

CELEBRATING 25 YEARS

SYMBIO – IMPROVING THE LIFE IN YOUR SOIL



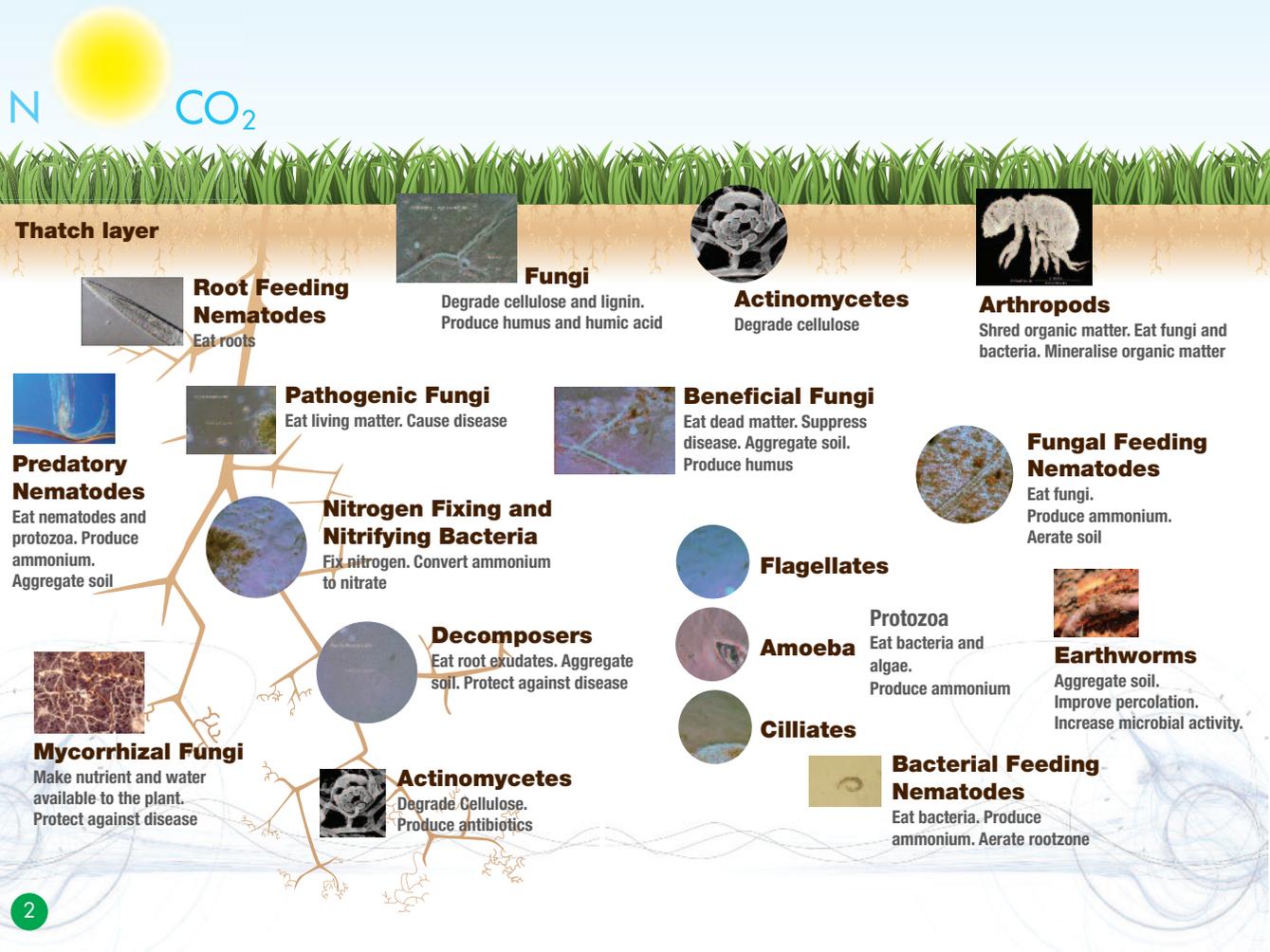
Symbio MycoForce



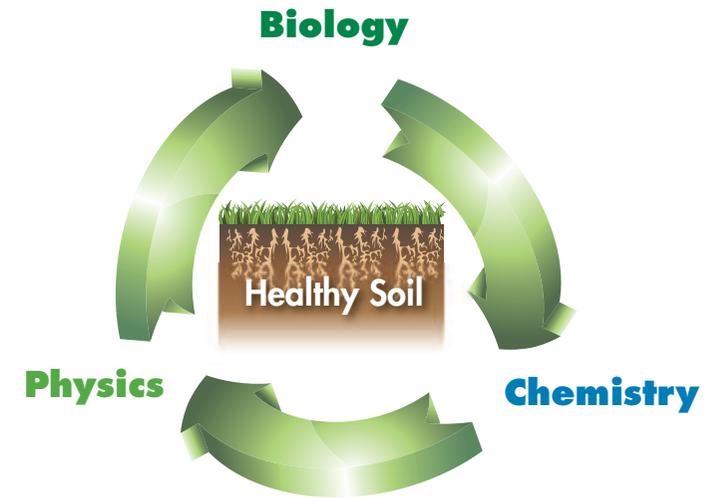
SPORTSTURF | LANDSCAPE | WATER

Symbio - creating healthy rootzones for healthy plants

Symbio creates a healthy soil food web for all grasses and plants



A healthy rootzone for healthy grass must have good biology, chemistry and physics. Biology controls the chemistry and physics.



The Symbio Approach

1. Assess the grass species, rootzone profile and physical soil structure.
2. Review the chemistry and available nutrients in the rootzone
3. Determine our customers requirements based upon the data available and preferred management practices.
4. Advise on adjustment to the fertilisers applied to balance the soil chemistry, bring base saturation into balance and increase Cation Exchange Capacity for optimal nutrient availability and uptake.
5. Devise a programme to create and maintain healthy grass and plants growing in healthy biologically active rootzones.

Advantages of a biologically active rootzone

Symbio MycoForce

Convert thatch to humus and plant food



5cm thatch layer remains after 2 years of hollow coring and 200 tonnes p.a. top dressing

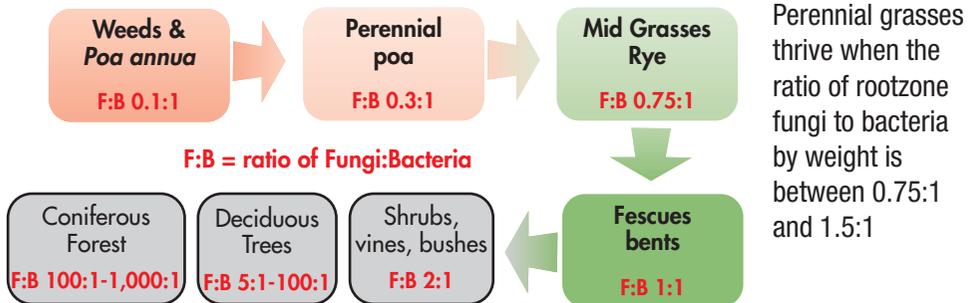


2 years after Symbio ThatchEater with hollow coring replaced by sorrel rolling and solid tining. Top dressing reduced to 120 tonnes p.a.

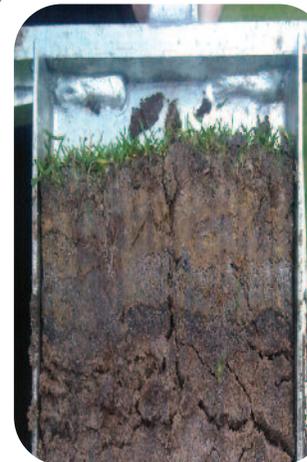
Pictures courtesy Bromborough Golf Club

Develop the correct biomass to grow perennial grasses

Ratio of rootzone fungi to bacteria by weight



Reduce or eliminate the need for hollow coring and reduce top dressing



Inorganic fertilisers, hollow coring and top dressing



Symbio programme – no hollow coring

Trial conducted by Reaseheath College

Pictures taken 9 November 2011

5 greens were managed with a conventional inorganic fertiliser programme, hollow coring 2x per year and top dressing. 5 greens were managed with a Symbio biological and nutrition programme with no top dressing.

