

Organic Fertilisers: They're Coming of Age

By Hugh Frost

A decade or so ago many greenkeepers and other sportsturf managers were quite taken with the idea of using so-called 'organic' inputs. However, for a number of people at that time, product performance did not meet their expectations. The reason for this was predominantly due to high expectations caused by over-selling in the market, together with biological misperceptions, inferior quality "copy-cat" products and an inadequate level of technical support.

Times have changed. Biological systems are better understood, companies and their products have evolved and at the same time there is a renewed emphasis on golf course ecology, environmental protection and input rationalisation. Several organic-type products are now persisting in the marketplace, therefore demonstrating their popularity, yet to too many people they remain an unknown quantity. It would be helpful to provide the golfing community with more accurate information, so that they are able to review the role of 'organic' inputs and decide for themselves. Read on...

Included within this category of 'organic' products is the largest group of golf course inputs, the plant nutrients, better known as fertiliser. It is this group which is now scrutinised more closely, though a better term for them would be 'plant growth stimulants' rather than fertilisers, as the activities of the organic components are more numerous and more complex than just solely providing soil fertility.



Defining 'organic' fertilisers

The term 'organic' is generally misused, as it is most commonly applied to all fertilisers that are not inorganic, mineral fertilisers. Broadly speaking, these so-called 'organic' fertilisers fall into one of three categories:

1. Predominantly inorganic fertiliser, with some components of organic origin, so giving some biological activity. These products are numerous in the market place.
2. Organic-based products with a predominantly biological activity, which usually contain some inorganic mineral component, to a greater or lesser degree. Products that fall into this category are generally fewer in number but more commonly used.
3. Fully organic, certified products that do not contain inorganic ingredients. These products are currently lacking in the golf marketplace

The second category of products listed above are generally those which most people describe as organic, though it would be more accurate to describe them as 'organic-based' as most still contain some level of inorganic nutrients. These minerals are included into most products to meet what most greenkeepers see as their turf needs, however, in reality it maybe that the inclusion of inorganic nutrients are less of a need to the plant and more of a want to the greenkeeper, by way of insurance. Given the pressure of the job it is entirely understandable for any greenkeeper to act in this way, though hopefully by reading the next few paragraphs greater levels of trust can be placed in the organic component of these organic-based fertilisers.

Product contents

Whatever its source, the main ingredient of organic-based fertilisers is also most likely to be the main source of nutrients within the product. The most common source for organics has previously been composted poultry litter, but feather meal is now also being used, whilst alternative composted products are also arriving on the market.

This organic base forms the backbone of the fertiliser and acts as a carrier for the

other components of the product. These additional components will include the macronutrients (N-P-K), any micronutrients and a plethora of different types of biological growth stimulants and microbes. All these components, in conjunction with the organic matter, are able to provide either growth stimulus to the grass plants or add beneficial structural or microbial properties to the rooting zone. The various components, their benefits and applications are outlined below:

Organic matter – The source of the organic-base within a product is important. It needs to be easily broken down and so contain organic matter that is in a readily available form. Technically this is described as coming from an 'active' pool of organic matter, as opposed to a 'passive' pool of slowly degradable material. Many of the 'copy-cat' products that were pushed on the market in the past few years contained at least some organic matter from the 'passive' pool and so caused problems to the root zone on golf greens. Providing good quality organic matter carriers are used, then the essential character of a golf green will not be changed (just its performance amended as described in the proceeding section).

Bio-stimulants – These are a broad range of natural plant products, usually include seaweed (or kelp extract) for cytokinin production that stimulates root growth and limits leaf dieback. Other bio-stimulants include vitamins, humic acids for improved nutrient use efficiency and amino acids which form proteins that are the building blocks for plant growth.

Bacteria & fungi – A large group of organisms that have in the past been seen as only having a negative effect on turf but which we now know contain many beneficial micro-organisms. Organic-based products will vary in their approach to micro-organisms, from not specifying a product's content (or indeed fully knowing) to providing a full analysis of bacterial or fungal content. The benefits of the soil bacteria to the plant will range from making nutrients more available in the soil (e.g. from thatch), to assisting nutrient uptake into the plant, to competing with pathogenic bacteria. Fungi are either be free-living and assist in suppressing other negative fungi or in the

case of mycorrhiza fungi form symbiotic relationships with grass, so increase root growth and lead to improved nutrient and water use efficiency.

Standard inorganic fertilisers use ash and salts to act as the carrier for the mineral fertiliser component which do not provide any further advantage to the plant and indeed over time can acidify the soil, making other micronutrients less available. While this acidification may be desired in some instances to lower a high pH, it also reduces microbial activity, not just pathogenic bacteria but also beneficial bacteria that compete with disease and many others intricately involved in plant nutrition.

