

What Wetting Agents Can and Cannot Do for Your Turf₁

William J. Johnston₂

₁Presented at the 39th Northwest Turfgrass Conference, Rippling River Resort, Welches, OR, September 24-26, 1985.

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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.

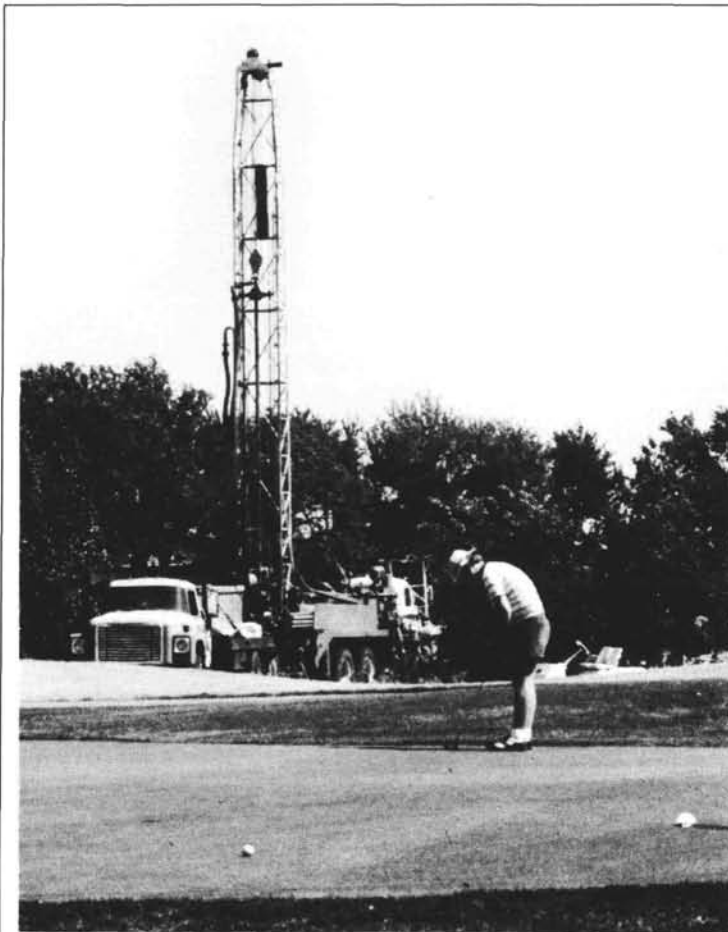
Wetting agents are classified according to their chemistry as anionic, cationic, and nonionic. Anionic wetting agents are negatively charged, general phytotoxic to turf, and highly leaved in soil. For these reasons the anionic wetting agents are not

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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Upcoming Events — Mark Your Calendar

August 6 — ILCA Field Day at Schroeder's Nursery, Grayslake

August 7 — Indiana Coalition for Environmental Concern at Indianapolis

August 7 — University of Illinois Turfgrass Field Day at Urbana

August 18 — MAGCS monthly meeting, Bartlett Hills

September 8 — MAGCS monthly meeting at Deer Creek G.C.

September 15 — ITF Golf Day at Evanston & Bryn Mawr C.C.

October 6 — MAGCS monthly meeting at Wilmette C.C.

November 10-12 — Penn State Turf Conference

December 9-11 — North Central Turfgrass Exposition

January 26 - February 3 — GCSAA Conference in Phoenix

(Editor's Note) — I need to correct a mistake in our last issue and give credit where credit is due: Beckmann Turf & Irrigation, Chicago Turf & Irrigation, and Tri-State Toro — all three donated a Toro PGM III to the ITF at the Eagle Ridge C.C. meeting. My excuse is that I was taking notes sitting next to "Pass the Bud Benson" and I may not have passed all the Bud's to him.

Jim & Sue Reed have adopted a 4 month old Korean baby girl on July 23rd. The new Reed will be Kimberly Jeong-Yung. Congratulations on the new addition!

Remember to bring some cash to buy raffle tickets at the ITF golf day. We have a set of Ram feather light women's irons, and a set of Wilson Staff irons and wood to raffle off to raise money for turf research in Illinois.

A fish story & trick photography ... Just ask Tom Nestor. Remember, Tom is from the "Show Me State" so be prepared for at least an hour of fish tales or is that "tails"???

Frank Krueger and his staff did an excellent job of hosting our golf event at Palatine Hills. Fred Hall, Director of the Park District donated the green fees and golf cart fees — thank you, Fred. Elanco Products donated the refreshments on the course.

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Graduation — Paul Voykin's daughter Shannon Beth graduated with honors recently from Columbia College in Chicago. Shannon received a bachelor of arts degree.