Other Important benefits

- ✓ Reduce disease
- ✓ Reduce dry patch and fairy rings
- ✓ Reduce fertiliser inputs
- ✓ Reduce management costs
- ✓ Improve the playing surface

Symbio's Biofixation Technology Provides the Foundation for Healthy Rootzones

NEW FORMULATIONS

Powerful microbial technology now with increased biostimulants, calcified seaweed and kelpie

SYMBIO THATCHEATER

GUARANTEED TO REDUCE THATCH ON HEAVILY USED SPORTS TURF

- Degrades thatch and mineralises organic matter
- Increases turf vigour, wear, and stress resistance
- Releases nutrients for sward development, not disease
- Releases food for fungi to help promote fine grasses
- Reduces the need for hollow coring and top dressing
- Improves surface drainage and prevents black layer

ThatchEater is applied in spring and works for a complete season to degrade thatch and organic matter, converting it to plant food and the humus, humic and fulvic acids essential for sustainable plant growth.

Savings made from reduced hollow coring, top dressing, fertiliser and fungicide inputs often pay for the entire thatch reduction programme.

ThatchEater is guaranteed, if you follow our instructions regarding aeration and nutrition and do not see a reduction in thatch density and nutrient input. To ensure success and benefit from our product replacement guarantee, please arrange a greens inspection with Symbio or an authorised distributor.



105 year old green showing break down of thatch and conversion to humus and plant food. The rootzone is friable and drains well. Photo taken 29th April.

SYMBIO GREENCIRCLE

PROVIDES THE FOUNDATION FOR THE BIOLOGICAL APPROACH TO SPORTS TURF MANAGEMENT TO MAINTAIN FAST, THATCH AND STRESS-FREE GREENS

- Degrades thatch and improves plant nutrient uptake
- Promotes greater root development and sward density
- Reduces fertiliser and chemical use
- Increases turf vigour, wear and stress resistance
- Helps promote perennial grasses over *Poa annua*

One application in spring lasts for the entire growing season.

GreenCircle contains facultative and aerobic bacteria and fungi that are essential to the nitrogen cycle, plant nutrition and the higher elements of the soil food web. For best results use with Symbio MycoGro Complete fertilisers.

“Since we started working with Symbio our thatch has nearly gone, we have converted the greens from *Poa annua* to predominantly fescue and reduced fertiliser inputs and fungicide applications by 4 or 5 a year. With reduced budgets, had we not been on a Symbio programme I doubt if we could have produced our greens to the exceptional condition at present.”

Andrew Shade
Head Greenkeeper, Spey Bay Golf Course

“During 13 years working with Symbio on our USGA greens, we have developed as high a quality of fescue/bent putting surfaces as anywhere in Britain. Our greens budget including top-dressing and seed is less than £5,000. I rarely need to use fungicides, and fertiliser use is at an absolute minimum. This is ‘real sustainability.’”

Howard Wood
Owner/Head Greenkeeper
Woodlake Park Golf Club



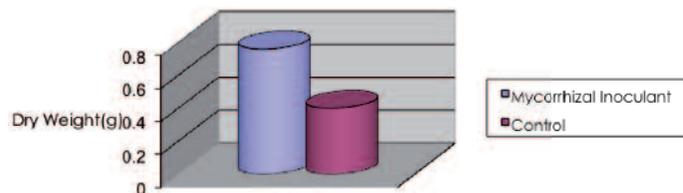
SYMBIO MYCORRHIZAL INOCULANT

FOR RAPID DEVELOPMENT AND LOWER COST MAINTENANCE OF NEWLY SEEDED OR TURFED SPORTS TURF

- Promotes establishment and longevity of perennial grasses
- May reduce grow in time by months
- Greatly improves root mass and increases nutrient uptake
- Mycorrhizal grass needs less fertiliser and water
- Mycorrhizal grass is less susceptible to and recovers faster from disease

The soil in new sand-dominated sports pitches is almost sterile. **Symbio Mycorrhizal Inoculant** contains 8 species of endo mycorrhizal fungi, growth-promoting soil fungi and bacteria, biostimulants, zeolite and soil nutrients to kick-start the soil’s natural food web.

Double Root Weight with Mycorrhizal Inoculant



Trial conducted by J Shannon – Lowe University of Surrey



*“Ever since we started using **Symbio Mycorrhizal Inoculant, MycoGro Complete Fertilisers and TraceOlite** the root depth and density has been fantastic producing a dense grass sward capable of withstanding heavy Premier Football play.”*

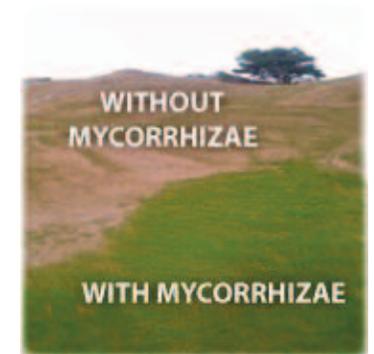
Paul Fiske
Head Groundsman,
Aberdeen Football Club

SYMBIO RESISTER

FOR STRONG GROWTH AND DISEASE RESISTANCE IN AUTUMN AND WINTER

- Breaks down thatch which harbours disease-causing fungi
- Utilises available nutrient for microbial and turf growth
- Promotes root development and increased winter wear resistance
- Increases turf vigour and natural plant protection
- Increases fungal populations to promote fine grass growth

Resister contains bacteria and fungi chosen for their ability to degrade thatch and utilise available nutrient for strong plant growth and to promote a healthy beneficial microbial population in the rootzone. Vigorous grass, efficient utilisation of nutrients and a biologically active root zone are important factors in maintaining a healthy sward that is resistant to disease, thinning, moss and other problems associated with winter play. One application will last up to 6 months.



COMPOST TEA BREWERS

Compost tea is a highly concentrated microbial solution containing a wide range of the bacteria, fungi, protozoa and beneficial nematodes that create healthy biologically active soil in which to grow healthy plants.

Symbio's bio brewers suit every situation from entire golf courses and playing fields to bowling greens.

Creating healthy biologically active soil with compost tea.

- Improves soil structure, oxygen diffusion, water infiltration and depth of active rootzone
- Retains and recycles nitrogen and other nutrients
- Rapidly decomposes thatch and turns organic matter into humus
- Produces hormones that encourage plant growth
- High biological activity in the soil and on the plant, reduces opportunities for pathogens to grow
- Introduces high levels of beneficial fungi to promote rye, fescue and bent grass over *Poa annua*

SYMBIO BIO BREWER 620



The Bio Brewer 620 makes enough tea for 1 – 12 hectares suitable for golf courses and larger playing fields.

SYMBIO BIO BREWER 200



The Bio Brewer 200 makes 200 litres of excellent compost tea which will cover up to 2 hectares of sand rootzones or 4 hectares of soil rootzones.

