where they are applied and the superintendent's understanding of how wetting agents work.

We address two common points of discussion that come up frequently in GCSAA seminars on managing localized dry spots and using wetting agents on the golf course. We use examples from two different studies to help illustrate our points. Although only one example is shown for each problem, we have seen the same effects on several occasions over the years.

Treating the hot spots or the entire green

Any sand-based green — or even a push-up green topdressed with sand — will develop localized dry spots (LDS) within 12 to 18 months after construction or renovation. As the name implies, LDS occurs sporadically throughout the affected green or fairway, suggesting that the cause of the problem is also sporadic. The cause of LDS as discussed in this article is water-repellent soil. We and other researchers have discussed the cause and occurrence of water-repellent soil in numerous articles (see References).

Treating hot spots

Research has shown that water-repellent soil does not occur uniformly throughout an area, and it varies in severity. LDS occurs first where water-repellent soil is most severe and/or the turfgrass is under the greatest stress. However, wherever water-repellent soil occurs — with or without LDS — the growth of the turfgrass, especially the root system, can be significantly affected. In a previous study, we found as much as a 30% increase in root length when turfgrass growing in water-repellent soil was treated with a wetting agent (*GCM*, July 2001). Therefore, it is important to apply a wetting agent to the entire green rather than to treat only the apparent "hot spots."

Treating the entire green vastly improves uniform movement of water and wetting of the soil. However, in some cases, it may be necessary to go back and spot-treat areas that are particularly prone to LDS. Areas that are susceptible to LDS often have more severe soil water-repellency or greater turfgrass stress from traffic, thatch, poor irrigation coverage, etc.

Treating the whole green

Some superintendents have suggested that applying a wetting agent to areas of a green that appear healthy and do not have LDS may, in fact, create other problems. They fear that too much moisture or delayed drying of the root zone will occur. In contrast, other superintendents are concerned that applying a wetting agent to areas of a green or fairway without LDS may facilitate

Localized dry spot is not uniformly distributed throughout greens and generally occurs where turf is undergoing the most stress. **Photo by F. Wong**

rapid drying of the soil. Research has shown that in most cases these concerns have little merit on mature greens where thatch and organic matter have been managed properly. On several occasions, our research has shown that a water-repellent soil treated with a wetting agent will not hold any more water than a soil that is not water-repellent (*GCM*, June 2002). In other words, field capacity for both soils is the same.

Applying wetting agents at non-label rates

All chemicals should be applied only at label rates. This is good practice, and it is the law. But some superintendents have asked whether applying more than the label rate will increase the effectiveness and duration of the wetting agent. In fact, it has been suggested that if enough of any of the 30-day application-type wetting agents are applied, they will mimic the various season-long wetting agents, which require only one application every three to four months. Conversely, it has been suggested that applying less than label rate will provide the same results but save money.

Efficacy at different rates

Table 1 shows the same wetting agent applied at four rates. The lower the water-repellency value, the more effective the wetting agent. The rate of 6 fluid ounces/1,000 square feet (1.9 milliliters/square meter) did, in fact, reduce soil water-repellency compared to the control. However, increasing the rate to 10 ounces (3.18 milliliters/square meter) offered little advantage over the 6-ounce (1.9 milliliters/square meter) rate. It could be said that both were equally effective. Increasing the rate from 10 ounces to 12 ounces (3.8 milliliters/square meter) — only a 2-ounce (0.63 milliliter/square meter) increase — made a significant difference in reducing the water-repellency of the soil. At this point, it might be assumed that increasing the rate again would add further advantages. In this case, an additional 12 ounces (3.81 milliliters/square meter) were applied five days later. As can be seen, adding another 12 ounces (3.81 milliliters/square meter) had little or no effect on the water-repellency of the soil. Therefore, the ideal rate of this particular wetting agent is probably 12 ounces (3.81 milliliters/square meter). This research was carried out to determine the most effective rate for this product. Most companies (not all, unfortunately) have tested their wetting agent products in the field and have established rate response data like those shown here.

Turf discoloration

Another reason for following label rates is the potential for phytotoxicity or discoloration of the turf. Most companies know how safe their product is to turfgrasses in terms of avoiding turf discoloration. The study represented in figure 1 clearly shows the effect of rate on turfgrass color. This study was also undertaken to determine the appropriate application rate for the product.

As mentioned above, in most cases, using a rate greater than the label rate will not further reduce water-repellency. However, as we have seen with most of the wetting agent products we have tested, increasing the rate beyond the label rate may significantly and negatively affect turfgrass color. In the example shown in the graph, the turfgrass recovered from all the treatments, but the discoloration that occurred almost immediately at rates greater than 4 fluid ounces/1,000 square feet (1.27 milliliters/square meter) would be totally unacceptable.