Product performance

Organic-based fertilisers utilise natural components, therefore they have a biological activity that works within natural plant and soil systems, so improving the growing environment for the plant and helping turf to be more robust. This is generally considered a preventative approach.

nutrients available to plants through normal soil processes. The result is that, depending on the levels of inorganic components, the different fertilisers will have differing properties and so performance. This can be summarized as follows:

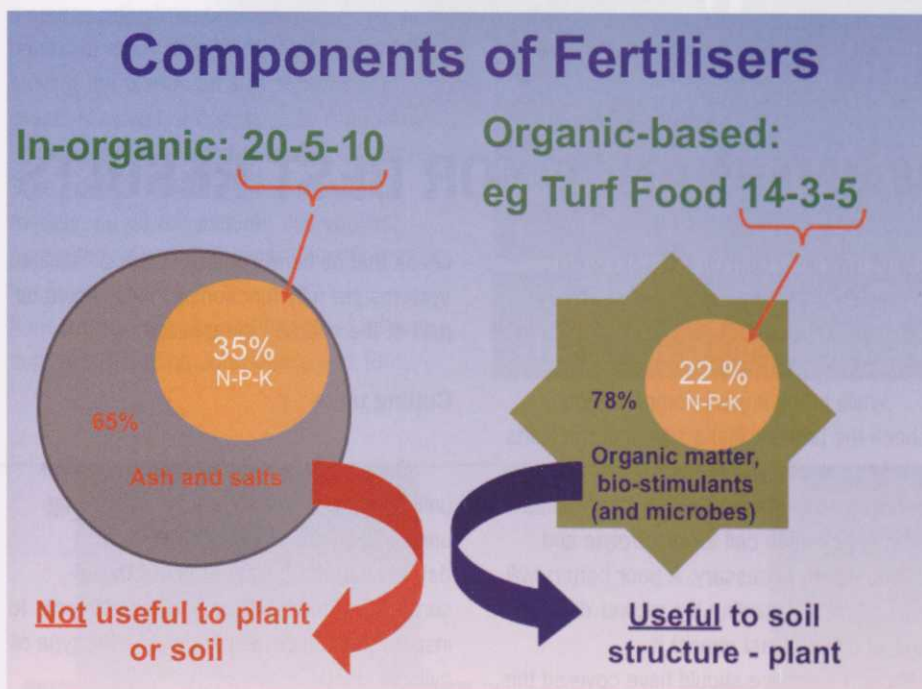
Inorganic fertilisers	Organic-based fertilisers
<ul style="list-style-type: none"> • Fast acting, force quick growth • Response curve of products less variable • More volatile and easily leached • Performance of product tails off rapidly • Tend to acidify soils • Carriers more likely to scorch turf • Good product adsorption requires water • Salt content reduces water uptake • Cheaper to manufacture, at present 	<ul style="list-style-type: none"> • A steadier, more gradual response • Product action proportionate to soil types • Nutrients less volatile in soil profile • Product performance fades in a slower manner • More of product used of benefit to soil structure • Less likely to scorch turf • More easily adsorbed into root zone • Low salt deposited in soil, so greater water uptake • Costs marginally high, less affected by oil price

Organic-based application methods

It is often believed by greenkeepers that they either have to be totally 'organic', or

The future of organics

No-one in the organic marketplace would argue that they know everything about the biological activities of plants, soils and the related microbial products, especially as science does not yet have all the answers. However, as new concepts and possibilities are almost endless in plant science, in a similar way as human health, then there are going to be a myriad of new biological products coming forward for trials in the future. In the meantime greenkeepers can get used to the idea of using biological control methods to contain their pathogens in the same way as greenhouse managers have learnt to control theirs.



By contrast, non-biological products generally use combinations of synthetic and natural ingredients to partially by-pass natural ecosystems, thereby seeking to get round obstacles of soil nutrition and achieve extra plant performance or to overcome disease. This is generally considered a curative approach.

What this means is that organic-based fertilisers do not 'spoon-feed' nutrients to the plant in the same way the mineral fertilisers do, instead they make the organic

not. While there are now a growing number of golf courses that predominantly use an organic-based regime it is a misconception it is not possible to integrate biological and non-biological products. Indeed, providing greenkeepers are advised correctly, there can be many good reasons why a mixture of product types might provide them with a larger armoury of tools. Certainly an integrated programme of organic-based and mineral based products can be a useful first step to understanding how their biological activities work best on a specific

Finally, as more pressure is placed on society to rationalise their use of pesticides, nutrients in water sources are scrutinised in greater depth and so nutrient and water use efficiency becomes more important, then the role that biological products play are likely to become increasingly important in golf course management. This is will not happen overnight, but as greenkeepers gain more confidence, get better technical advice and experiment with new options then turf grass can be managed in a more 'organic' way.

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