“We’ve been applying Compost Tea for the last five years with some very encouraging results. The brewing process and subsequent applications have undoubtedly seen a reduction in disease development and certainly enhanced both rooting depths and general aesthetics. In addition, the combination of Phytogro and Liquid Silicon have proved invaluable during the late autumn/winter months”

Rob Jackson
Course Manager Bramley, Golf Club



SYMBIO BIO BREWER 25

COMPLETE COMPOST TEA PACKAGE FOR USE WITH ALL COMPOST TEA BREWERS

The Symbio Compost Tea Pack has been specially formulated using Symbio’s composting microbial technology. Each batch is tested to ensure it contains:

- Specially formulated compost, high populations of natural soil fungi and essential bacteria plus protozoa and beneficial nematodes
- A comprehensive nutrient pack containing the nutrients required for bacterial and fungal growth plus
- A selection of plant based key nutrients and highly porous minerals to provide a protective support for the growing micro-organisms



Fungal Additive for Compost Teas

Many lignase producing fungi that degrade thatch do not grow in the time it takes to make a good compost tea. This highly concentrated mix of 7 species of soil fungi is selected for its ability to degrade thatch and organic matter converting it to humus and essential organic acids. The fungi also maintain the fungal dominance needed for perennial grass growth and to help out compete the fungi that cause fairy rings and fungal dry patch. Simply add 100-500 gms per hectare to your compost tea at the beginning of the brewing cycle.



The Bio Brewer 25 a portable unit that produces 25 litres to cover up to 5,000m²

Pack sizes **1Kg, 5Kg**

Bacterial Additive for Compost Teas

A mix of 16 species of soil bacteria concentrated at 2×10^9 CFU per gram. The bacteria are used to boost the compost tea to stimulate growth in early spring and late autumn. If your sward is predominantly *Poa annua* that requires a bacterial dominant rootzone then Bacterial Additive may be applied throughout the growing season. Just add 250gms to your compost tea at the beginning of the brewing cycle.

Pack sizes **250g, 2.5Kg**

APPLICATION AND TIMING

For soils that have been subjected to heavy inorganic fertiliser and pesticide use, apply every 7 days for the first three applications and then every 3 or 4 weeks. If the sward has traditionally been subject to bad attacks of disease, increase the frequency of application just before disease usually attacks and during times when disease is usually prevalent. Compost Tea is not a pesticide but plants growing in healthy soil are less susceptible to many common diseases.

For sand rootzones dilute 100 litres of Compost Tea in 300 – 750 litres of clean water per hectare.

For soil rootzones e.g. football pitches and fairways dilute 50 - 100 litres of Compost Tea in 300 - 600 litres of water per hectare.

Sterile v Biologically Active Rootzone



Comparison of grass roots grown in sterile rootzone to grass grown with compost teas and with mycorrhizae

(Trial performed by Josh Webber Portmore GC at Myerscough College)

Mycorrhizal SeedCoat and Grass Seed

Mycorrhizal fungi are one of the most important elements for grass growth and health. They are essential for the growth of strong perennial grasses with dense roots and good disease resistance. Mycorrhizal grass requires less fertiliser and water.

In addition to healthy soil you need the correct seed to get the very best fine grasses for your playing surface. Symbio supply the DLF Johnsons range to ensure maximum performance from your turf.

SYMBIO MYCORRHIZAL SEEDCOAT AND GRASS SEED

FOR THE RAPID ESTABLISHMENT OF PERENNIAL GRASSES

- Improves establishment of fine grass seed in new and old sward
- Increases the percentage of fine grasses in the sward over *Poa annua*
- Greatly improves root mass and increases nutrient uptake
- Mycorrhizal grasses need up to 30% less water in times of drought
- Mycorrhizal grass suffers less from disease, heat and cold stress

Symbio Mycorrhizal SeedCoat contains spores of 9 beneficial endo mycorrhizal fungi, plus growth promoting bacteria and fungi and organic soil nutrients, to improve success when overseeding and the rapid establishment of newly seeded areas.

Mycorrhizae are essential for grass health, colonising the roots, they can increase the surface area for nutrient and water uptake by over 300%.

“Following years of wet weather, our thatch levels had increased significantly. However since applying Symbio Liquid Seaweed 50%, Liquid Aeration and Symbio ThatchEater in combination with routine aeration we have seen greatly reduced thatch levels, increased soil friability and firmer surfaces. Fertilizer inputs have been reduced and we look forward to continued success working with Symbio.”

Neil Robinson
Head Greenkeeper, Penrith Golf Club

Bent, fescue and rye grasses rely heavily on mycorrhizae for survival in nature. In sports turf, levels of mycorrhizae are often low or non-existent due to sterile soils, compaction, pesticide and inorganic fertiliser use.

With the ever increasing price of seed it makes sense to make sure you get the maximum establishment possible. For research and trials data, contact Symbio or log on to our website www.symbio.co.uk

APPLICATION AND TIMING

Apply 3Kg of Mycorrhizal SeedCoat per hectare regardless of the amount of seed used. Mix with seed in the bag or drum and sow in the usual way. The aim is to achieve even coverage of the Mycorrhizal SeedCoat across the sward using the seed as a carrier.

When a healthy mycorrhizal root touches a non mycorrhizal root, in most cases, the mycorrhizae will transfer and infect the weaker root.



Roots on left inoculated with Mycorrhizal SeedCoat. Roots on right control.



Symbio is pleased to supply all Johnsons and Pro Master Range seeds precoated with Mycorrhizal SeedCoat.



Pack size 1.5Kg

Aberdeen Football Club 4 weeks after seeding.

Plant and Soil Nutrition

MycoGro Greens Grade Biological Fertilisers

Easy to spread fertilisers with mycorrhizae, soil fungi and soil bacteria.

Symbio MycoForce

MYCOGRO

- Promotes establishment of fescue, bent and rye grasses
- Mycorrhizae improve root mass and increase nutrient and water uptake
- Increases plant tolerance to drought and stress conditions
- Faster grow-in and establishment of new grass seeds and turf
- Healthy grass growing in a microbially active root zone suffers less and recovers faster from disease

BIOLOGICAL ANALYSIS

All MycoGro fertilisers contain, per 20kg bag, a minimum of 15,400 spores/propagules of 9 species of endo mycorrhizal fungi, 7 essential soil fungi for thatch reduction and fine grass promotion and 5 species of *Bacillus* bacteria for phosphate solubilisation, nutrient retention and plant growth promotion.

SYMBIO MYCOGRO COMPLETE BIOLOGICAL FERTILISERS

With mycorrhizae, fungi and bacteria

SPRING and SUMMER

- Symbio MycoGro 10.0.0 + 4% Mg with trace elements.
- Symbio MycoGro 10.0.10 + 4% Mg with trace elements.
- Symbio MycoGro 10.0.20 + 2.4% Mg 1.6% Fe with trace elements.

AUTUMN, WINTER and SPRING

- Symbio MycoGro 5.0.28 + 4% Mg 2% Fe with trace elements.
- Symbio MycoGro 9.3.14 + 2% Mg 2% Fe (without mycorrhizae).

“We have worked with Symbio’s microbial approach over the last two years and have seen significant ingress of finer grasses and improved plant health throughout the year. We look forward to continued improvement going forward.”

Mick Buckley Course Manager, Muskerry Golf Club

SYMBIO MYCOGRO COMPLETE ORGANIC BIOLOGICAL FERTILISERS

Organic fertiliser, rich in humus with added mycorrhizae, soil fungi and bacteria

Organic fertilisers put microbial life back into your soil. Symbio’s MycoGro organic fertilisers contain biostimulants and humic material and all the macro and micronutrients grass plants need for healthy growth.

CHEMICAL ANALYSIS

- Symbio MycoGro 5.3.8 - 100% Organic.
- Symbio MycoGro 10.2.10 + 4% Mg - 50% Organic

Organic content contains the trace elements: Copper, Magnesium, Manganese, Zinc, Molybdenum, Sulphur, Boron, Iron.

What do the rhizo bacteria and fungi do?

Soil bacteria and fungi are essential to:

- Convert ammonia to plant-available nitrate.
- Solubilise phosphorus.
- Degrade thatch and other organic matter, produce humus and recycle the nutrient as plant food.
- Assist nutrient uptake into the plant.
- Produce enzymes to help seed germination
- Competitively exclude harmful fungi
- Feed the nematodes, protozoa and other organisms in the soil food web

What do Mycorrhizae do?

Mycorrhizae are fungi that effectively expand the root system of the plant, allowing it to take up nutrients and water more efficiently. Mycorrhizae also help fescue, bent, rye and perennial *Poa annua* species to dominate *Poa annua*.

