

WETTING AGENTS AND THEIR ROLE IN WATER CONSERVATION TODAY

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Robert Moore is a chemical engineer who, 25 years ago, developed a product to improve the penetration of water into all types of soils. Moore received his degree from Cornell University and previously worked for Mobil Corp.

A few years ago, we were all shocked, and made well aware of our dependency on oil — particularly foreign oil — and we have been talking about "An Energy Crisis" ever since. It is my firm belief that our next national crisis will be "A Water Crisis." As an example, at the Oklahoma Turf Conference, in December 1978, Dr. Huffine recalled a comment by Marv Ferguson, that if this nation ever has another Civil War, it will be fought over water.

I don't believe we'll run out of water! But I do believe we must stop wasting water. We must learn to use water efficiently. Some areas of our country are now very aware of the necessity to conserve water, and have started various programs. Most of these programs require registering and reporting the quantity of water used, either monthly, quarterly or yearly. Very few areas are actually restricting water use except in cases of extreme drought or water shortages. We have all read about these checks — and in some years, have experienced such regulation.

The present requirements for registration and monitoring of water-use, provide the mechanism for future planning, and future restrictions, if and when they are needed. Take note of how many conferences in recent years are placing an increasing emphasis on water. When our company started twenty-five years ago, very few conference programs considered water at all. Today's increased awareness of potential limited water resources is sharpening our senses on ways to more economically use water — ways to make water more efficient.

One enormously useful tool to make water more efficient, that has gained recognition in the last few years, is the use of soil wetting agents. Before we discuss their place in water conservation and improved plant growth, let's take a quick look at the vital role of water in plant growth and turf maintenance; and at some of the characteristics of water that can lead to problems. Bob Kneebone, has pointed out that water is essential for every function within the plant — for photosynthesis, for cooling, for growth, for turgor and for root development. It is used as a solvent, as a reagent, and as a nutrient — in fact the largest

nutrient used by a plant. Water is also involved in every maintenance practice in your operations — fertilizing, pesticide treatments, mowing, aerifying — it even affects the quality of playing conditions — sometimes to the point of eliminating play.

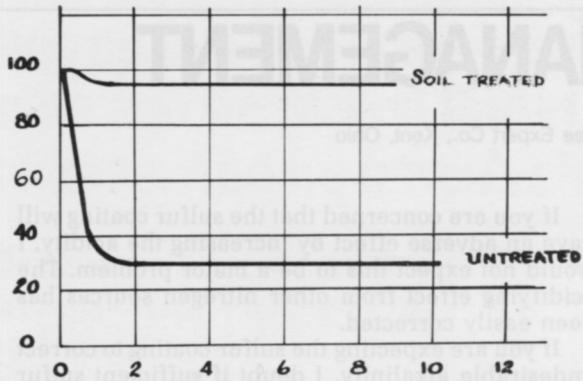
Most properties of water are beneficial, but two in particular, surface tension and the moisture tension in the soil, can be obstacles leading to inefficient water use, and turf losses. If we investigate the relationship between these moisture-tensions, turf losses and water uses, we see a definite pattern. Plain water has a lot of tension and hang-ups that can cause soil-water problems, one obvious example is low infiltration rates and puddling.

Puddling leads to run-off, and evaporative loss of water. One U.S.D.A. survey in the plains states, indicated that less than 20% of the natural rainfall actually becomes root-zone moisture — the water being lost by run-off and evaporation. Without water in the root-zone plants can't function. Plain water with its high tensions, moves slowly in fine textured soils. Though not always a loss of water, this is another inefficient use, since turf can't utilize water from a saturated soil with poor aeration. Diseases such as root rots, pythium, and other water molds, as well as algae increase under these conditions, weaken the turf, add to the inefficient use of water, and many times result in turf losses.

