

With the first Emergency Drought Orders issues last year for over a decade, water, or lack of it, is still a key concern across large areas of the UK. Golf courses, sports facilities and amenity areas are under increasing pressure to reduce water use.

The influence of Global warming weather patterns has resulted in extended periods of dry weather, this has meant that even golf courses with extraction licences or reservoir facilities will have to make far better use of available water resources in the future.



Use of irrigation for sports turf areas is always high on the turf management agenda regarding environmental issues and sustainability. Over-use of irrigation systems in the past have been responsible for creating poor playing surfaces and encouraging sward invasion from weed grasses such as *Poa annua*.

Now we are seeing certain parts of the country affected by drought and restriction on water use for irrigating turf, it is vitally important for the turf manager to make sure that their management practices are geared towards creating turf that is sustainable in drought conditions or has minimal irrigation requirement.

Water is a valuable resource, especially in the form of available irrigation water. As part of an environmentally sound management programme, the optimum use of irrigation is essential. Maintaining an optimum level of water in the root zone is needed to produce a turf playing surface of the highest quality. Too little available water, and turfgrass will suffer drought stress. But there are actions that can be taken to minimise this risk.

### Drought Management - Agronomic Factors



Well Developed Root System

To create a drought tolerant grass sward there are a number of factors that need to be considered. Some of these factors should be adopted prior to drought stress:

- ◆ Encourage grass species that are tolerant of drought conditions: fescue, colonial bent grass, smooth stalk meadow grass and new rye species etc.
- ◆ Reduce soil compaction. Deep roots cannot develop in compacted soil.

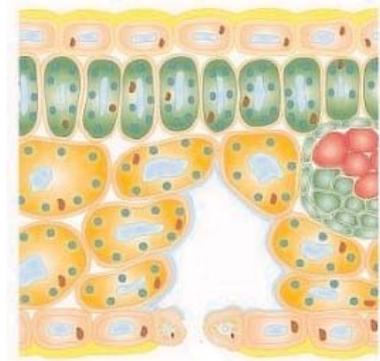
- ◆ Increase appropriate aeration - helping to encourage deep rooting.
- ◆ Reduce thatch build up - verticutting, grooming etc.
- ◆ Only very light top dressing treatments - avoid completely in very dry conditions.
- ◆ Raise height of cut - reducing stress on grass plant and root.
- ◆ Use hand mowers to reduce stress on turf.
- ◆ Appropriate use of Nitrogen to encourage rooting without excess vegetative growth. Maintain nutrients responsible for stomata regulation such as Potassium, also Calcium for cell strength.

### Nutrition & Drought

Correct nutritional input is essential prior to and during turf stress periods to encourage a healthy root system and to maintain the grass plant's stress response functions such as stomata control.

Avoid high applications of Nitrogen during drought stress. If the plant already has access to sufficient Nitrogen and a good root system, excess Nitrogen will cause the plant to produce excessive vegetative growth at the expense of the root system. This is especially important in the late spring and early summer when grasses are growing rapidly.

The use of appropriate amounts of Potassium in your nutritional input programme can help to reduce plant stress caused by drought. Photosynthesis and carbohydrate production are reduced when Potassium is low. However, do not over apply Potassium as this can have a detrimental effect on availability of other essential nutrients such as Magnesium. Potassium is also used by the grass plant to help regulate stomata function. Stomata are small openings on the cuticle of the plant. Their function is to allow entrance of gases and to help control water release from the surface of the plant; this function becomes vitally important during times of drought stress or low water availability. Calcium is also an essential nutrient for maintaining cell wall strength.



Cross section of leaf blade showing Stomata

Controlled release fertilizers and the use of appropriate liquid fertilizers can be an effective way of managing nutritional input during drought stress periods without increasing stress on the grass plant. In research, late autumn nutrient applications to boost carbohydrate levels are also showing some positive results.

## Drought Management Strategy - Products

### Sierrablen

COATING: water-soluble fertilizer particles are coated to limit the rate of dissolution and transport of nutrients:

- ◆ RESIN: Osmocote technology.
- ◆ POLYMER: Poly-S technology.