What do the Molasses & Biostimulants do?

Our biostimulants come in different forms to:

- Provide carbon to feed all the soil microbes
- Increase the population of soil microbes
- Improve soil structure
- Increase plant photosynthesis and cell division.





SYMBIO TRADITIONAL LINKS FERTILISERS

Blood and bone, hoof and horn, humates and seaweed have been used as organic nutrients for centuries and are a foundation for traditional fescue links course management.

Symbio SSD 8.0.6 + 1 Fe
 Symbio SSD 8.0.0 + 2.5 Fe
 Symbio SSD 8.0.0
 Symbio SSD 2.0.10 + 1 Mg Potash Plus

Pack size **20Kg**

SYMBIO MYCOGRO TEE, PITCH, LAWN AND FAIRWAY FERTILISERS

Contain Thatch Eating Fungi and Bacteria

12.2.9	50% Organic
20.0.10	50% SCU Slow release
7.0.10	with extra thatch eating fungi
10.0.10	with extra thatch eating fungi
15.2.15	25% UMAXX slow release

- Fungi convert thatch, dead moss and grass clippings to humus
- Bacteria solubilise and retain nutrients
- Assists seed germination
- Creates the biology needed for perennial grass growth

Pack size **20Kg**



Granular compound fertilisers without microbes

FINE TURF MINI GRANULAR 1.5 - 3mm

12-0-9 +1Fe +0.5Mg
 12-3-9 +1Fe +0.5Mg
 3-10-5
 4-6-8 +2Fe

OUTFIELD GRANULAR 2 - 4mm

7-7-7
 9-7-7
 6-9-6
 12-6-6
 10-15-10
 20-10-10

ORGANIC BASED GRANULAR 2 - 4mm (10-12 Weeks Release)

12-6-6
 3-12-12
 21-1-0.45 +1Mg
 10-4-4 +3.5Fe with Mecoprop P and 2,4D

FINE TURF MICRO GRANULAR 1.5 - 2mm

4-0-0 +11Fe
 10-0-0 +6Mg
 8-0-0 +4Fe +2.4Mg
 8-0-6 +2Fe +1Mg
 5-0-28 +2Fe +1Mg
 10-4-4 +3.5Fe with Mecoprop P and 2,4D

FINE TURF ORGANIC BASED MINI GRANULAR 1.5 - 3mm (10-12 Weeks Release)

12-6-6 +1Fe
 5-3-8
 18-3.5-8 +Mg +TE
 3-0-3 +3Fe +1.5Mg
 1-0-0 +9Fe

SYMBIO LIQUID FERTILISERS

Easy to apply, readily available nutrients for all heavily used sports turf.

20.0.10 - 16.3.10 - 15.3.3 - 12.0.6+Fe - 1.0.16 all with essential trace elements. 20.0.10 available with added seaweed and humic acid.

Pack sizes **20 litres, 200 litres, 1,000 litres**



Cool Season Fertilisers and Carbohydrate Biostimulants

SYMBIO CMS SHOOT 5.0.2 WITH 12% FULVIC ACID

For the earliest start to Spring growth

Contains 9.2% amino acids w/w. CMS Shoot 5.0.2 is made from molasses by amino acid fermentation to retain proteins and nutrients, it is a rapidly available source of carbohydrates and amino acids to boost the plants resources for strong, healthy growth.

- Stimulates soil biology for early spring root and shoot growth
- Rapid assimilation of nutrient through roots and shoots
- Stimulates photosynthesis and carbohydrate production
- Improves seed germination and survival
- Improves growth in shady conditions
- The most economic source of carbohydrates available
- Year round fertiliser for sports pitches and outfields

APPLICATION

As a total fertiliser for greens, pitches, fairways and lawns 30 - 50 litres per hectare.

As a biostimulant for golf greens and other grass swards 10 - 20 litres per hectare.

NUTRIENT CONTENT

N 5%, P 0%, K 2% in concentrated molasses.

Pack sizes **20 litres, 200 litres, 1,000 litres**



Cricket square renovation with Mycorrhizae and Symbio Caviar 10.0.4

SYMBIO CAVIAR 10.0.4 WITH 25% FULVIC ACID ORGANIC FERTILISER FOR FAIRWAYS, SPORTS PITCHES AND AMENITY GRASS

A 10-0-4 low salt index organic granule combining slow release nutrients, with organic matter 45% – fulvic acid 25% – amino acids 15% with excellent biostimulant and soil building properties.

- Easy to spread organically sourced slow release fertiliser – 2mm granules
- Manufactured from Soluble Condensed Molasses
- Improves the friability of heavy and clay soils
- Improves soil structure and water infiltration
- Place under newly laid turf for rapid root establishment, even in winter
- Ideal for stadium pitches and grass in shade

CONTAINS

Nitrogen (min):	10%
Phosphorus:	0.3%
Potassium (min):	4.0%
Sulphur:	3.6%
Calcium:	1.2%
Magnesium:	0.36%
Manganese:	89 mg/kg
Zinc:	36mg/kg
Iron:	332 mg/kg
Boron:	0.01 %
Humic Acid:	3.8%
Fulvic Acid:	25%
Amino Acids:	15%



▲ Before

► 2 weeks later after seeding and applying Symbio Caviar 10.0.4



Pack sizes **20Kg bag, 500Kg big bag**

BIOSTIMULANTS

Biostimulants play a very important role by feeding the life in the soil that recycles and retains nutrients and degrades thatch. Many biostimulants directly improve the plant's metabolism and increase plant hormone activity to strengthen the plant against stress and disease. Not all biostimulants are the same, so use the following guide or contact your Symbio advisor to get the best results.

SYMBIO FULVIC BOOSTER

COOL SEASON GROWTH PROMOTER AND CHELATING AGENT

Apply in Spring and Autumn

Extend the growing season with Fulvic Booster. The best way to encourage early spring and late autumn growth.

Symbio Fulvic Booster is a concentrated 30% fulvic acid solution with humic acids and trace elements.

- Promotes early and late season and shaded growth
- Reduces drought stress and transpiration
- Powerful chelating agent when mixed with liquid fertilisers, trace elements and fungicides
- Thickens plant cell walls to improve cut and roll

APPLICATION

To promote early and late season growth apply at 10 litres per hectare. To maintain results apply at 2.5-5 litres through the summer. To chelate liquid fertilisers and improve fungicide uptake: 5 litres per hectare tank mixed. To mix with organic fertilisers and compost teas: 2 litres per hectare.

Pack size **10 litres**

Also available as a soluble powder at 80% concentration



SYMBIO BIOBOOSTER FISH 8.7.7

- High performance plant and soil nutrient
- Rapid assimilation through roots and shoots, ideal spring starter
- Stimulates photosynthesis and carbohydrate production
- Aids germination and survival of young plants
- Contains growth promoters and trace elements

Symbio BioBooster Fish, is an odour free fish hydrolysate, one of nature's most efficient plant and microbe stimulants. Containing NPK of 8.7.7 and numerous trace elements which encourage plants to access available nutrient. It is an excellent low light, cool season growth promoter and biostimulant.

Nitrogen N	8%	Iron Fe	0.07%
Phosphorous P2O5	7.8%	Manganese Mn	0.016%
Potassium K2O	7.2%	Zinc Zn	0.006%
Sulphur S	2.7%	Molybdenum	0.009%
Calcium Ca	1.3%	Copper Cu	0.007%
Magnesium Mg	0.33%	Boron B	0.016%

BioBooster Fish 8.7.7 may be mixed with Compost Teas, and most biostimulants and inorganic fertilisers.

Pack size **10 litres**

SYMBIO LIQUID 50% SEAWEED

CONCENTRATED 50% SOLID MATTER

Apply throughout the growing season

A super concentrated Liquid Seaweed with 50% solid content, rich in growth hormones, laminarin, fucoidan and trace elements. Made from *Ascophyllum nodosum*.