Back in mid June a few of our members traveled to Hubbard, Oregon for the 4th Annual Turf Field Day sponsored by Turf-Seed, Inc./Pure Seed Testing, Inc. Those attending were Tony and Marge Meyer — their son Dr. Bill Meyer was the host for the event. Also Warren Bidwell representing the Tee to Green Corporation, Art Clesen, Roger Lemke, William & John Huber took in the field day. At the field day were people from all over the country and Japan. The day involved a review of the farm's turf, seed yield, forage evaluation and the new wildflower trials. Along with Dr. Bill Meyer on the program was Dr. Jim Beard who spoke on overseeding in the south.

By this time we are hoping that John Ebel has recovered from his bout with the removal of kidney stones by ultrasonic sound. John went to Indianapolis to have this done and was in and out in a couple of days.

Also fully recovered by now is Ted Mochel who had his appendix removed in early July. Ted especially liked the bed pan with a cactus in it that the MAGCS sent him. He expresses his thanks to all that called and sent cards.

MAGCS is again planning on having two GCSAA seminars in January at Pheasant Run again this coming year. Dr. James Beard will be instructing one of the courses. These seminars usually take place in early January — so reserve the time to attend one.

The word around town is that Bruce Sering needs practice in mowing greens. He was caught in the act one morning using a walking mower and his lines were anything but straight!

St. Charles C.C. was 95% seeded in their new addition as of the middle of July. Pete has had trouble just like everyone else who has new construction going on in trying to get it completed around all of the rain that we have been having.

Mike Nass at Bryn Mawr is installing new VT4 controllers from Toro which are replacing his old Moody controllers. Mike is one of the first in the country to get the VT4. The temporary facilities for a clubhouse are just about completed. Roger Stewart at Riverside reports that his new clubhouse is up and they are working on the inside at the present.

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Kenneth R. Zanzig

(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.

(cont'd. page 18)

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Mary, my wife, and myself, decided that we would like to team up and be involved in ownership of a Toro distributorship. Mary had been in the commercial banking business, lending to small and medium sized business for twenty years and I had been involved in the resources engineering and the irrigation equipment business, both agricultural and turf. I spent the last ten years with the irrigation division of the Toro Company. Mary graduated from the U of

Wyoming, with B.S. in business and is the chief financial officer for the company. I have a B.S. in agricultural engineering from South Dakota State University and MBA in finance from the U of Colorado and concentrate on the sales, marketing and the operations side of the distributorship.

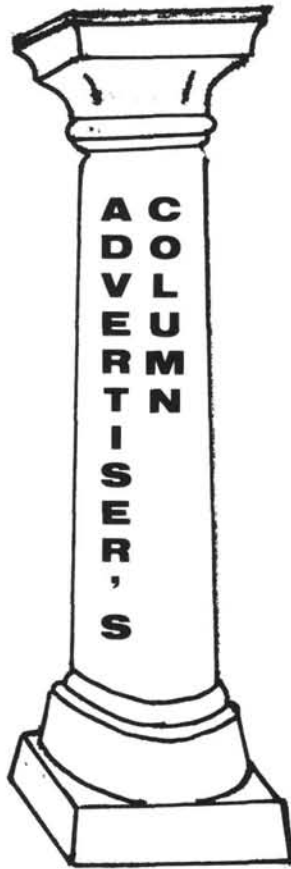
We have four operating groups at Chicago Turf & Irrigation that exist for no other reason than providing value added service to our customers. As a distributor of products manufactured by other firms, our only value added product is service. I grew up on a farm in South Dakota and have first hand experience with equipment dealerships. The proper level of service, a good product selection and a strong sales effort usually results in long term success and good customer relationships.

Now, let's review the CTI team. The commercial equipment sales effort is headed by Duane Cotte. Jim Reed, Steve Stewart and Kurt Kunze cover assigned territories, North, South and West. The irrigation department sales effort is directed by myself and with Tom Nestor in golf sales. Bob Hauser is operation manager. We have two sales people covering contractor and specifications markets, Chris Tucker and Mike Haener.

Our parts department is managed by John Neis. John started in the service department. He then spent five years in dealer and rotary product sales. His background is a real asset in our effort to provide better service.

Buzz Gutsman is the service department manager with Howie Bitterman in phone service administration and customer training. George Scherdin spends the mowing season running our "Red Wagon" service truck.

All of the four operating groups and the respective managers are involved in the installation and training on a software/computer system. We will have some struggles this season as we all become efficient and responsive with this industry tested system.



I hope that this provides the association members with an overview of who and what CTI is all about. Mary and I are the two new players, most of the CTI team have many years of service to the industry.