#### Release Mechanism - How It Works?



Granule as applied



All nutrients inside granule



Absorbs moisture/ pressure increases



Nutrient forced out of shell and slowly released



Empty organic based shell decomposes

### Greenmaster Liquids

#### Core Range

High N	25-00-00+2MgO+TE
NK	10-00-10+TE
High K	03-03-10+TE
Spring & Summer	12-04-06+TE

#### Specialities

Liquid STEP	Trace Element Mix
Iron 4	Fe 4% (EDTA chelated)
Ca-Booster	08-00-00+10%CaO+TE

### Greenmaster Blade

#### What is it?

- ◆ Based on carbohydrate, seaweed and trace elements.
- ◆ Simple sugars provide a readily available Carbon Source.
- ◆ Macro and Micro-nutrients:
  - ▶ Nitrogen/Phosphate/Potassium - 2.1.2.
  - ▶ Iron/Magnesium/Zinc plus other traces.
- ◆ 10% Seaweed concentrate.
- ◆ The formulation is unique to Scotts.

#### What Does It Do?

- ◆ Increase root mass - (Carbohydrate).
- ◆ Increased soil bacterial cell counts.
- ◆ Increased VA Mycorrhiza numbers.
- ◆ Improved visual appearance of turf.
- ◆ Improved Seedling Emergence.
- ◆ Increased grass growth rate.
- ◆ Increased rooting depth.

#### Proven By Research

- ◆ 3 year PhD project: Royal Holloway:
  - ▶ Increased Mycorrhiza.
- ◆ Royal Holloway Research (10 years of research):

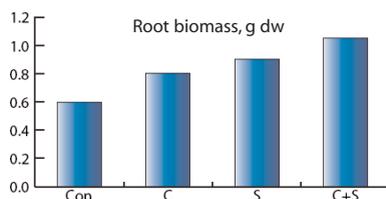
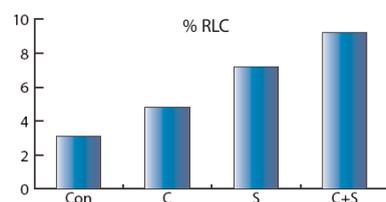
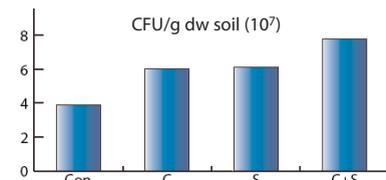
- ▶ Interactions between Blade and Seaweed - improved turf quality, increased shoot density, increased Mycorrhiza.
- ▶ Increased beneficial microbial populations in golf greens.

#### ◆ STRI:

- ▶ Improved root mass (in presence of Seaweed).

PhD Research (Royal Holloway College 2003) showing increased bacterial activity, AM Colonisation and increased root mass using the new unique formulation of Greenmaster Blade.

KEY	
Con	= Control
C	= Carbon
S	= Seaweed amendment
C+S	= Combined carbon and seaweed amendment



Seasonal means of: a) Bacterial abundance, b) AM colonisation, c) Root biomass.

### Increasing Root Density

- ◆ Grass roots and side shoots continue to grow after application.
- ◆ Energy normally used to produce vegetative growth is re-directed downwards into the root system.
- ◆ Lateral stems and root mass increase after repeat applications.



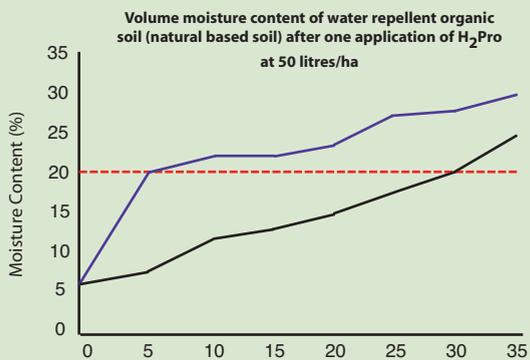
### Improves Drought Tolerance/Reduces Irrigation Requirement

- ◆ Produces smaller leaves with less surface for transpiration.
- ◆ Improves rooting for access to deeper soil moisture.
- ◆ Improves water use efficiency (av. 20%).

Research conducted at Cornell, Kansas State, Texas A&M - 2001.



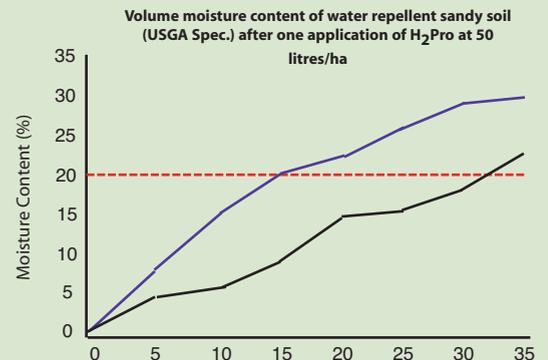
### H<sub>2</sub>Pro Water Efficiency



In Other Words...