- Promotes stress-resistant, healthy plants
- Promotes the growth of fungi in your soil to help encourage fine grass growth
- Increases soil fertility
- Strong antioxidant

Laminarin and fucoidan – boost the plant's defence mechanisms against stress and disease and stimulate germination. **Growth Hormones** – Cytokinins, auxins, gibberellins and betaines help the plant reach its genetic potential.

APPLICATION

10-20 litres in 400-800 litres of water per hectare.

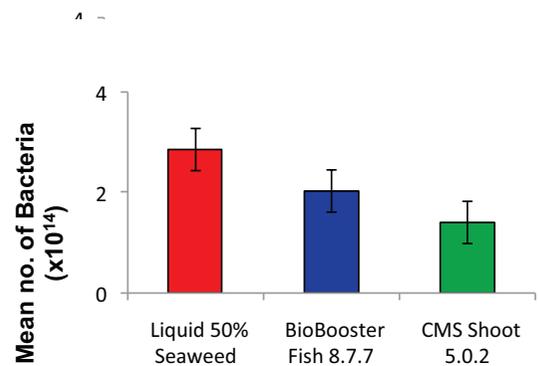
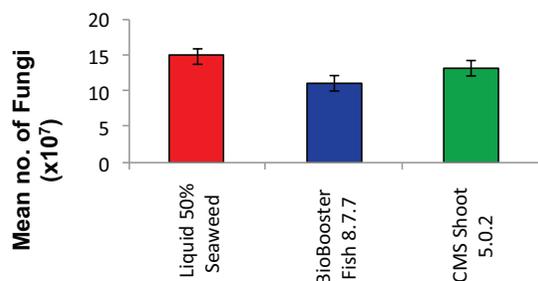
Contains - N, P, K, CaO, MgO, SO4, Mn, Cu, Fe

Pack size **10 litres**





Trials showing biostimulant properties of Symbio's biostimulants on Fungi and Bacteria in Compost Tea



Source G Giardina University of Surrey

SYMBIO HUMIC BOOSTER

FUNGAL BIOSTIMULANT AND CHELATING AGENT

Apply throughout the growing season

The essential biostimulant for perennial grass growth in sandy rootzones with available humic and fulvic acids.

- Increases beneficial fungal activity to promote fine grass, thatch reduction and disease management
- Increases Cation Exchange Capacity (CEC)
- Improves nutrient uptake and stimulates plant growth
- Increases microbial activity to improve soil structure

Available as a liquid or soluble powder.

Humate, humic and fulvic acids are essential food for fungi and a stimulant for plant growth and soil structure.

Humic Booster can be applied as a foliar feed or soil drench via irrigation systems or spray tank and mixed with all Symbio products plus liquid fertilisers.

APPLICATION

Soluble 1-5Kg dissolved in 400+ litres per hectare per hectare.

Liquid 10-20 litres in 400+ litres per hectare.

Pack size **soluble 10Kg, 25Kg sack or liquid 20 litres**



SYMBIO SILICON

RAPIDLY AVAILABLE POTASSIUM SILICATE K₂O 12% SiO 24%.

For a faster, stronger sward

- Strengthens cell walls for stronger disease resistant grass.
- Lifts grass blade for a cleaner cut and removal of *Poa annua* seed heads.
- Increases ball roll and green speed.
- Reduces water loss in dry weather
- Foliar potassium promotes photosynthesis

APPLICATION

5 litres per hectare in 300 to 600 litres of water. To increase ball roll or green speed apply 4-7 days before competition.

Pack size **5 litres**



New Innovations in Dry Patch Management

SYMBIO INCISION

A new wetting agent combining penetrating surfactant technology with the water retaining power of polymers

Even distribution of water throughout the rootzone is essential for the plant and playing surface in times of drought and deluge.

Incision combines

- Penetrant technology to ensure even distribution of water through the rootzone and rapid removal of excess water during times of heavy rainfall.
- Water retaining polymers to hold onto water in a thin film around the soil particle to ensure the all-important airspace between soil particles is maintained in times of drought.
- Uniform uptake of liquid fertilisers and pesticides is essential for level growth and Incision ensures that nutrients, biostimulants and pesticides are evenly distributed throughout the rootzone.

Incision is best applied from spring onwards at 10 litres per hectare to prevent dry patch but may be used as a cure for existing dry patch at any time of year, with an initial application of 20 Litres per hectare cutting quickly through the profile to the hydrophobic layer.

Pack size **10 litres**

“Symbio Incision retained beneficial soil moisture levels in the greens throughout 2014. Less irrigation water was required, sward health, colour and the soil profile remained consistently good. When the greens dried out badly due to an irrigation failure we applied Incision, within a couple of days the sward recovered and they looked brilliant.”

Louis Ayres

Course Manager Hurtmore Golf Club

SYMBIO TRIALS DATA

Incision Wetting Agent STRI Trial



The efficacy of Symbio Incision was compared to two of the industry leading wetting agents; Qualibra and Revolution, during lab based trials conducted by STRI between February and May 2014.

20 cores were collected by STRI from the course at Royal Liverpool Golf Club, from an area known to have problematic hydrophobicity. Leached irrigation water, core weight loss and cumulative soil moisture loss were measured. Qualibra was applied at the equivalent of 20L/Ha; Revolution was applied at 19L/Ha and Symbio Incision was initially applied at 20L/Ha and then subsequent applications were reduced to 10L/Ha. All products and the control used a water rate equivalent of 700L/Ha.

Results:

Core weight loss and cumulative soil moisture loss: cores were weighed immediately prior to each wetting agent application and then again afterwards. Between applications of the wetting agents a further three measurements were recorded on a weekly basis. This data was used to produce the core weight loss and cumulative weight loss.

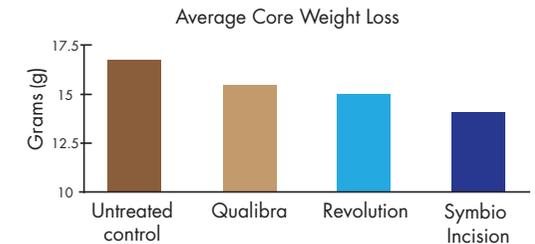


Fig 1. Symbio Incision retained on average more moisture, resulting in a significantly lower core weight loss compared to the untreated control ($P < 0.05$).

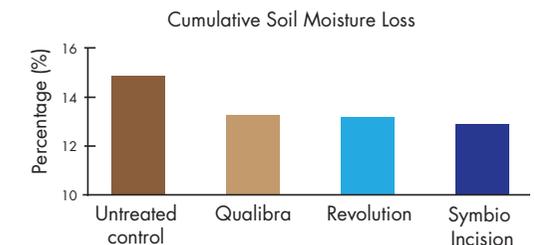


Fig 2. Symbio Incision maintained core moisture, resulting in a significantly lower cumulative soil moisture loss compared to the untreated control ($P < 0.05$).

Conclusion:

Symbio Incision's complex chemistry allows beneficial soil moisture to be retained. Consequently, although grass growth was not maintained on these cores, Symbio believe Incision can enhance plant growth in times of drought whilst reducing the need for excessive irrigation.

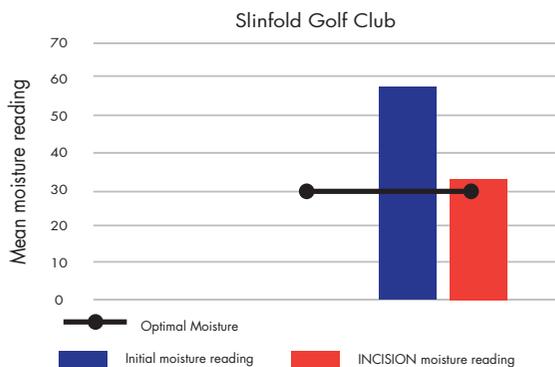


SYMBIO SUPA YUCCA WETTING AGENT

Combined wetting agent and biostimulant

A super concentrated natural extract derived from *Yucca schidigera* is an ideal alternative to synthetic surfactants, wetting agents and soil penetrants and is completely non-phytotoxic. Supa Yucca breaks down the waxy coating that prevents water from entering the plant in the same way as conventional wetting agents. Supa Yucca has a pH of 4.5 so is ideal for buffering alkaline water and may be tank mixed with compost teas to combine a biological and chemical defence against dry patch.

