Jonathan Harmer, Managing Director at Farmura Ltd, writes for GI

Bacteria, fungi and life in the soil

Bacteria, Fungi and life in the soil are suddenly mainstream topics. There is now keen interest by turf managers in more balanced and sustainable management programmes – a management style promoted by Farmura for over forty years!

Why has this occurred? Environmental legislation, withdrawal of chemicals, increasing cost of inputs including water – an increasingly scarce commodity for many.

There is also a growing desire to become more sustainable on the golf course from turf management through to wildlife and habitat conservation. The huge interest in the STRI Golf Environmental Awards, of which Farmura are one of the sponsors, demonstrates this. Finally a realisation that golf budgets are not ever growing but are now in real terms, at least for the foreseeable future, diminishing.

What then is balanced management?

We believe that best results are achieved by combining good cultural methods, organics and synthetics - no different than a doctor recommending exercise, meat and vegetables. The turf manager is the conductor, to use a musical metaphor, adjusting these to suit his situation. A links course will have different requirements to a new sand construction but the principles remain the same. Leading on from that there is a system dependency with a healthy plant needing healthy soil biology which in turn creates the soil which feeds the plant and so on. There is a clear symbiosis between the plant and the soil.

Balanced and Sustainable Management

This brings us on to one of nature's most amazing and yet taken for granted creations - the soil. We use it , abuse it and most of the time take it for granted and don't give it much thought. Yet the soil is where it all starts and is very much alive or at least it should be. Soil is a complex and dynamic living world of bacteria, fungi, yeasts, protozoa, algae worms, insects and a host of other organisms.

Peter Shaw head greenkeeper at Munchen Riedhof in Germany. In" Leading Courses of Germany" ranked no I over last 5 years. Farmura customer for over 35 years in UK and Germany

The statistics are staggering! Thirty grams of soil can have a surface area of two and a half hectares. The bacteria in a handful of soil can exceed the population of the world. There is more diversity in a handful of healthy soil than in the entire Amazon rain forest and up to thirteen thousand species of bacteria can be found in a gram of soil. A word of caution before you start counting however.

Amenity soils have a lower diversity and number of microbes due to lower organic matter, lower oxygen levels, a tendency to rapidly go anaerobic and the regular disturbance of turf maintenance, all of which promotes a lower number of a limited range of hardy bacterial species.

So what do soil microorganisms actually do? The primary activity is to break down organic matter. An interesting aside is that thatch build up occurs when the management style means that soil microbes cannot keep on top of this breaking down.

They have the ability to degrade, mineralise and immobilise fertilisers and pesticides. They enhance plant available nutrient levels through nutrient recycling and organic matter decomposition.

Other benefits include improved soil aggregation which has an influence on soil water movement and aeration. The improvements in plant health that these result in can also reduce susceptibility to disease.

Examples of Farmura Research

Table 1. Trial at Laverstoke Park 2014

Table 2. Trials With Usda

Counts of fungi, bacteria and Actinomycetes in two soils, one from Dr. Kaufman USDA, Beltsville MD and the other from Robert Newman's plots at Madison WI following treatment with Farmura.

Table 3. Trial at Whitchurch Golf Course, South Wales

How then do we encourage soil microbes? Research from Cornell University in the USA advises the following, use manures – in the Farmura liquid organic range, such as Porthcawl and Farmsea which are formulated with manures we have an easy and convenient method of supply and application. Maintain soil moisture and oxygen levels.

This leads one to surfactants and Revolution from Aquatrols which will do just that in balancing air and water. Also a balanced PH, consistent fertility by spoon feeding, good aeration and the encouragement of root development which in turn releases organic compounds that stimulate activity – in short nothing other than good greenkeeping practice.

It would be remiss not to mention microbial products - the addition of soil biology into turf, which is another way of boosting numbers. The broad range of natural bio stimulants contained in Farmura products increases the numbers of useful bacteria and fungi in the soil assisting the addition of microbial inoculants as well as stimulating the natural populations already living in the root zones.