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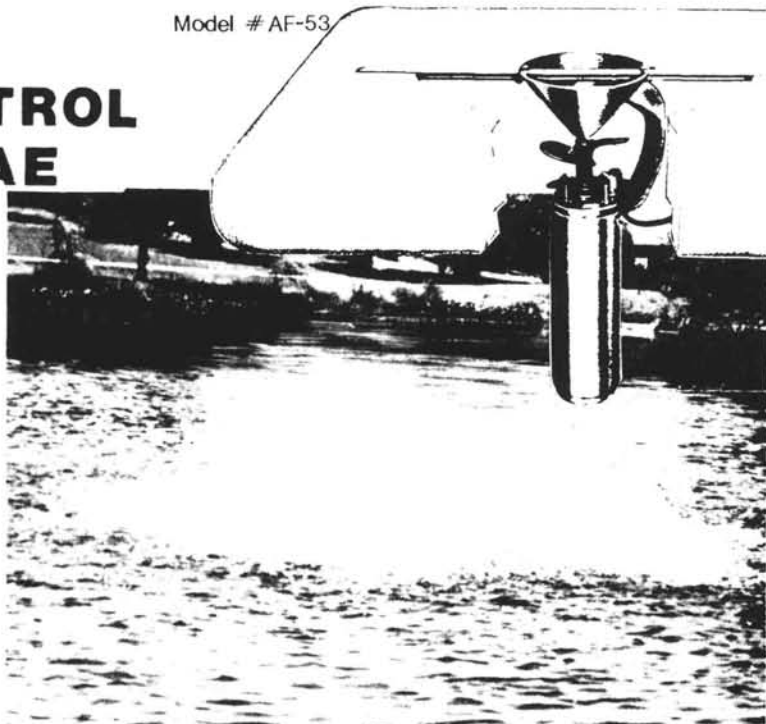
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(Wetting Agents cont'd.)

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 ₃)
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 ₂	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.

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Some clubs use city water for their irrigation system. If this water is pumped directly from the city supply to the irrigation system, the municipal water system must be protected from the golf course irrigation. Even though the water in the irrigation system is municipal water, a back-flow condition could occur.

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In the above cases the state of Illinois Environmental Protection Agency requires, by law, an approved protective back-flow preventive device.

BACKFLOW VENDORS

This is a partial listing of companies that provide various brands of backflow devices. These listings were compiled using the AWWA Buyer's Guide and Product information.

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Bridgeton, MO 63044
314/291-4327 or 800/225-1480

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Hastings, MI 49058
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Scientists at the Agricultural Research Service's Nursery Crops Research Laboratory in Delaware, OH, have found a chemical that, when injected into shade trees, can reduce leaf damage from ozone pollution by as much as 94 percent. Ozone is a major air pollutant that damages crop and causes tree leaves to yellow, wither and fall. It also reduces vigor and growth, leaving trees vulnerable to attack by insects and disease. How ethylenediurea (EDU), the chemical found to protect trees from ozone, works is not well understood, according to Bruce R. Roberts, a plant physiologist with the ARS. "Our test results indicate that when it is injected directly into the stem, it alters enzyme and membrane activity within the leaf cells where photosynthesis takes place," Roberts said.

According to Roberts, honeylocust, red maple, pin oak and sweetgum seedlings were treated with the chemical by two different methods a week before being fumigated with 0.30 and 0.95 parts per million of ozone, an amount well above the normal level found in smog. Leaves were checked for damage within six days after fumigation. Roberts and coworkers found that injecting EDU into a small cut in the stem was more efficient than drenching the soil around the potted seedlings. With one-fiftieth as much EDU solution, injection provided up to 94 percent protection, while drenching provided a high of only 46 percent protection.

The study was conducted on two-year-old seedlings because they would fit into the fumigation chambers, but Roberts says EDU injection should protect mature trees as well. The scientist believe that "EDU" is a relatively safe chemical for protecting the leaves of most trees and shrubs from ozone damage," according to Roberts.

Betty Solomon, Agricultural Research, Jan. 1986

What Others are Saying About the Professionals Who Manage Today's Golf Courses

by Arnold Palmer

"Some like long fairways, some like them short. Some like fast greens, some like medium to slow greens. There will always be someone who doesn't like what the superintendent is doing. You can't please everyone ... The rewards of being a superintendent are many ... There are things in this profession you can't put a dollars-and-cents sign on. It's the love of being in the midst of nature, the ability to counter a lot of adversities and the enjoyment of seeing your work make things happen ... any golf course superintendent should be happy with this great outdoors job, especially with the respect it carries in these times. See, years ago he was just the guy cutting the grass. Now the guy is a very important entity, more in the limelight than he ever was before."

Credit: On the Green, June '85

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