Pack sizes **1 litre, 5 litres, 10 litres**



Symbio Incision Trial at Slinfold Golf Club showing 43% reduction in average water content of waterlogged green from 57% to 32% saturation.

SYMBIO HYDROAID PLUS

Budget wetting agent and penetrant for sports pitches, greens, surrounds, tees, fairways and outfields

HydroAid plus is an all purpose wetting agent and penetrant designed to break down the coating, removing the waxes and proteins that prevents water ingress into the plant causing hydrophobic conditions. It also acts as a penetrant and encourages water to move through the rootzone in wet conditions.

Applied at 10 litres per hectare it is one of the most cost effective wetting agents available from just £33 per hectare.

When water is to be retained in the rootzone use HydroAid Plus to encourage percolation in Spring and late Autumn and Symbio Incision during the dry summer months

Pack sizes **2 x 5 litres, 200 litres**



SYMBIO AQUACEPT

A new biological answer to the hydrophobic layer caused by fairy rings and fungal dry patch

Many turf managers experience a hydrophobic layer 4-6cm thick just below the thatch layer. It often occurs in conjunction with or near fairy rings. The hydrophobic layer is caused by organic wax and protein based hydrophobins excreted by fungi that coat the soil particles making the soil hydrophobic. The bacteria in Aquacept are chosen for their ability to digest the protein and waxes and out-compete the fungi for nutrient, removing the cause of the problem.

Simply activate the microbes in lukewarm water, tine to the depth of the hydrophobic layer, mix the solution with a wetting agent e.g. Symbio Supa Yucca and apply with enough water to get even distribution into the hydrophobic layer.

Pack size **5 kg**

Symbio Incision maintained soil moisture at target levels throughout the very hot dry summer of 2014. Incision ensured healthy grass cover on areas which historically have been too dry to support grasses, regardless of wetting agents and intensive irrigation.

Martyn Gray
Deputy Head Keeper, Bramley Golf Club

Water removal, CEC and oil spill remediation

SYMBIO TRACEOLITE

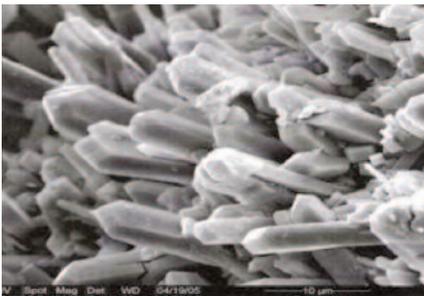
A long lasting mineral, TraceOlite is a natural zeolite, packed with trace elements, with unique physical, chemical and cationic exchange properties. (130 - 270 meq/100gm).

- Boosts cation exchange capacity (CEC), re-mineralises poor soil
- Holds over 40% of its weight in water
- Prevents water logging, hardens soft playing surfaces, extends winter play
- Dramatically reduces fertiliser leaching and chemical run off
- Reduces grow in time and maintenance costs of new constructions

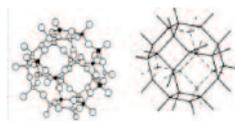
APPLICATION

To increase Cation Exchange Capacity. Apply 1-10 tonnes per hectare.

To firm and dry wet playing surfaces. Apply 2-10 tonnes per hectare, either via fine holes or mixed with top dressing.



Zeolite (Phillipsite) showing massive internal surface area under an electron microscope



TraceOlite's three dimensional lattice allows for a very high cation exchange and water holding capacity

OIL SPILL MANAGEMENT

SYMBIO OIL REMOVER

EVERY TURF MANAGER SHOULD HAVE OIL REMOVER ON STANDBY

Oil spills are a fact of life. Symbio **Oil Remover** makes you prepared for immediate action. Simply mix Oil Remover in a bucket of water, brush or drench the affected area and the enzymatic and surfactant action will break down the oil to water soluble elements and nutrient. For use on grass and hard surfaces 1Kg treats up to 1,000m².

SYMBIO OIL DEGRADER

FOR LARGER SPILLS WHEN THE ROOTZONE IS CONTAMINATED WITH OIL

Powerful oil degrading bacteria convert oil to carbon dioxide and water in weeks. Simply drench the contaminated rootzone with **Oil Degradar**, repeat weekly until the smell of oil has gone and it is safe to overseed.



Oxygen Transfer Technology

SYMBIO LIQUID AERATION

A REVOLUTIONARY PRODUCT THAT OXYGENATES THE ROOTZONE AND THATCH LAYER ENCOURAGING HEALTHY SOIL MICROBE AND PLANT GROWTH IN COMPACTED, OXYGEN STARVED ROOTZONES.

- Eliminates anaerobic black layer
- Combats the effects of squidge, water logging and compaction
- Encourages the breakdown of thatch
- Substitutes physical aeration in wet conditions
- Increases the uptake of applied nutrients for rapid growth
- Encourages healthy microbial activity in the rootzone
- Friable rootzones retain water when dry, and drain faster when wet



APPLICATION

2.5L – 5L per hectare in 400-600 litres of water. Liquid Aeration may be mixed with most biostimulants and fertilisers. If the anaerobic layer is deep in the root zone, the best results will be obtained by tining to the anaerobic layer before spraying to allow the liquid to penetrate quickly through the rootzone to the affected layer.

Pack sizes **1 litre, 5 litres**



Before Liquid Aeration

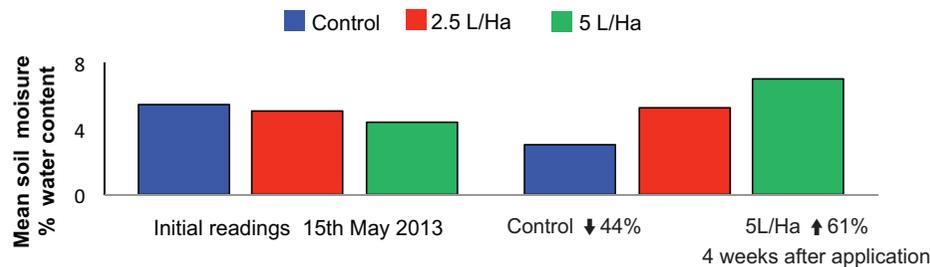


3 weeks later

Thatch reduction and rootzone improvement on a 10 year old USGA specification rootzone before and 3 weeks after application of Symbio Liquid Aeration

Showing thatch reduction, improved friability and improved drainage

Improved rootzone friability and water retention in drought conditions



Trial conducted by G. Giadina. University of Surrey

“After the prolonged rainfall experienced in the area many courses were suffering the ill effects of waterlogged greens, Liquid Aeration plus Symbio Seaweed 50% immediately gave the greens a new lease of life which allowed uninterrupted play into the winter.”

Sam Wardill
Head Greenkeeper, Meltham Golf Club

Disease, Fairy Rings, Root Feeding Nematodes and Dry Patch.

These are all symptoms of microbially deficient soil and weak grass when non beneficial microbes have colonised your sward, thatch layer and rootzone.

Symbio helps you create a supportive natural environment for fine grass. Symbio does not supply pesticides but develops an active soil food web that defends the grass against disease and drought stress. By creating healthy soil as part of an IPM programme you will substantially reduce the need for pesticides.

