

GrowTekSA

making your greens greener

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PBS¹⁵⁰ - GROUND-BREAKING LONG-TERM SURFACTANT

The New Standard

PBS¹⁵⁰
POLYFUNCTIONAL
BRANCHED SURFACTANT

THE FIRST LEGITIMATE
NEW TECHNOLOGY FOR
LONG-TERM SURFACTANTS
USED FOR TURFGRASS

**PBS¹⁵⁰** represents the first **LEGITIMATE** new technology for long-term surfactants used for turfgrass.

Unlike older surfactant chemistries that are applied at higher rates to achieve longer lasting performance, PBS150 uses a unique new surfactant molecular construction to address the source of performance loss—*biodegradation of the surfactant molecule by soil microbes*.

The **PBS¹⁵⁰** Polyfunctional Branched Surfactant Technology brings a new dimension to long-term surfactant performance.

PBS¹⁵⁰ is the only long-term surfactant specifically designed to compensate for rapid natural molecular breakdown by microbes in the soil profile. The design of the **PBS¹⁵⁰** formulation is so novel, it was granted a U.S. Patent in February, 2005.

Turfgrass managers will find that when they use **PBS¹⁵⁰**, it lasts significantly longer than competitive products and that its surfactant performance characteristics are superior.

PBS150 promises to become the new standard for long-term surfactant technology in turfgrass. It has undergone a rigorous research and development program followed by extensive field testing under real world turfgrass management conditions. PBS150 has proven it will:

- ♣ Reduce hydrophobic conditions on a sustainable basis for 5 months or more
- ♣ Encourage a pattern of hydration and re-hydration that improves the amount of available water in the soil profile to meet the metabolic demands of the plant
- ♣ Restore the uniform movement of water into and through the soil matrix
- ♣ Promote improvement in turfgrass quality, color, and uniformity
- ♣ Improve stress tolerance
- ♣ Money Back Guarantee

Unparalleled Performance Characteristics

Sustained Surfactant System. The unique “shedding” of its branch surfactants allows **PBS¹⁵⁰** to compensate for biological degradation and perform as a sustained, effective surfactant system significantly longer than conventional long-term surfactants. **Highly Flexible Surfactant System.** Unlike other “long-term” surfactants whose effective surfactant performance drops rapidly after about 3 months, **PBS¹⁵⁰** improves the soil moisture status of turfgrass for a full 5 months—offering the turfgrass manager a highly flexible surfactant system by which to manage two critical periods of turfgrass management:

- Heat and Water Stress
- Turfgrass Recovery and Repair



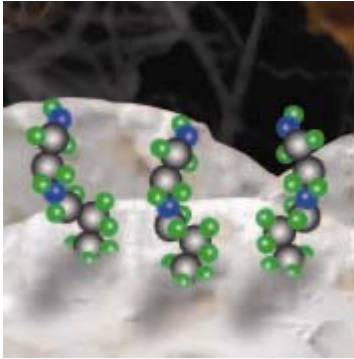


Fig.1. Graphic depiction of Linear surfactant

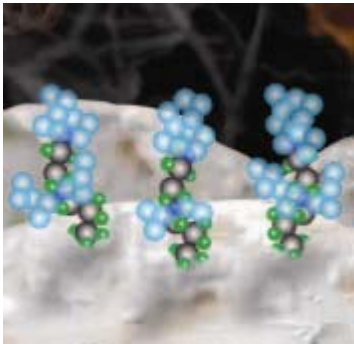


Fig.2. Graphic depiction of hydrated linear surfactant

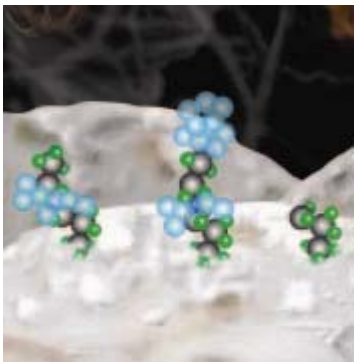


Fig.3. Graphic depiction of degradation of linear surfactant

For well over a decade, golf course superintendents and professional turf managers have come to rely on the use of surfactants as a management tool to address problems caused by water repellent (hydrophobic) conditions in their soil profiles.

In recent years, several “long-term” surfactants have been introduced to meet the demand from turfgrass managers for products that provide a more practical interval between applications. In most cases these products are applied at higher rates to achieve their performance promise. However, the field performance of these products on golf courses has been erratic, due to biological and chemical challenges within the soil ecosystem.

Most long-term surfactants in use today are medium to high molecular weight polymers that contain:

1. a hydrophilic constituent that attracts water molecules and
2. a hydrophobic constituent that is attracted to the non-polar areas of water repellent soils and serves as the surfactant’s anchor point (Fig. 1).

Once applied to a turfgrass area, the surfactant molecules are chemically attracted to hydrophobic (non-polar) areas of soil particles. The hydrophobic constituent of the surfactant molecule attaches chemically to the surface and the hydrophilic (polar) constituent is exposed to attract water. It is this ability of the surfactant molecule to exist as a molecular “polar site” on the soil surface that contributes to its ability to establish a pattern of hydration and rehydration in the soil profile (Fig. 2).

BIODEGRADATION: THE LIMITING FACTOR FOR “LONG-TERM SURFACTANTS”

The linear construction of many of these long-term surfactants makes them quite vulnerable to degradation of their molecular structure by microbes found in the soil ecosystem. During the degradation process, enzymes produced by the microbes break down the surfactant molecule (Fig. 3). This results in a progressive loss of the surfactant’s “polar site” characteristic, and consequently, the loss of effective “wetting” characteristics of the surfactant product.

