



Soil-Zyme™ - Est. 1996

Bio-Chemical Soil Renovator

Soil-Zyme™ is a powerful, highly concentrated bio-chemical soil renovator designed for the turf and horticulture industries. Its advanced enzyme technology uses specially selected enzymes to biologically re-invigorate degraded soils. The enzymes stimulate and enhance existing soil bacteria to treat a wide range of soil ailments and plant diseases. It is not an amicrobial inoculant because it contains no actual living organisms of its own.

Soil-Zyme™ is for use on golf courses, sporting fields, bowling greens, parklands, nurseries, turf-farms, gardens or in any horticultural situation where an effective, environmentally responsible and economical alternative to traditional soil management practices are required.

HOW & WHY IT WORKS

Enzymes are proteins within bacteria. The enzymes used in **Soil-Zyme™** are extracted from high quality aerobic bacteria cultures using a multi-stage fermentation process.

When **Soil-Zyme™** is applied to turf, the powerful solution penetrates beyond any hydrophobic soil near the surface, thatch and mat layers below. Local or existing soil bacteria absorb the new enzymes and when they reproduce, the new bacteria inherit within them an exact copy of the enzyme from **Soil-Zyme™**. Hormones within **Soil-Zyme™** then further accelerate bacterial multiplication to around 50 times the normal rate. The result is a massive population explosion of aerobic soil bacteria which has been observed at over 600 times pre-existing numbers two weeks after application.

Soil-Zyme™ enhancement of aerobic bacteria also provides the bacteria with a more efficient digestive tool than their own. This enables the aerobic bacteria to consume and decompose organic matter at a much higher rate, which before only fungi could consume slowly. The massive increase in numbers of the enhanced aerobic bacteria sets up a feeding frenzy in which the bacteria look for any suitable food. The aerobic bacteria attack anaerobic bacteria, hydrocarbons, chemical residues (all contributing causes of black-layer), fungi spores (cause of diseases and hydrophobic soil) and plant lignin contained in thatch. The soil is being composted. As the process cleans the soil it also unlocks many other nutrients in the soil that would otherwise be unavailable to the plants. **Soil-Zyme™** also de-compacts soil and encourages deeper & more efficient root systems reducing the plant's dependency on irrigation and fertiliser.



6 WEEKS AFTER APPLICATION

WHAT IT CONTROLS & HOW

Soil-Zyme™ is recommended for the control of the following soil and turf related problems. Improvements can be observed in 1 - 2 weeks from time of application.

Surface Algae & Moss

Grass growing in moist or humid conditions with low light intensity and poor drainage is usually plagued with either or both of these conditions, particularly in situations where plenty of nutrients is available. **Soil-Zyme™** quickly decomposes algae plants into carbon and eliminates any new spores in the soil. Often algae or moss growing on the surface is an indication of other problems developing beneath the surface.

Excess Thatch

Thatch is an accumulated layer of dead and decaying stolons, rhizomes and clippings immediately below the surface. It is often hydrophobic and results from the inability of soil fungi to break down and decompose plant lignin present in dead plant matter at a rate faster than plant lignin is produced. Decomposition of lignin is always a very slow process, achievable only by fungi in the soil. When turfgrass is under intense management pressure to perform at high levels, it produces plant material at a faster rate than the soil fungi can decompose it. Bacterial decomposition is extremely rapid by comparison and soil bacteria enhanced with **Soil-Zyme™** completes the process of thatch decomposition far more efficiently and can reduce, or even eliminate the need for disruptive mechanical renovation.

Fungal Diseases

Symptoms of most fungal diseases appear on or near the surface. Once diseases have manifest in their respective observable forms the grass will have either already died or declined beyond recovery. If disease pathogens are already present, the **Soil-Zyme™** bio-activation process will quickly consume them and stimulate the grass re-growth into the affected areas quickly. Prevention is better than cure with fungal disease and regular treatment with **Soil-Zyme™** will enable the local soil bacteria to keep fungi in balance and prevent diseases from re-establishing.

Hydrophobic Soil

Waxy coatings surrounding fungal spores are the major cause of water repellent or hydrophobic soil in organically rich soils. **Soil-Zyme™** helps moisture to penetrate and weaken the waxy coating surrounding fungal spores. As the local aerobic bacteria become enhanced with enzymes from **Soil-Zyme™** they are able to completely break down the waxy coating and attack and kill the spore inside. This is a more permanent way to control dry patch than spraying it with surfactants that need to be added regularly. Use of surfactants merely displaces the wax and grease to lower levels in the soil. Surfactants cannot eliminate the cause but rather reduce the symptoms near the surface temporarily, eventually causing the soil to tighten up and compact.

