New agronomics to enhance turf health

New turf agronomics that utilise exciting combinations of fungicides, growth regulators and wetting agents could alleviate plant stress and enhance turf quality, to produce consistently improved playing conditions right through the year.

Turf stress factors

Biotic stress

Disease

Abiotic stress

Physiological

Drought · Heat · Cold · Shade

Environment

Nutrient · Air pollution

Mechanical

Turf maintenance · Heavy play

Low stress — **High stress**

Antioxidant — **Free Radicals**

Base levels of antioxidants	Induction of antioxidants	Loss of antioxidants	Complete loss of antioxidants
Anti oxidants · Free radicals	Anti oxidants · Free radicals	Anti oxidants · Free radicals	Anti oxidants · Free radicals
Healthy balanced plant cells	Stressed cells quickly and fully recover	Onset of sub-clinical oxidative stress	Collapse and death of plant cells

How do product combinations work to target free radicals and relieve stress?

HeritageMaxx®
- Stimulates antioxidant levels
- Improves water use efficiency of plants
- Increases leaf numbers and density

PrimoMaxx®
- Increases root mass for water uptake
- Regulates water use in leaves
- Enhances leaf turgidity
- Stimulates antioxidant levels
- Improves turf density and strength

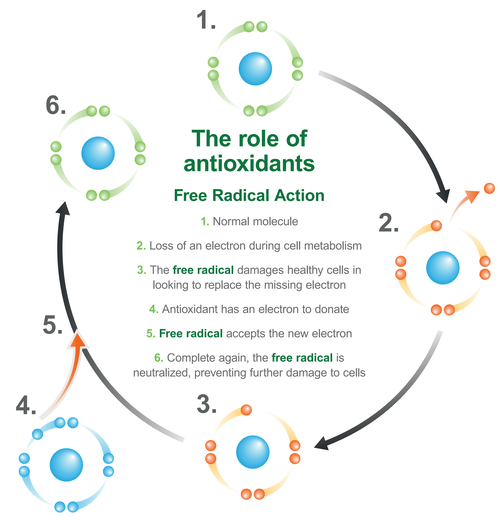
Qualibra® Wetting agent
- Holds available water in the root zone
- Enables larger root mass for improved water uptake

HeritageMaxx® syngenta

The science of stress busting

The key to stress busting is: (a) to remove or alleviate the stress factor, and (b) to make the turf plant stronger and naturally more resilient to the effects of stress.

REMOVAL OF STRESS FACTORS → PROMOTION OF TURF HEALTH → ENHANCED TURF QUALITY → IMPROVED PLAYING SURFACE



In practice, increased chlorophyll has a number of benefits for turf plants:

- Carbohydrate reserves can be built-up that provide season-long health benefits
- In shaded conditions, plants make better use of available light
- Other inputs, such as water and nutrients, can be better utilised
- Leaves retain better colour and appearance

In addition, Primo Maxx can reduce physical effects of leaf damage and stress by:

- Reducing mowing frequency
- Giving greater opportunity to alternate cutting and rolling
- Enabling faster recovery from maintenance operations, such as aeration

Firstly, Primo Maxx has been shown to increase antioxidant activity within the plant leaf by up to 40%.

40%
antioxidant activity

Trials at Rutgers University have shown a 60% increase in chlorophyll concentration in treated leaves.

+60%
chlorophyll concentration

In drought induced stress conditions the relative water content of turf leaves remained a healthy 20% higher than untreated 28 days after treatment.

+20%
relative water content

PrimoMaxx® syngenta

Soil water management to stop stress effects

For most greenkeepers and turf managers, the major challenge is soil water management – maintaining the optimum balance of soil water and air pockets for healthy root development and plant growth.

TOO MUCH WATER IN THE SOIL PROFILE

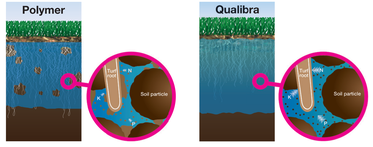
Anaerobic conditions
Roots die back
Nutrients lost through leaching and run-off

SOFT surfaces
High damage from player movement

TOO LITTLE WATER IN THE SOIL PROFILE

Roots die back
Reduced uptake of nutrients
Drought stress on plants
Risk of dry patch
Increased risk of heat stress

HARD playing surfaces
Reduced density and surface consistency

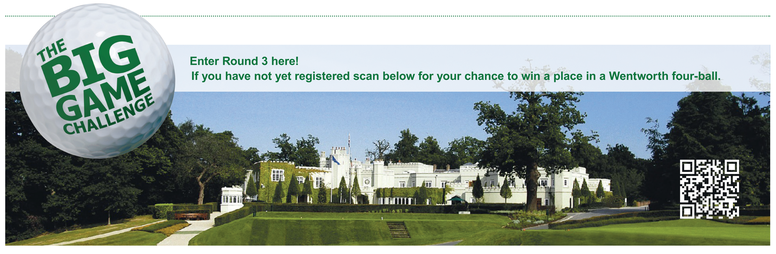


Polymer: Hydrophobic soil leaves dry areas where roots are unable to take up water or nutrients.

Qualibra: Deep and even distribution of soil moisture with Qualibra treatment enhances root to soil water contact and prevents the formation of dry patches.

Restricted root uptake of... **N** =
- Yellowing of leaves
- Reduction in photosynthetic activity
- Weakened growth and poor health

Restricted root uptake of... **H_2O** =
- Loss of turf leaf turgor
- Yellowing of leaves
- Increased stress on turf plants
- Plant death



Qualibra® syngenta