

# OARS™

## ORGANIC ACID REMOVAL SYSTEM

**OARS represents a major breakthrough in dealing with water-repellent soils. Unlike surfactants and other soil amendments that just alleviate the symptoms of soil water-repellency, OARS also removes the cause of water repellency—the build-up of organic substances that coat the surface**

**of coarse-textured sand particles. Golf course superintendents that use OARS will now be equipped to manage water movement problems in their soil profile as well as take corrective action to remove hydrophobic deposits from the soil particle surface.**

Researchers generally agree that the cause of water-repellency in soils is the result of organic coatings on the soil particles. Research also suggests that these coatings are the result of naturally-occurring microbial breakdown of organic matter (thatch, plant tissue, root exudate, fungal exudate and fungal hyphae) that produce high molecular weight polymer compounds. Humic substances, such as humic acid and fulvic acid, have been identified as compounds that contribute to the formation of hydrophobic organic coatings on soil particle surfaces.

When subjected to repeated wet-dry cycles, these humic substances undergo structural changes that render the soil particle water-repellent. Because of their small surface area, coarse-textured sands used to construct greens and tees are highly susceptible to becoming water-repellent. There is a strong correlation between humic substances on soil surfaces and localized dry spot (LDS) and non-uniform movement of water in greens and tees.

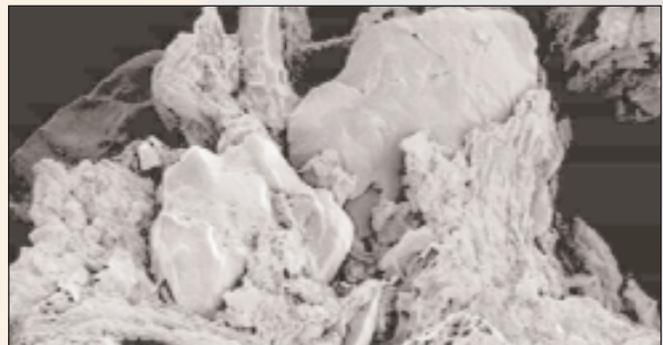
### **SURFACTANTS – A MANAGEMENT APPROACH**

The application of surfactants is a valuable tool used by golf course superintendents to temporarily alleviate symptoms of water-repellency. Soil surfactant molecules are attracted to the water-repellent (non-polar) coatings on soil surfaces. Surfactant molecules attach to these coatings and create sites where water can attach to the soil surface (adhesion). Re-establishment of water attachment sites on soil particles promotes the uniform movement of water into and through the soil matrix and improves the amount of available water to meet transpirational and metabolic demands of the turfgrass.

It should be remembered that surfactants are used to maintain reduced levels of water-repellency and manage its symptoms. **Surfactants cannot and do not deal with the cause of water-repellency—organic coatings on the soil particle surface. Indeed, biodegradation of the surfactant molecules will return the soil profile to its pre-treatment water-repellent state.**



Electron microscope photo of hydrophilic "clean sand!"



Electron microscope photo of hydrophobic sand showing humic substance coating.

### **OARS – TAKING CORRECTIVE ACTION**

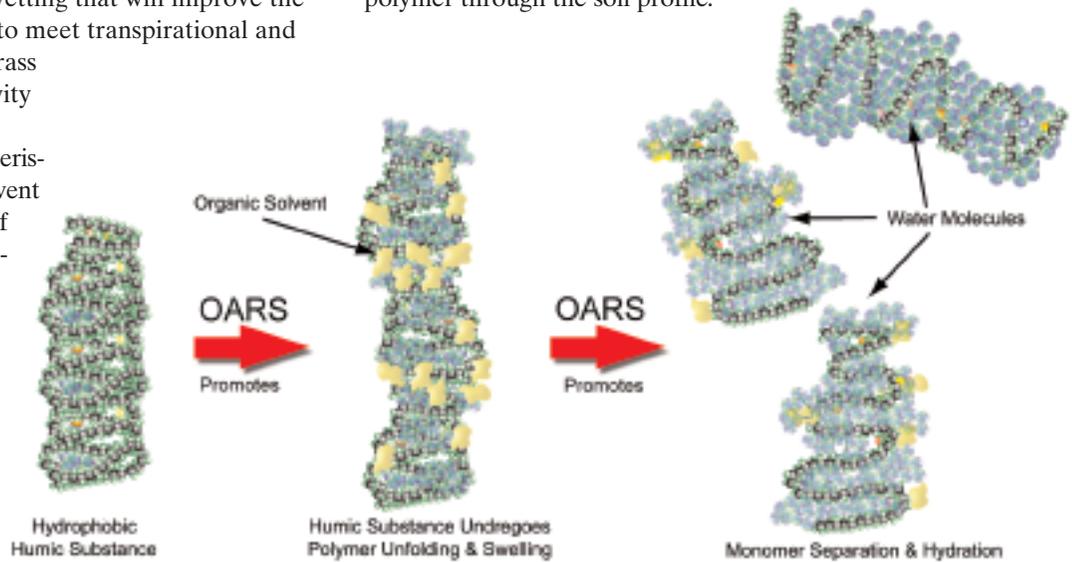
OARS is a patented combination of an organic solvent and a surfactant complex that, under extensive testing, has proven to be effective in removing accumulations of hydrophobic humic substances on soil surfaces. OARS represents a major breakthrough in dealing with water-repellent soils. Unlike surfactants and other soil amendments that just alleviate the symptoms of soil water-repellency, **the chemistries in OARS work to correct the cause of water repellency.**