SYMBIO LIQUID FUNGIBOOSTER

Liquid Fungal inoculant

- Accelerates recovery from fairy rings and disease
- Promotes the establishment of fescue, bent and rye grasses
- Increases active fungi to improve root mass and nutrient uptake
- Increases the plants natural defences against drought and disease stress
- Prevents fungal dry patch



Fungi Booster is a unique blend of five beneficial soil fungi essential for thatch degradation and humus production, grass root growth and stress recovery. It may be applied monthly or used to spot treat affected areas.

Pack size **2 litres**

“With regular spot treatments of Symbio Fungi Booster and Aquacept, fairy rings and the associated dry patch disappeared within 14 days.”

Rob Boyce
Course Manager, Links Golf Club

DISEASE AND DRY PATCH PREVENTION AND REPAIR

SYMBIO PHYTOGRO 0.0.18

3 in 1 Biostimulant, Hormone Stimulant, Penetrant with Foliar Potassium

- For the prevention of dry patch and disease scarring
- Rapidly repairs dry patch and disease scarring especially snow mould and fusarium
- Stimulates hardy spring and autumn growth, increases cell production
- May be used as a treatment or a preventative

Symbio PhytoGro 0.0.18 employs a unique combination of: Fatty Acids, Fruit Acids and Vitamins wetting agent/penetrants and foliar potassium 0.0.18. The biostimulants increase cell growth and plant hormone production, wetting agents aid water penetration and dispersal and foliar potassium citrate improves photosynthesis, stomatal function and cool season growth.

Apply monthly in spring, late summer and autumn

APPLICATION AND TIMING

PhytoGro's 3-in-1 formulation strengthens the plant against disease, drought stress and helps reduce waterlogging. It may be applied at any time soil temperature is above 6°C. For best results apply monthly from late summer until the grass stops growing and as soon as the soil temperature goes above 6°C in spring.

Pack size **10 litres**



“In May significant root knot nematode damage was evident. We applied 3 applications of Root Repair which restored root growth and increased root depth.”

Brett Cox
Course Manager, Welwyn Garden City Golf Club

BIOSTIMULANTS

Symbio MycoForce



SYMBIO ROOT REPAIR

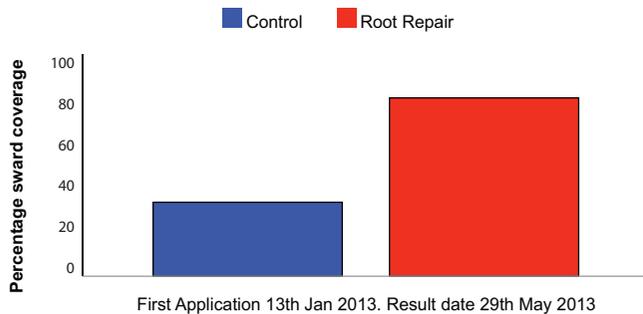
FOR RAPID REPAIR OF NEMATODE DAMAGE AND INCREASED FROST TOLERANCE

A new biostimulant containing complex carbohydrate, chitin and amino nitrogen.

- Promotes balanced soil biology for rapid recovery from nematode damage
- Improves resistance to frost damage
- Stimulates photosynthesis for improved growth
- Stimulates phytoalexin production for improved stress and disease resistance
- Biostimulant for fungi, bacteria and beneficial nematodes



Root Repair increase in frost damaged sward coverage



Trial conducted by G. Giadina. University of Surrey

SYMBIO PHOSPHITE NPK 7.30.11

HIGHLY CONCENTRATED LIQUID FERTILISER FOR PLANT HARDENING AND STRESS RELIEF

- Rapidly available source of phosphate, especially in mycorrhizal plants
- Increased energy transfer within the plant
- Rapid absorption from foliar or root application
- Stimulates and supports plant defence mechanisms
- May be tank mixed with many biostimulants and fungicides
- Complements the action of calcium, magnesium and iron

Symbio Phosphite is a fast acting liquid fertiliser containing highly mobile phosphite (PO_3) molecules, rather than the usual phosphate (PO_4). Its effect is to increase the rate of energy transfer within the plant, resulting in increased root and shoot growth.

Phosphite is highly mobile and may be applied as a foliar spray, tank mixed with fungicides or Fulvic Booster, or via the roots as a soil drench.

It also stimulates and supports natural plant defence mechanisms because natural phytoalexin production is maximised when ideal nutrition is provided.

APPLICATION RATE

5-10 litres of Symbio Phosphite in 200-300 litres water as a foliar spray or 400-600 litres water as a soil drench.

Biological treatment for problem lakes and ponds

Good water quality is essential for irrigation and the pleasant appearance of water features and lakes.

Symbio's biotechnology restores and manages healthy aquatic ecosystems at a fraction of the cost of chemical treatments and dredging.

SYMBIO BLUEWATER

TREATMENT FOR PROBLEM LAKES, PONDS & WATER FEATURES

- Prevents the growth of blanket weed and unicellular algae
- Helps to prevent green and cloudy water
- Reduces organic silt build-up
- Eliminates odour problems
- Non-chemical, safe for fish

ACTION

Symbio **BlueWater** is a natural formulation of bacteria, enzymes and buffers contained in a water-soluble sachet. The bacteria in BlueWater use the nitrates and phosphates that feed algal growth as their own food source, starving the algae and reducing algal growth. Other bacteria break down and mineralise the organic solids from fish and waterfowl excreta and decaying plant material that results in cloudy water, sludge build-up and foul odours.

APPLICATION

Symbio BlueWater is supplied in a 225gms sachet for larger lakes and ponds. The sachets are water-soluble. Just throw the required number of sachets evenly around the lake.

DOSAGE

For larger water bodies: Apply 1 x 225gms BlueWater sachet per 800m³ (176,000 gallons) per week through the algae growing season when water temperature is above 10°C.

For smaller water features and fishponds:

Apply 1 x 25gms scoop of Symbio BlueWater Junior per 25m³. (5,500 gallons) once every 2-3 weeks.

ECOLOGY

BlueWater is harmless to aquatic life and to rooted plants. BlueWater creates a less stressful environment for fish and amphibians.



Before



After

Before and after applying Symbio BlueWater

“Using Symbio Blue Water is the most effective and economic way we have found of keeping our angling lake free of blanket weed having tried all other available methods.”

Tony Little
Area Parks Officer
Southend Borough Council

SYMBIO AQUABLUE

- Colourant for ponds and lakes
- Reduces algal growth
- Reduces the growth of submerged aquatic plants
- Complements the effects of BlueWater sachets

ACTION

Symbio **AquaBlue** is a highly concentrated blue vegetable dye which filters out the wave lengths of light that promote photosynthesis, this reduces algal growth whilst creating a more aesthetically pleasing water feature.

APPLICATION

AquaBlue should be added to ponds and lakes at several different locations to ensure even distribution. For smaller water features, it is advisable to pre-dilute a small volume of AquaBlue in separate container to avoid accidental overdosing.

If you are unsure of water volumes or desired colour intensity, add a small volume of AquaBlue; allow to disperse and re-apply until the desired colour intensity is achieved.

DOSAGE

AquaBlue is typically applied at a rate of 1 litre per 5000m³ – 7500m³ of water (1.1 million – 1.7 million gallons). The colouration will remain for several weeks and can be topped-up as required.

Notes: AquaBlue will not stain birds or fish when used at the recommended rates although it is advisable to avoid dosing the product close to swimming waterfowl. AquaBlue will not disrupt fishing, swimming or irrigation once the product has dispersed throughout the entire water body. **AquaBlue should only be used in closed water systems.**

“Using Blue Water over the last five years has enabled me to provide a much better service for my customers by keeping their ponds and lakes algae free all year. I wouldn’t hesitate to recommend Blue Water to anyone.”

Tim Soane
Managing Director,
Clearwater plm



Remove problem blanket weed and green algae.

SYMBIO LAGOON

Restores polluted lakes and lagoons

- Restoration of neglected ponds and lakes.
- Restoration of surface waters after oil or chemical spills.
- Non Invasive organic silt reduction in heavily silted lakes.