Soil Compaction

As the bacterial breeding and organic decomposition process accelerates, it breaks down bondage agents such as grease and wax, and produces very large amounts of carbon di-oxide (CO₂). Increased CO₂ pressure, lifts the soil (like dough rising with yeast). **Soil-Zyme™** activates aerobic bacteria, drawing more oxygen from the atmosphere to fuel the process as carbon di-oxide production increases thus aerating and de-compacting soil. Gas exchange rates are raised to around 6 cubic metres per square metre, per minute for a period of about 4 weeks after application. When used as directed, **Soil-Zyme™** will reduce and often eliminate the need for disruptive and expensive deep soil maintenance practices such as coring and verti-draining.

WHAT IT CONTROLS & HOW - Continued...

Black-Layer

Black-layer is a layer of accumulated grease, waxes, fungal residues and sulphide deposits in an anaerobic (oxygen-less) environment. It is observable anywhere between 25 to 250 mm below the surface. Anaerobic bacterial decomposition from black-layer gives off methane and hydrogen sulphide gas, both of which are antagonistic to plant growth and acidify the soil. Hydrogen sulphide gas is what causes the noxious odour associated with black-layer.

As **Soil-Zyme™** makes its way down through the soil and the enzyme enhanced bacteria breed more rapidly, they consume all foreign elements they come across including anaerobic bacteria and the materials mentioned above which accumulate to form black-layer. The process aerates the soil and continues deeper until all the anaerobic bacteria and residues have been reduced to humic acid. With the removal of methane and hydrogen sulphide gasses the soil pH returns to normal and grass roots are able to penetrate deeper as a result.

Humic Acid

The end product from aerobic bacterial decomposition in soil is organic carbon or humic acid. This base element is essential for healthy plant growth and proper nutrient assimilation.

This Bermudagrass bowling green is located in the tropical north of Western Australia. The grass growth is spindly and not responding to fertiliser. There is evidence of dead or dormant grass and the subsoil has black layer & is severely stratified. This green was due for replacement before the **Soil-Zyme™** programme. Four weeks after first application of **Soil-Zyme™**, the green has almost completely recovered. Black layer, algae & disease are eliminated & grass has filled in the gaps. It still has a way to go before play can resume, but it saved the club some considerable expense.



No response to conventional treatment was observed before **Soil-Zyme™** was applied to this Bermudagrass bowling green in Western Australia. Surface algae & sparse growth are indicators of severe soil degradation & problems beneath the surface. The soil was hard and compacted with evidence of recent renovation attempts, visible in the flail lines.

Soil-Zyme™ transformed the surface and alleviated compaction and algae in 4 weeks without additional fertiliser, by releasing residual fertiliser and nutrients previously not available to the grass.



UNIQUE FEATURES

Unlike inoculated biological soil management products, **Soil-Zyme™** contains no actual living bacteria or organisms of its own. This is a great advantage to turf managers & farmers because it does not require special storage facilities, nor does it have to be applied before or after daylight. There is no possibility of introducing bacteria cultures that are often hostile to local microbe populations. There is no wastage or time lag whilst added microbes adjust to a new environment.

Soil-Zyme™ simply assists the local or indigenous microbes to perform at levels far in excess of their normal capability, so you see more effective results more quickly. The concentrate is easily diluted with water and applied with conventional spraying equipment or through irrigation.

RATE OF APPLICATION

Between 3.5 to 7 Litres per hectare (35-70ml per 100M²). Instructions provided on request.

Soil-Zyme and Bioactivator trials					
North					
PLOT 3 Soil-Zyme			PLOT 2 Bioactivator		
PLOT 4 Bioactivator			PLOT 1 Soil-Zyme		
Thatch layer in mm					
Date	1	2	3	AVG	Reduction
PLOT 1					
20 May 2003	38	38	34	36.7	
4 June 2003	22	24	22	22.7	14 (38.1%)
PLOT 2					
20 May 2003	37	40	38	38.3	
4 June 2003	29	25	32	28.7	9.6 (25 %)
PLOT 3					
20 May 2003	33	37	39	36.3	
4 June 2003	24	26	20	23.3	13 (35.8 %)
PLOT 4					
20 May 2003	34	37	35	35.3	
4 June 2003	22	22	27	23.7	11.6 (32.8 %)

Trails were conducted in South Africa, by Eric Taylor



4 WEEKS AFTER APPLICATION



5 WEEKS AFTER APPLICATION

HEATHRIDGE

BEFORE

AFTER



HEATHRIDGE

BEFORE

AFTER



KINGSLEY

BEFORE

AFTER



KINGSLEY

BEFORE

AFTER



PENISTONE

BEFORE

AFTER



PENISTONE

BEFORE

AFTER



SCOTCH COLLEGE TESTIMONIES



To whom it may concern

The Scotch College playing fields, located in Swanbourne Western Australia, are over 100 years old and are situated on top of an old swamp site filled over the years with various soil types ranging from beach sand through to lateritic clay. It is the lowest point in the surrounding area so the collection area for substantial runoff from road ways and natural bush land. This presents significant drainage issues resulting in anaerobic soil conditions.