## HOW DOES OARS WORK?

OARS should be applied to soils using conventional spray equipment. Its surfactant components attach to the non-polar sites on hydrophobic soil surfaces and thatch to provide:

- Uniform movement of water into and through the soil matrix
- Patterns of wetting and re-wetting that will improve the amount of water in the soil to meet transpirational and metabolic demands of turfgrass
- Long lasting surfactant activity

In addition to its surfactant characteristics, OARS contains an organic solvent that weakens the chemical bonds of “packed” or “collapsed” humic substances that coat the surface of soil particles. The organic solvent in OARS disrupts the hydrogen bonds on the humic substance molecule which allows the polymer structure to reconfigure, “unfold” and undergo “polymer swelling.” The surfactant component also aids in the hydration of the unfolded humic molecule.

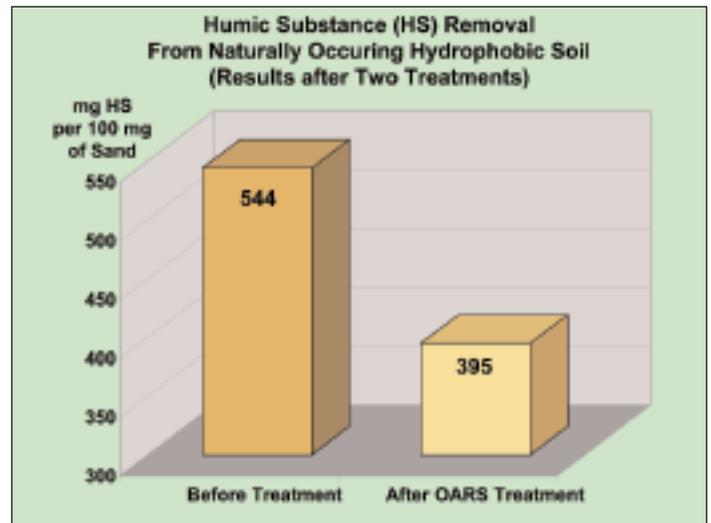


As the humic polymer molecules unfold, they reach a threshold point and break (“flake off”). The patented formulation of OARS encourages the unfolding process by hydrating the humic substance molecule. This facilitates monomer separation and also aids in moving the fragments of the humic substance polymer through the soil profile.

## TEST RESULTS – 27% REDUCTION IN HUMIC SUBSTANCES FROM SAND SOIL SURFACES

OARS has been thoroughly researched and tested to verify its ability to remove humic substances from hydrophobic sands. Replicated trials were conducted on hydrophobic sands comparing two treatments of OARS with two water treatments used as a control.

The sand samples were then flushed with water, dried, and the remaining humic substances were removed from the sand samples, measured, and analyzed according to methods approved by the International Humic Substance Society (IHSS). Results were consistent. **After just two treatments with OARS, over 27% of water-repellent humic substances were removed from the sand soil surfaces.**



## USE DIRECTIONS

Apply OARS at 6-7 oz. per 1000 sq. ft. in 2 gallons of water. For best results, apply monthly throughout the growing season. No water-in is required when used at recommended rates.

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