On the other hand, in the coarse texture soils, which have been enjoying great popularity for the past few years, the high tensions of plain water create different problems. Water tends to channel and not wet the soil profile uniformly. These soils can be droughty requiring greater amounts of water. In addition, the sandy type soils have been shown to produce a hard-to-wet condition referred to as localized dry-spots. These areas literally



Poa annua deeply rooted in the middle of summer because of treatment with wetting agent.



Percent water penetration in inches of untreated versus treated soil.

case there were potential turf problems because there was too much water or too little water. And yet the approach to solving the situation has historically been aerifying and soil renovation. Though the soil condition is involved, the main cause of the turf losses outlined has been the high tensions of plain water.

It is essential for the growth of healthy plants and for the conservation of water that certain compensations be made to promote a more efficient and wise use of water.

As mentioned earlier, the use of soil wetting agents to change water by lowering its tensions is rapidly gaining recognition for the purpose of "Making Water Better." Under low-tension-water conditions, water percolates faster. Puddling is reduced. Run-off and evaporation losses are reduced or eliminated. University data using tensiometers indicated a reduction of 30 to 50% in water use requirements when using wetting agents. That could mean a 30 to 50% reduction in salts introduced when using high salt content water — an important factor in these western states. Erosion losses were reduced by 65% in these same tests — which were under the severe conditions of 6 inches per hour on a 30% slope. All this, simply using a wetting agent to compensate for water's few negative characteristics.

A statement that has often been heard is that we can't do anything about the problem of water pene-

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repell water, resulting in wilting and turfgrass losses. Repellent areas require special hand labor and extra waterings to try to save the turf — and that can cost you money! Thatch can also inhibit the movement of plain water, consequently, the movement of nutrients and other chemicals, particularly soil insecticides, are limited, weakening the grass and resulting in-turf losses.

As we review these problems that can lead to turf losses, we note that they can be classified as WATER problems — not SOIL problems. In each

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tration in areas of high traffic — high compaction. The remedies discussed are usually aeration, soil renovation or paving. No thought is ever given to the WATER.

Improved infiltration and percolation means better drainage and aeration — without rebuilding! The better drainage and aeration obtained in a wetting agent treated soil improves rooting — improved water movement reduces disease potential — and the overall efficiency of water and nutrient utilization is increased. This healthier turf, is also more efficient in using water as shown by Kauffman's data from Michigan State which indicated a significantly lower water-use-rate for Merion Kentucky bluegrass growing in a wetting agent treated soil — an 11 to 14% reduction.

Harry Muesel's work at Yale University with Aqua-GRO, showed that the turf grown with the wetting agent had a more compact cellular structure, a heavier cutin layer, and increased cell wall thickness — a definite change in the physiological structure of the turfgrass blades and roots. These changes contribute to improved resistance to disease, winter injury, traffic and wilting — a lower water use rate with a water "Made Better." These are real changes that have resulted from the better availability of rootzone moisture and the lower energy of that water.

Stress areas that develop as localized dry spots requiring extra labor and waterings can now be eliminated. Beard and Rieke's data from Michigan State clearly shows that wetting agents are the most effective correction in eliminating the damage from these localized spots; more effective than aerifying or slicing alone. The best overall results can be obtained with combined coring and wetting agents use. Water will quickly and uniformly move through a treated thatch and water repellent soil layer thus eliminating the necessity for extra hand-watering and labor.

I would like to emphasize a point made by Beard and Rieke — "All wetting agents are not alike." In fact, 80% of the commercially sold materials that they tested did not work better than plain water! You must use a scientifically blended material to be assured of performance in all type soils. It must work for you in your soil to be of value. A proper blend will feature controlled biodegrading to safeguard the environment and, at the same time, be effective over a period of months. Some materials are lost after only two or three waterings. Your use of wetting agents should be on a repeating basis in order to compensate for this controlled biodegradation.

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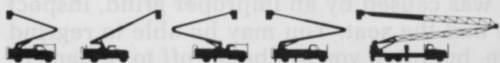
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