The length of time a surfactant will maintain its effective properties is greatly influenced by the level of biodegradation by microbes in the soil profile. The kinetics of biodegradation is uncertain at best. Under ideal conditions, most long-term surfactant products lose their performance characteristics after about 3 months.

It has also been pointed out that *the period of effective performance of a long-term surfactant can also be reduced by the accumulation of water repellent materials on the surface of soil particles after the application of the long-term surfactant product.* An increase in surfactant rates would logically not compensate for this natural occurrence.

COMPENSATING FOR BIODEGRADATION

The structure of the **PBS¹⁵⁰** molecule is well suited for long-term performance and will provide sustainable surfactant activity for 150 days or more following its application. Its inventive formulation is based on the use of a large oxygen-containing polyfunctional base compound to which multibranch surfactant polymers (with both hydrophilic and hydrophobic constituents) are attached (Fig. 4).

Once the **PBS¹⁵⁰** surfactant is applied to target soils, it initially exists as a single surfactant compound. In its “complete state,” **PBS¹⁵⁰** provides multiple sites for water molecules to attach—providing superior wetting agent characteristics (Fig. 5) versus linear surfactants (Fig. 2). When the **PBS¹⁵⁰** molecule is attacked by soil microbes (biodegradation) in the soil profile, its branch surfactant constituents will begin to separate (disassociate) from the polyfunctional base as individual, fully-functional surfactants. They will then travel through the soil/water matrix and will seek and attach to, new water repellent (hydrophobic) sites (Fig. 6). Even when all its surfactant “branches” have become disassociated, the **PBS¹⁵⁰** polyfunctional base molecule retains its surfactant performance characteristics.

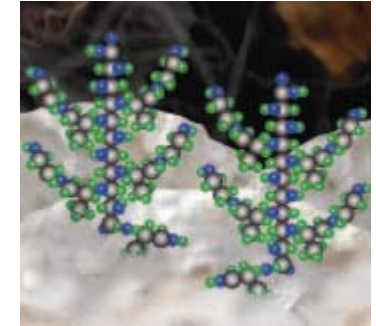


Fig.4. Graphic depiction of **PBS¹⁵⁰** poly-functional branched surfactant molecules attached to hydrophobic soil particle surface

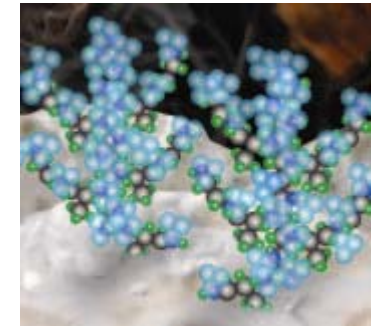


Fig.5. Graphic depiction of hydrated **PBS¹⁵⁰** surfactant molecule

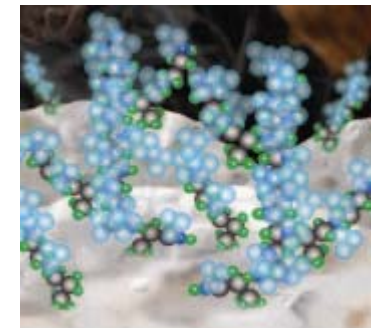


Fig.5. Graphic depiction of branched surfactant molecules released via degradation and re-attaching to hydrophobic sites on soil particle surfaces



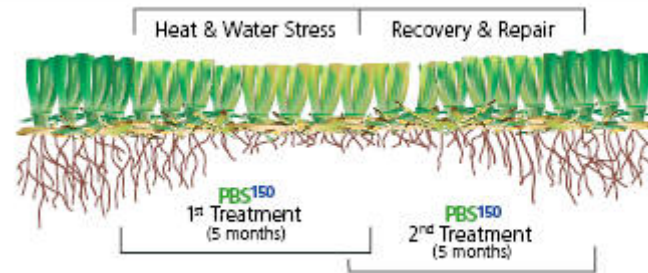
making your greens greener

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PBS¹⁵⁰ - MANAGING TURFGRASS STRESS & RECOVERY

A uniform supply of water within the soil profile is critical during heat and water stress periods to meet the transpirational demands of the plant. Equally important, is the need for a uniform supply of water to turfgrass roots during a period of recovery and repair. Without a sustained supply of water, the turfgrass plant will be unable to rebuild its root system and carbohydrate (sugar) reserves (needed to survive dormancy and for subsequent new growth requirements).



Superintendents often find that older, “long-term” surfactants cannot sustain an effective performance profile during the time frame required to manage the soil moisture status throughout either heat and/or water stress periods or turfgrass recovery periods. This is not the case for **PBS¹⁵⁰**.

The ability of **PBS¹⁵⁰** to improve the soil moisture status of turfgrass for 5 months or more offers the turfgrass manager a highly flexible surfactant system from which to address these two critical periods of successful turfgrass management—Heat and Water Stress and Turfgrass Recovery.

PBS¹⁵⁰ - DIRECTIONS FOR USE

WHERE TO USE	FORMULA-	DIRECTIONS FOR USE
Fairways, Bunker Faces, Collars and Rough	Liquid	Apply PBS¹⁵⁰ in a split application of 8 ounces in 2 gallons of water per 1000ft ² (250ml in 8 litres of water per 100m ²) followed by an additional 8 ounces in 2 gallons of water per 1000ft ² (250ml in 8 litres of water per 100m ²) within 7 days of the initial application.
Greens & Tees	Liquid	Apply PBS¹⁵⁰ in a split application of 8 ounces in 5 gallons of water per 1000ft ² (250ml in 20 litres of water per 100m ²) followed by an additional 8 ounces in 5 gallons of water per 1000ft ² (250ml in 20 litres of water per 100m ²) within 7 days of the initial application.

