

# What Wetting Agents Can and Cannot Do for Your Turf<sub>1</sub>

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The field of turfgrass management has seen many products come and go, they were a "flash in the pan" so to speak. Wetting agents may or may not fit into this category of products. However, they have received a considerable amount of attention from the turfgrass community and have caused some controversy. This paper is being presented to update you on the current status of wetting agent and is also an attempt to separate fact from myth regarding wetting agents.

What are wetting agents? Wetting agents are chemicals that change the physical properties of water. They reduce the surface tension of water. Basically they can be thought of as making water wetter. To illustrate this, if you placed a drop of water on a waxy leaf surface the water droplet would sit on the surface as a somewhat spherical drop. If on the other hand, you adding a wetting agent to the water prior to placing a droplet on the leaf, the droplet would spread out on the leaf surface. The drop with the wetting agent added would have a lower contact angle between the leaf surface and the water droplet.

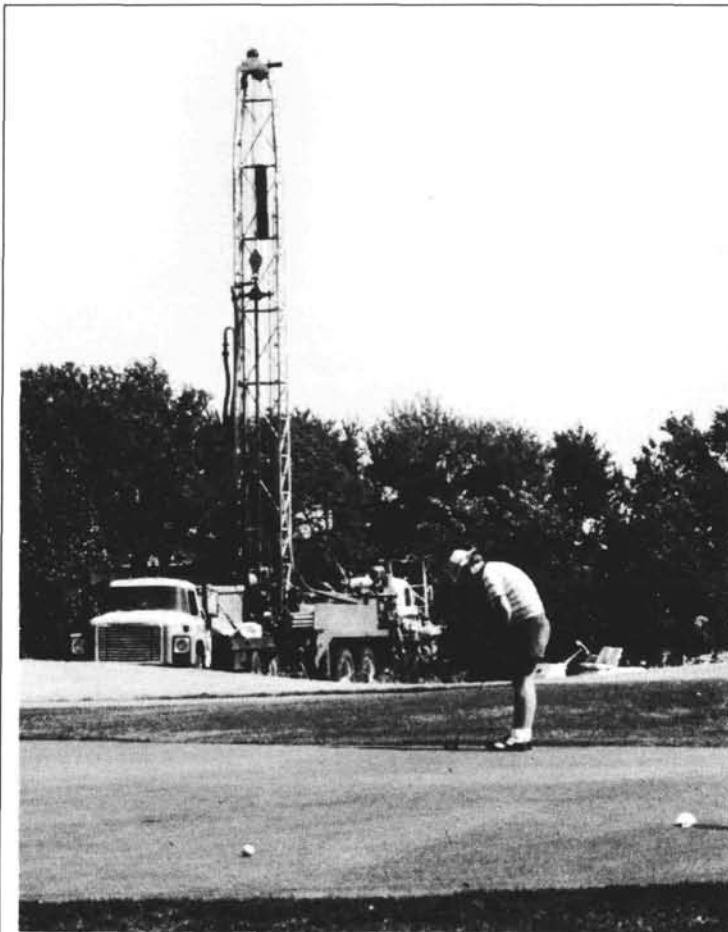
Wetting agents are classified according to their chemistry as anionic, cationic, and nonionic. Anionic wetting agents are negatively charged, general phytotoxic to turf, and highly leaved in soil. For these reasons the anionic wetting agents are not

generally used in turf. Cationic wetting agents are positively charged and are, therefore, tightly held to the predominantly negatively charged soil particles. This makes these compounds somewhat less effective. The nonionic wetting agents have no charge, are less bound to soil, and are less phytotoxic to turf. The nonionic agents are the most common wetting agents used in turfgrass management.

What can wetting agents do? Table 2 gives a list on some of the claims that have been made regarding wetting agents. Let's look at these claims to see just what role wetting agents might play in your turfgrass program.

*Localized Dry Spots.* The cause of localized drop spots, also termed LDS, has been most frequently attributed to a fungal growth that produces a waxy material that coats soil particles. These coated particles then become very hydrophobic (water hating). These problems most often are associated with sandy soils or sands in golf course greens. Although LDS is most common on golf courses, it is becoming more apparent that LDS is also associated with other turfgrass areas. Table 3 gives the results of some research conducted at Michigan State University which indicates that wetting agents are quite effective as a treatment for LDS.

*Plant Growth.* Most of the research with wetting agents would indicate that they have little effect on plant growth or are somewhat detrimental. On a positive note, Schmidt indicated from his research at Virginia Polytechnic Institute that sod rooted faster under dry conditions when wetting agents were used. Also, Petrovic's work at Cornell showed that Aqua Gro substantially reduced annual bluegrass *Poa annua* seedhead produc- (cont'd. page 14)



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(Wetting Agents cont'd.)

tion without reducing clipping yields on a golf course fairway.