How do we know that manures or at least the Farmura manures work to build up bacteria and fungi?

Apart from a track record stretching back to the 70s and the restoration of Open Championship courses a good deal of research has been carried out both in the UK and USA in different locations which has demonstrated their effectiveness in a number of areas as shown in the examples.

With the direction of travel moving evermore towards sustainability and a more balanced and natural approach the bigger picture needs to be considered and the soil and its life surely needs to be looked after just as much as the manicured turf we can see with our eyes.

Not so visible but certainly as important!

Table 1

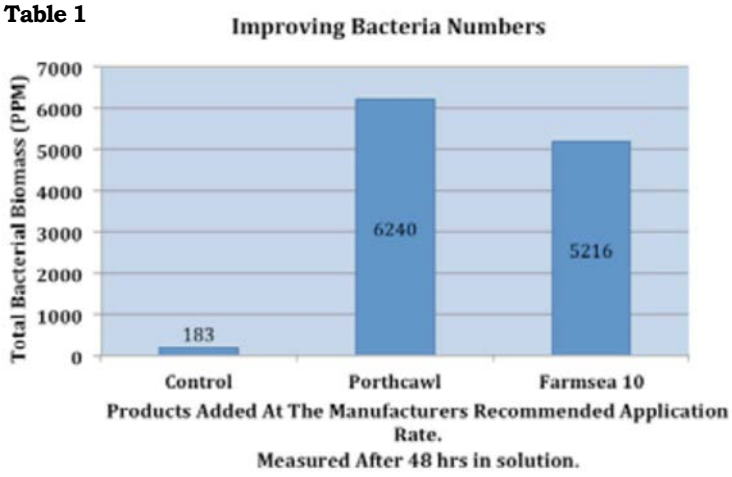
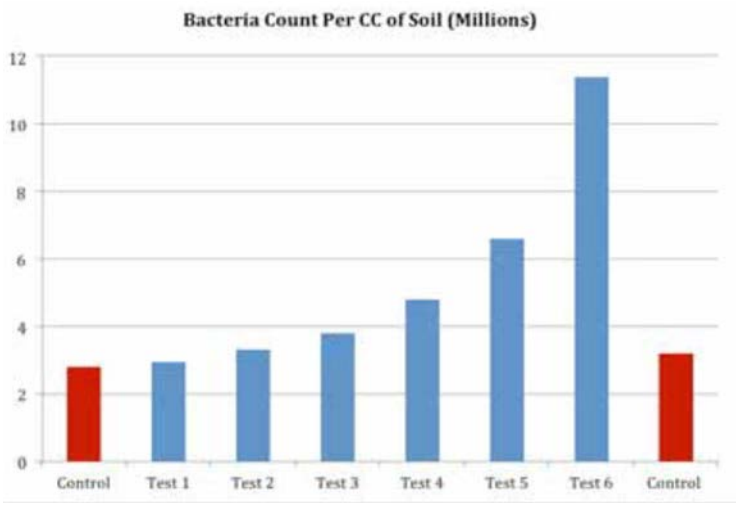


Table 2

Farmura Lab Rates Litres 100m2	Fungi	Bacteria	Actino-mycetes	Fungi	Bacteria	Actino-mycetes	Thatch Layer Thickness cms
0	10	10	10	12	12	7	0.73
0.6	45	30	30	32	55	25	0.26
1.24	65	45	40	52	80	35	0.26
SAMPLE USDA				SAMPLE MADISON			
Day 27 Counts [X 1,000,000]				Day 27 Counts [X 1,000,000]			

Table 3



about the author

Farmura was established to develop the Farmura system of converting cow manure into organic fertiliser. Jonathan joined the company in 1976 as a rep and subsequently moved its offerings into the amenity market.

Farmura pioneered Liquid Iron into the European market with Ferrosol, introduced the first successful Spray Pattern Indicator and was one of the first to promote the benefits of true liquid fertilisers. The company pioneered the development of sustainable products to manage golf courses, and this year are celebrating their 40th birthday.