...on natural soil, 31mm of irrigation was needed to reach the optimum moisture content whereas with H<sub>2</sub>Pro, only 7mm of irrigation was required

— H<sub>2</sub>Pro 28 day interval  
 — Untreated  
 - - - Optimum moisture content



...on sandy soil, 33mm of irrigation was needed to reach the optimum moisture content whereas with H<sub>2</sub>Pro, only 16mm of irrigation was needed

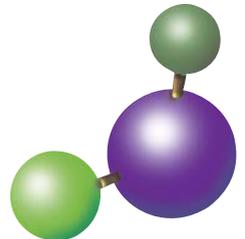
### Why Is H<sub>2</sub>Pro Different?

- ◆ New surfactant technology based on patented water conserver.
- ◆ Technology never used in European turf markets before.
- ◆ Unique mode of action that optimises water usage in the root zone and controls Dry Patch.
- ◆ Increases the effectiveness of applied irrigation.
- ◆ Reduces the amount of irrigation required to reach various ideal soil moisture contents.
- ◆ Treats both the causes and the symptoms of Dry Patch by:
  - ▶ Reducing the amount of wet/dry cycles in the root zone, preventing the hardening of the water repellent deposits.
  - ▶ Allows water to hold in the water repellent areas, allowing uptake by the turfgrass.
- ◆ Supporting work from Levington, Agro Chemex and University of Georgia.

### Long Term Wetting Agents

- ◆ Unique residual wetting agent based on water conservation agent that hold the maximum amount of water to the previously water repellent materials and to some organic materials in the root zone.
- ◆ Three different chain lengths:
  - ▶ Short (4-6 weeks)
  - ▶ Medium (6-10 weeks)
  - ▶ Long (complete season)
- ◆ As the medium and long chain molecules break down, they re-attach themselves to the non-polar sites creating efficient long lasting effect.

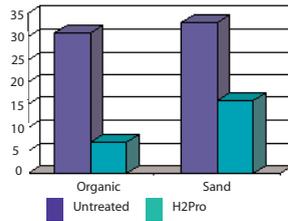
Long Chain H<sub>2</sub>Pro Molecule



## H<sub>2</sub>Pro Water Efficiency

Amount of irrigation required to reach ideal 20% soil moisture content:

- ◆ Organic:
  - ▶ Untreated 31mm
  - ▶ H<sub>2</sub>Pro 7mm
- ◆ Sand:
  - ▶ Untreated 33mm
  - ▶ H<sub>2</sub>Pro 16mm



## The H<sub>2</sub>Pro Range

The range consists of four different formulation types to optimise management options:

- ◆ H<sub>2</sub>Pro Liquid
- ◆ H<sub>2</sub>Pro Tablets
- ◆ H<sub>2</sub>Pro Granules
- ◆ H<sub>2</sub>Pro Maximise Liquid

The benefits of the range are as follows:

- ◆ Flexible use rates.
- ◆ Safer to users and turf.
- ◆ Easy to use.

## H<sub>2</sub>Pro Liquid Application Rates

Monthly	
Initial application	25L in 600 - 900 Litres per Ha
Monthly application (no watering in)	10L in 600 - 900 Litres per Ha

## Bi-Monthly

Bi-monthly application 25L in 600 - 900 litres per Ha  
(no watering in)

## Annually

Annual application 50L in 600 - 900 litres (min) per Ha  
(watering in required)

## Drought Management Strategy - Summary

- ◆ Use soil analysis to check for nutrient levels - Scotts can provide a programme to rectify any deficiencies.
- ◆ Especially important to maintain adequate levels of K and Ca for optimum plant stress management.
- ◆ Avoid high salt concentrations at surface, e.g. avoid over use of high acid reaction fertilizer.
- ◆ Use Sierrablen controlled release fertilizers as a base feed - Sierrablen has a very low scorch potential.
- ◆ Use Greenmaster chelated liquid fertilizers on a little and often basis. This gives very accurate nutrient input control, without increasing conductivity levels in the root zone.
- ◆ Greenmaster Blade encourages roots to store essential carbohydrates, also encourages indigenous Mycorrhiza - encourages rooting.
- ◆ H<sub>2</sub>Pro wetting agent programme - helps to maintain more available moisture in soil, e.g. reduces irrigation requirement.
- ◆ Primo MAXX programme - encourages rooting rather than vegetative growth, reduces evapotranspiration due to less leaf area.

**The Scotts Company is committed to being a Total Solution Provider to its customers.**

**To find out more, call one of our specialists below:**

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Growing success