**Infiltration and Percolation.** As has been previously stated, wetting agents can substantially improve drainage in areas with LDS. Drainage is also better on layered soils when wetting agents are used. However, on easily wet soils there is little if any, effect of wetting agents on drainage. Beard, when discussing wetting agents in his text book "Turfgrass: Science and Culture", cites several references which indicate that wetting agents do not increase infiltration.

**Compaction.** There is no direct evidence in most cases that wetting agents affect compaction. In a University of Maine study (cited by Moore, 1981), it was found that wetting agents reduced soil bulk density and is also reduced compaction. Morgan et al., at the University of California at Davis, reported a decrease in compaction in peat-amended soil but they reported no effect of wetting agents on other soil materials. It should be noted that if a site or soil is now compacted, the addition of wetting agents will not cure the problem.

**Thatch.** Wetting agents have been claimed to reduce thatch buildup. There is little, if any, experimental evidence to support this claim. Most studies show that wetting agents, especially prolonged use of wetting agents, generally have no effect on thatch. Some work has shown a thatch buildup. Murry and Juska, in an 8 year study, showed no effect of wetting agents on thatch. Engle and Alderfer's 10 year study showed a slight increase in thatch.

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**Dew Removal.** Wetting agents are fairly effective in mitigating the formation of dew. Wetting agents have been reported to reduce dew formation for 3 to 10 days on a bentgrass putting green. The length of effectiveness is probably related to irrigation and rainfall, both of which would tend to remove the wetting agent from the soil profile and thus decrease the period of effectiveness.

**Fertilizer and Pesticide Effectiveness.** Since water is the carrier for most chemicals applied to turfgrass, improved water movement and distribution within the soil profile could improve chemical efficacy. It has been proposed that wetting agents might improve the uniformity of movement of systemic pesticides into the root zone. More research is needed in this area to verify these claims.

**Water Use Efficiency.** Work at the University Nebraska by Shearman has indicated that in turf where water was not a limiting growth factor, evapotranspiration was reduced as much as 25%. However, this does not necessarily translate over into a 25% reduction in water used by the turfgrass manager. Additional studies by Carroll and Petrovic at Cornell University indicate that a reduction in evapotranspiration due to the application of wetting agents is a result of there being less water available for evapotranspiration due to increased loss of water through drainage. So, it appears that wetting agents will not improve water use efficiency, since water use efficiency is a measure of the amount of water needed to produce a given amount of dry clippings.

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**CONCLUSIONS**

There are many wetting agents available in the market place and selection of the best one is not always an easy task; therefore, you should gather as much information as possible, especially hard facts, prior to embarking on a program utilizing wetting agents. Remember, wetting agents can be phytotoxic if not properly applied. Also, there is some evidence to indicate that prolonged use may increase thatch. However, wetting agents are one of the cultural practices available to turfgrass managers to improve water movement into and through localized dry spots (LDS) and hydrophobic soils. Wetting agents should be regarded as just another tool available to the turf manager and not the cureall they are often touted to be. Additional research is needed to fully define the role of wetting agents in turfgrass management.

**Table 1.** Common wetting agents used in turfgrass management.

| Trade name | Manufacturer                  | Rate (oz/1000 ft <sub>3</sub> ) |
|------------|-------------------------------|---------------------------------|
| Aqua Gro   | Aquatrols Corp. of America    | 4 to 16                         |
| Hydro Wet  | Kalo Laboratories             | 8 to 16                         |
| Lesco Wet  | Lesco Corporation             | 8 to 16                         |
| Peneturf*  | Four Star Agriculture Service | 0.2                             |
| Surf Side  | Montco Products Corporation   | 16 to 32                        |

\*Marketed as a soil conditioner.  
Data from A. M. Petrovic 1985.

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**Table 2.** Claims made for the use of wetting agents.

1. Improve wetting of localized dry spots
2. Affect plant growth
3. Improve infiltration
4. Improve percolation
5. Reduce compaction
6. Reduce thatch
7. Remove dew
8. Increase fertilizer and pesticide effectiveness
9. Increase water use efficiency

**Table 3.** Effect of wetting agents on the visual quality and soil moisture of localized dry spots.

| Wetting agent | Rate oz/1000 ft <sub>2</sub> | Quality | % Moisture |
|---------------|------------------------------|---------|------------|
| Aqua Gro      | 8 & 8                        | 3.8*    | 16         |
| Aqua Gro      | 16                           | 2.2     | 20         |
| Aqua Gro      | 16 & 16                      | 3.8     | 16         |
| Aqua Gro      | 32                           | 2.4     | 19         |
| Aqua Gro      | 8 monthly                    | 2.5     | 18         |
| Check         | —                            | 6.1     | 12         |

\*Quality rated 1 = ideal turf.

A. M. Petrovic 1985 from data provided by Rieke and Bay 1977.