ACTION

The microbes fixed in Symbio Lagoon degrade organic silt, and pollutants and utilise available nitrate and phosphate preventing growth of algae and blanket weed.

APPLICATION

Symbio Lagoon is applied direct to the water, silt or sludge.

DOSAGE

Lagoon is usually dosed at a rate of 3-5 tonnes per hectare, depending on the problem to be treated. The bioremediation programme is determined after analysis of the silt and water by Symbio’s technical team.



Tree and Plant management

Symbio MycoForce provides all the biological support systems the plant needs to survive in its new environment and grow from day one in its new environment.

Plants grown in a nursery in sterile growing media with managed water, fertiliser and fungicide inputs often remain dormant for a year or two or even die when transplanted to the natural environment.

SYMBIO MYCORRHIZAL TRANSPLANTER

FOR CONTAINERISED AND ROOTBALLED TREES AND SHRUBS

- Improves transplant survival rate
- Accelerates growth rates
- Reduces need for fertiliser and fungicide
- Increases resistance to stress and disease

AN ENDO (VAM) AND ECTO MYCORRHIZAL INOCULANT CONTAINS

Endo Mycorrhizal species – *Glomus clarum*, *G. intraradices*, *G. mosseae*, *G. deserticola*, *G. monosporum*, *G. aggregatum*, *G. etunicatum*, *Gigaspora margarita*, *Paraglomus brassilianum*. Ecto Mycorrhizal species – *Pisolithus tinctorius*, *Rhizopogon sp.* Plus beneficial soil bacteria and fungi.

APPLICATION

3gms per 2-3 litre rootball then add 1gm for every extra 1 litre of rootball size. The object is to get an even coating of mycorrhizal spores over the young feeder root system on the outside of the rootball.



Acer plant on left grown with 50% fertiliser and Mycorrhizal Transplanter



Sitka spruce on left grown with Mycorrhizal Transplanter

SYMBIO MYCORRHIZAL WHIPDIP

FOR BARE ROOT AND FEATHERED TREES AND SHRUBS

- Improves transplant survival rates
- Accelerates growth rates
- Reduces need for fertiliser and fungicide
- Increases resistance to stress and disease

An endo (vam) and ecto mycorrhizal inoculant for almost all* whips, bareroot trees, shrubs, seedlings, cuttings and small containerised plants. Easy to apply as a root dip just before planting.

CONTAINS

Glomus clarum, *G. intraradices*, *G. mosseae*, *G. deserticola*, *G. monosporum*, *G. aggregatum*, *G. etunicatum*, *Gigaspora margarita*, *Paraglomus brassilianum*. Ecto Mycorrhizal species – *Pisolithus tinctorius*, *Rhizopogon sp.* Plus beneficial soil bacteria and fungi. Additional sachet of swell gels. WhipDip is made into a paste with the water retaining polymers supplied.

APPLICATION RATE

The object is to get an even coating of mycorrhizal spores over the root system. Add one 300g sachet of MycoForce to 6-10 litres of water, add polymers, mix and leave for a few minutes until the mixture has the consistency of wall paper paste then dunk bare roots until coated in gel. 300gms will be enough for approx 660 bare root trees or 2000 - 3000 seedlings depending on size of root. (Use less water for seedlings).

* Endo and ecto mycorrhizal inoculants benefit most plants except ericaceous species, brassicas, orchids and some annual plants.



Technical support from Symbio has been consistently excellent since I began using their products. The Sales Managers are extremely knowledgeable and have always been available to give sound advice when required.

Jason Hatton
Golf Course Manager
Arkley Golf Club

ANALYTICAL SERVICES

Ensure you have the correct balance of biology, physics and chemistry for soil and plant health.

Soil, Compost and Compost Tea Analysis. Soil Food Web Analysis for Fungi, Bacteria, Mycorrhizae, Nematodes and Protozoa

Total Bacteria	Measure total bacterial biomass and compares it to optimal bacterial biomass for the grass or plant.
Active Bacteria	Measures the % of the bacteria actively metabolising organic compounds and nourishing the plant.
Total Fungi	Measure total fungal biomass and compares it to optimal fungal biomass for the grass, plant or crop.
Active Fungi	Measures the fungi currently growing and metabolising nutrient to feed the plant. Check to see if you have beneficial or pathogenic fungi.
Fungal:Bacterial Biomass	Measure the effective ratio of bacterial:fungal biomass and compares it to the ideal ratios for your plants.
Protozoa	Measures total flagellates, ciliates and amoeba. These large single celled organisms eat bacteria and excrete ammonium to feed the plant.
Nematodes	A very large group of small worms, that make nitrogen available to the plant. We count the number and identify them to genus and function.
Mycorrhizal Colonisation	Checks roots for percentage mycorrhizal colonisation.
Qualitative Analysis	A visual scan to see if bacteria, fungi, protozoa and nematodes are present in excellent, good, adequate or poor numbers.

Physico Chemical Soil Analysis

Standard Soil Analysis	pH, available phosphorus, potassium, magnesium, iron, sodium, calcium, sulphate, Cation Exchange Capacity and % Organic Matter.
Complex Soil Analysis	As above plus boron, copper, zinc, manganese.
Conductivity	Measures the total salt index in the soil.
Granulometry	Check your soil against the specifications needed for your sport or plant.

Plant Analysis

Leaf surface assay	Measures the bacteria and fungi on the leaf – an important test for disease management.
Tissue Analysis	Measures the macro and micro nutrients taken up by the plant

Water Analysis for Irrigation, Lake, Pond and River Management

General	pH, BOD, COD, suspended solids, conductivity, hardness as calcium carbonate, turbidity, bicarbonate and alkalinity.
Nutrients	Nitrate, nitrite, organic nitrogen, ammonia, phosphate, sulphate, potassium, silicates and chloride.
Metals	Magnesium, calcium, iron, lead, zinc, cadmium, chromium, copper, nickel, barium, strontium, boron, aluminium, sodium and manganese.
Microbiological	TVC for coliforms, E.coli and faecal streptococci, salmonella, legionella

Silt Analysis

General	Total solids, total organic carbon and dissolved organic matter plus hydrocarbons.
Nutrients	Nitrogen, phosphorus plus others as required
Metals	Iron, lead, zinc, plus other metals if required.

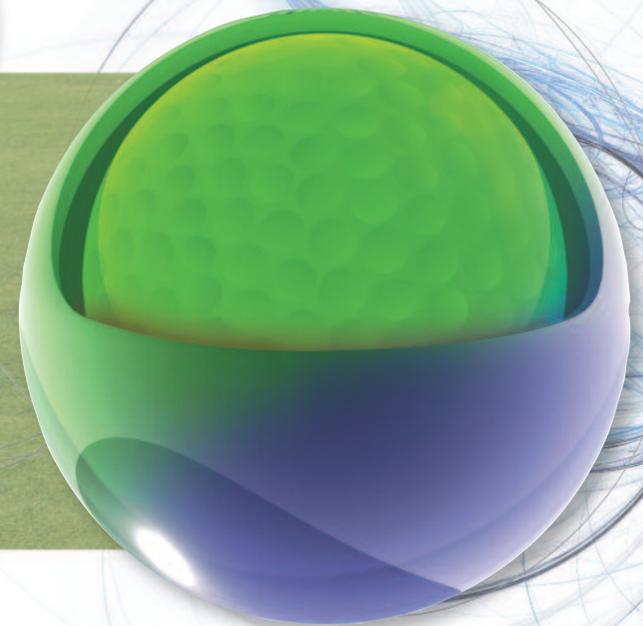
Disposal

As required to determine silt disposal options



Your Symbio technical advisor will help you decide on the analysis you need and arrange for sample collection, analysis and interpretation of the results. The results will be used to formulate a management plan to give you the results you want.

www.symbio.co.uk



SYMBIO

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