Discoloration can be reduced even with the "hottest" wetting agent if the product is applied when conditions are not stressful (stressful conditions are drought and high temperatures) and washed off the foliage and into the soil as soon as possible after application.

Conclusions

Wetting agents will continue to be the primary

Soil water repellency

Treatment	Rate (ounces/1,000 sq. ft.)	5/28†	6/11	6/25	7/9	7/23
		Water repellency value‡§				
Wetting agent	6	2.9 a	1.6 b	2.1 b	1.4 b	1.3 b
Wetting agent	10	2.9 a	1.4 b	1.9 b	1.4 b	1.3 b
Wetting agent	12	3.1 a	0.0 c	0.9 c	0.6 c	1.2 b
Wetting agent	12/12	2.9 a	0.9 c	0.4 c	0.8 c	1.2 b
Control	—	2.9 a	2.8 a	2.9 a	2.7 a	2.8 a

†Measurements on 5/28 were taken before the wetting agent was applied.
‡Water repellency value: 0 = none, 4 = severe.
§Means in the same column followed by the same letter are not significantly different from one another.

Table 1. Soil water-repellency at varying rates of a wetting agent.

tool used by superintendents in their fight against LDS caused by water-repellent soil. The results of research at the University of Georgia show that applying wetting agents at label rates and applying them to the entire area having water-repellent soil is the best way to ensure success with any wetting agent product.

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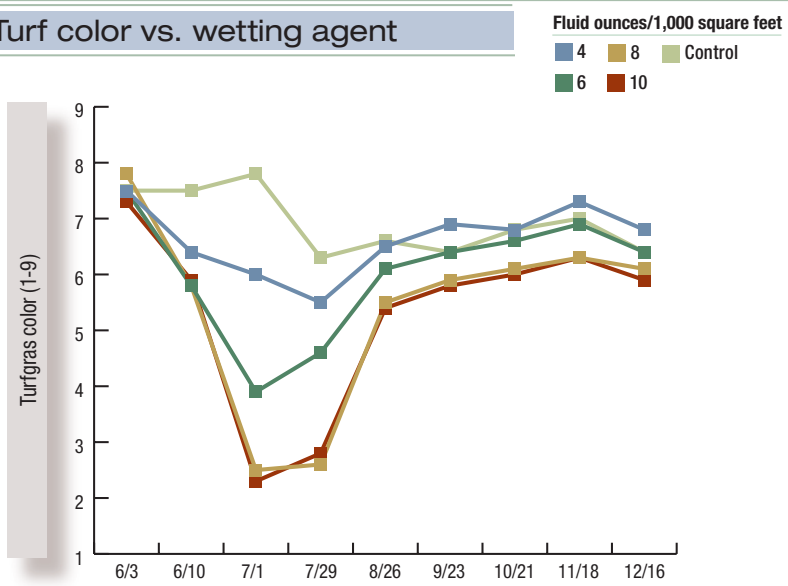
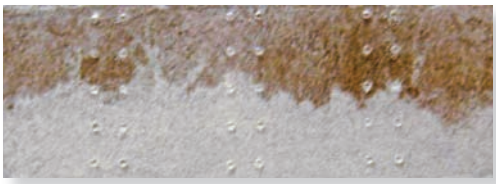


Figure 1. Applying wetting agents to turf at rates greater than the rate recommended on the product label is illegal and is likely to harm the turfgrass. In this case, all rates greater than 4 ounces/1,000 square feet caused unacceptable turf discoloration. Turf quality was rated on a scale of 1 to 9, where 1 was brown, dead turf, and 9 was dark green turf. Metric equivalents of application rates per square meter: 4 ounces = 1.27 milliliters; 6 ounces = 1.9 milliliters; 8 ounces = 2.54 milliliters; 10 ounces = 3.18 milliliters.

GCM

Keith J. Karnok (kkarnok@uga.edu) is a professor of turfgrass science and Kevin Tucker is a research associate in the department of crop and soil sciences at the University of Georgia, Athens. Karnok will be a seminar instructor at the 2008 GCSAA Education Conference and Golf Industry Show in Orlando.



Top: Hydrophobic soil treated with a wetting agent. Note the uniform wetting front. **Bottom:** Hydrophobic soil profile not treated with a wetting agent. Note the nonuniform wetting. **Photos by K. Tucker**

The research says

→ Whether water-repellent soil occurs with or without LDS, it significantly affects the growth of the turfgrass, especially the root system.

→ Therefore, it is important to apply a wetting agent to the entire green rather than to treat only the apparent "hot spots."

→ Treating the entire green with a wetting agent will not cause the green to dry out too quickly nor will it cause the green to retain too much moisture.

→ It is illegal to apply wetting agents at rates higher than the label rate.

→ Applying too much wetting agent is more expensive, not more effective, and it can cause rapid discoloration of the turf.