The grounds department started using **Soil Zyme** approximately 10 years ago in response to treating an anaerobic black layer approximately 8 inches below the surface. Cultural methods were used but appeared to have little impact so Soil Zyme was applied at recommended rates and had an almost immediate response clearing this layer and eliminating general soil layering throughout the profile. After 6 – 8 weeks the soil became much more friable significantly improving drainage and relieving compaction. The turf show a much better response to nutrient applications which were significantly reduced due to nutrient release by increased microbial activity.

After about 4 years of use, applications of Soil Zyme were stopped and over the next 4 years the soil condition returned to close to anaerobic conditions. Since the commencement of applications 2 years ago, both soil and turf vigour returned and Soil Zyme is now used as an important maintenance and remedial tool in our programs. I would highly recommend turf managers use Soil Zyme to correct soil conditions or use it as a preventative maintenance tool as it is a proven product which uses natural processes in reducing the use of fertilizers, chemicals and de-thatching programs which saves both time and money.

Alan Brown
Grounds Manager
Scotch College
Western Australia

TESTIMONIAL

My name is Alan Brown and I am Head Groundsman at Scotch College in Perth W.A.

I started using Soil Zyme approximately 2 years ago in response to a fungal and algal build up in the soil. This resulted in poor turf vigour, poor response to wear and a shallow root system.

An inspection of the soil showed anaerobic layers present with little microbial activity. Soil Zyme was applied at the recommended rate, initially 10L / Ha and lightly irrigated to prevent any possible leaf burn.

An application two weeks prior of 100ka / Ha of a broad spectrum fertilizer was made, cores were taken at approximately 1 month intervals after the application. Over a 6 month period showed and marked improvement with little fungal or algal activity present. The layering present on the initial inspection had all but disappeared, this promoting an obvious increase in root depth.

The flow on effect was healthy and more robust turf sward, which during the following summer required less irrigation to maintain the same quality. Subsequent application at reduced rates maintained the microbial activity which inturn improved drainage in heavy soils.

I would definitely recommend Soil Zyme for control of fungal and algal problems in turf particularly where microbial activity requires stimulating.

Alan Brown

Head Groundsman
Scotch College

AQUINAS COLLEGE TESTIMONY



Steve Burke, Head of Grounds at Aquinas College is an enthusiastic supporter of Soil Zyme. Prior to the use of Soil Zyme, this turf area under the trees was difficult to establish. By incorporating Soil Zyme into the establishment program, this previously difficult area has been covered with a strong sward.



At Aquinas College the incorporation of Soil Zyme into the maintenance program has helped to present the turf on the College's main playing field in a uniformly green and vigorous sward.

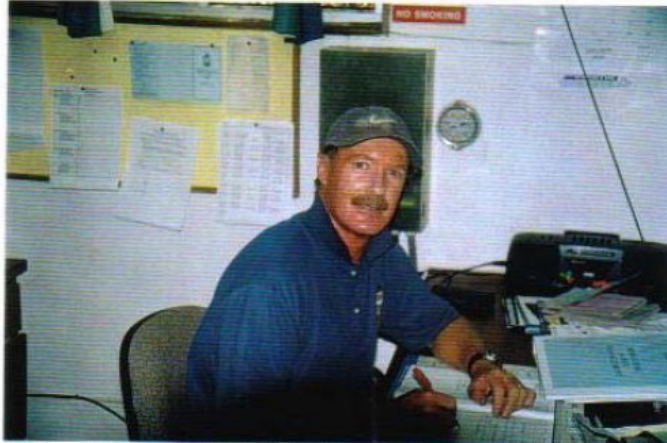
HALE SCHOOL TESTIMONY

Hale School

Hale School Head of Grounds, Mike Daley is a big user of Soil Zyme. Hale School has a lake with a capacity of five million litres. The lake is filled with water from bores that is fed into the lake by an artificial cataract. Twice each year - in October and in January Mike mixes 75 litres of Soil Zyme into the water running down the cataract. Since the lake is used for irrigating all of the turf and gardens at the school, the entire irrigated area at the school is treated with Soil Zyme twice each year.

The benefits of including Soil Zyme in the school's grounds maintenance program are listed by Mike as:

- Improved wetting of turf and garden soils
- More vigorous growth of both turf and gardens
- Better colour of lawns and garden plants
- A more uniform quality appearance.



Mike Daley, Head of Grounds at Hale School makes two applications of Soil Zyme each year by adding 75 litres of the product to his irrigation lake from which all turf and gardens are watered.



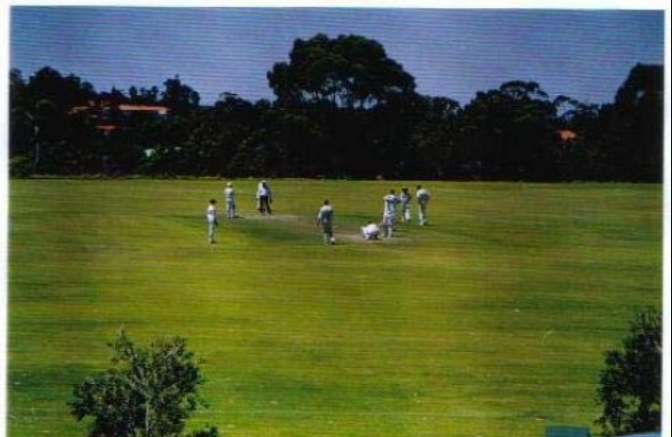
All turf areas at Hale School are treated with two applications of Soil Zyme each year. Amongst the list of benefits cited, improved uniformity of growth and colour is an important aspect in the presentation of the grounds to a prestige



A five million litre lake at Hale School is used as a water storage from which all of the School's turf and gardens are irrigated. In October and January of each year, 75 litres of Soil Zyme is added to the lake so that all irrigated areas benefit.



All turf and garden areas at Hale School are managed with Soil Zyme making up part of the grounds management program. The inclusion of Soil Zyme is attributed to the good colour of both turf areas and of garden beds.



Renowned for its quality as a sporting surfaces, the turf at Hale School benefits from easier wetting and more vigorous growth attributed to Soil Zyme.

BALI GOLF AND COUNTRY CLUB TESTIMONY



Bali Golf and Country Club

In regard to: **International Rehabilitation and Soil Stabilisation Services of 42/19 Joseph St, Maylands Western Australia**

Bali Golf and Country Club have a number of unique Environmental problems due its location and design. One of the main problems has been our Lake (3ha Surface area, 2m deep).

To solve the problems we are engaging the service of Jan Tschierschky from International Rehabilitation and Soil Stabilisation Services (IRASSS).

So far the advice and service given has been good, cost effective and simple to implement. Without hesitation do I recommend IRASSS to any one with unique Environmental problems.

Yours faithfully,

Mark S. Isley
Superintendent
Bali Golf and Country Club

CURTAIN UNIVERSITY TESTIMONY



A general view of a replicated plot trial being conducted by *Sports Turf Technology* at Curtin University.

- The plots are on an area of couch grass maintained like a golf course fairway.
- All of the plots receive the same management in terms of mowing, renovation, irrigation, fertilisation and weed, pest and disease control.
- Half the plots are treated with Soil Zyme and half the plots act as control plots and have not been treated with Soil Zyme.
- The picture shows the dark green colour of plots treated with Soil Zyme compared with the dull green colour of those plots not treated with Soil Zyme. The picture was taken just two weeks after treatment.



In research trials conducted by *Sports Turf Technology* at Curtin University, Soil Zyme treated plots produced dramatic improvements in colour in less than a week. This picture shows a Soil Zyme treated plot surrounded by untreated turf.

KINGS PARK & BOTANIC GARDEN TESTIMONY



International Rehabilitation and soil Stabilisation Services
42/19 Joseph Street
Maylands 6051

Dear Jan,
In reference to the product you market called 'Soil Zyme'

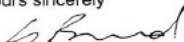
As you are aware the Botanic Gardens has been using this product for the past 18 months and would like to register our satisfaction with the field results.

The parkland grasses in the Botanic Gardens have approximately been established for 30 years with little to no lawn care work done on them apart from watering/mowing and very basic fertilising programme.

The problems we were encountering consisted of areas of grass losing vigour, going yellow and dying. The effected areas looked to have a black compost type appearance on the surface and symptoms indicating that the cause of decline was induced by fungal problems. These problems were most obvious during the autumn months. Their response to fungicidal treatment and fertiliser/water application was very minimal.

With the application of 'Soil Zyme' as per the accepted method, the treated areas began to slowly come back. We sped the process up by reseeded. The seedbed was suitable and vigorous growth took place. We continue to have problem spots appearing and treat them with 'Soil Zyme' as soon as we see any lawn yellowing with the previously described symptoms. This has proved very successful on our Kikuyu based lawn and we are very happy with the results that have been achieved by Soil Zyme.

Yours sincerely


Grady Brand
Curator Collections and Displays

HONG KONG GOLF CLUB TESTIMONY

The Hong Kong Golf Club



SOIL-ZYME TESTIMONIAL

To Whom It May Concern

February 8, 2000

I was introduced to Soil Zyme about 18 months ago after I started with this club. At that time the bermudagrass greens at HKGC were in need of some serious attention and had deteriorated because of persistent algae and disease problems. Many attempts, including regular intensive verticoring and using various products which were recommended had failed to address the problem and the greens were about to be resurfaced.

Only a few weeks after having trialed Soil-Zyme on a badly affected green, I was pleasantly surprised at the recovery. The soil has become better drained and the blacklayer had disappeared along with the algae. The bermudagrass has become greener, denser and more vigorous.

I now use Soil-Zyme in my regular management program and have recognised it as an integral part of any quality turf management program, particularly in the tropics. My fertilizer and chemical use has reduced significantly and the root depth of the bermudagrass is increasing allowing longer periods between irrigation in dry spells. This in turn has reduced disease.

I no longer have plans to physically replace any greens which have deteriorated. I now have the confidence that this product does the job biologically. Soil-Zyme has definitely made my job a lot easier.



Shane Templeton
Course Manager
The Hong Kong Golf Club

EL CABALLO GOLF COURSE TESTIMONY

Overcoming Super Challenges

Jeff Austen, superintendent at El Caballo Golf Course for the past eight years, is a young, award-winning professional with plenty of work on his plate.

The El Caballo course is an 18-hole layout about 60km east of Perth, in the heart of some of the harshest and most drought-affected territory in Australia. The landscape is severe and hostile — a far cry from the more manageable terrain of Royal Perth Golf Club where Austen served his apprenticeship from 1986–1991.



Built on the side and top of a hill in the Darling Ranges, El Caballo must withstand temperatures ranging from 47 C in summer to -3 C in winter; cold snaps in 2001 produced 48 frosts.

This unique and forbidding course is characterised by 3kms of open rock drains, 12 lakes, two storage dams and 10 effluent treatment ponds, all clustered within a high-salt area that requires constant attention. About half of the water features are currently bone dry. Despite the obvious climatic and environmental hurdles facing him, Austen has somehow managed to create a course that is not only playable, but which also offers golfers the prospect of enjoying challenging golf in healthy surrounds for many years to come.

The uniqueness of the course rests squarely on its exceptional location.

"The golf course was originally built to cater for the discharge of effluent water from two sheep and cattle abattoirs (now closed)," Austen explains. "The water had high levels of salts and nutrients and proved to be very damaging to the original irrigation system. With the golf course being built on a rocky laterite and clay, this combination proved to be devastating on the local fauna and flora."

Austen's solution was to install sub-surface air injection units which reduced water temperatures from 30+ C to 22 C within a week.

These days the course is cleaner and more manageable than ever before. Tees of Windsor Green Couch about fairways decked with Greenless Park Couch and Saltene (a salt tolerant variety harvested from a local creek). Two greens varieties, Saltene and Santa Anna Couch, are used according to their respective salt and frost tolerances.

The Saltene greens are cored annually, though Austen has found that he "would prefer to mini-tine every 6 weeks during the growing season if I had the staff."

"The Santa Anna greens are scarified heavily during the growing season to reduce thatch, as it appears the salt tends to do more damage to the playing surface when thatchy.

"Fairways have only been scarified once since construction, again because of the saline conditions and the clay soil the turf grows in. I've found the use of a verti-drain has been extremely useful in promoting growth and reducing compaction."

Tees, last renovated years ago, are tended as required.

Austen and his staff of five cut the greens six times per week during the growing season. Fairways and tees are mown once per week as the moderate salt levels reduce growth. The couch roughs are mown monthly, "however in winter this picks up as we encourage winter grass to grow in roughs to create some definition."

Tees are fertilized every eight weeks, and greens are fed every three or four weeks with low-index salt fertilisers. Sparring use helps minimise disease.

The harsh conditions mean environmental sustainability is always forefront in Austen's mind. And ongoing education as fundamental to success.

"There is so much information available that without suitable training and experience you would be doing your employer a disservice and potentially harming the industry through mismanagement of chemical and fertilizing practices."

By John Power

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AUSTRALIAN MADE & OWNED

