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THE ECONOMIC VALUE OF 'GREEN' COMPOST UTILISED AS A TURF TOPDRESSING

By Ron Alexander

Golf course and other sports turf management faces many changes moving into the future. Golf course superintendents face the challenge of expanded course usage, a shrinking selection of pesticides, climatic change and tightening maintenance budgets. For these specific reasons, the use of compost in sports turf management around the world has expanded significantly. Golf course superintendents in the UK have a unique opportunity to benefit from the expanded production of compost. Real compost (sometimes called green compost in the UK) is the product resulting from the controlled biological decomposition of organic material that has been sanitised through the generation of heat and stabilised to the point that it is beneficial to plant growth. Real compost is not peat based. Compost can be produced from many feedstocks, however, the majority of composts produced in the UK are produced from green waste (grass clippings, leaves, brush). Composts can be produced so that they possess very consistent characteristics.

The Benefits of Using Compost in Turf Management

Having a proper amount of organic matter in the soil is essential for soil health. These healthy soils allow turf to flourish, because they provide it with a better medium for which to grow and derive their sustenance. This is sometimes forgotten in the sports turf industry, where sand-based media are used and concerns about softness of playing surfaces are an issue. Compost adds high quality organic matter to soils and sand-based media, increasing its quality and long-term success through a variety of benefits:

- Improved soil structure and tilth
- Improved water holding in light soils
- Reduced bulk density in heavy soils
- Supplies slow release macro and micro plant nutrients
- More even turf colour, plus green-up without excessive growth
- Increases soil cation exchange capacity
- Improved wear tolerance
- Reduced surface hardness
- Provides and feeds beneficial soil microorganisms
- Biological disease suppression
- Promotes recovery on heavy-use turf sites
- Weed free

The majority of these benefits were demonstrated during a Sports Turf Research Institute (STRI) research project (October 2005) completed on the use of compost in topdressing (sponsored by Waste & Resources Action Programme).

Unfortunately, when assessing the use of a new product, it is difficult to actually quantify these benefits. When assessing the value of compost in certain applications, we must consider not only the physical, chemical and biological benefits in general, but also the value it can lend to reduced chemical fertiliser, pesticide and irrigation costs. The following example illustrates the value of compost used as a turf topdressing. In saying this, it should be understood that neat compost (unblended with sand) is not a 100% replacement for sand-based topdressings often used in golf course management. It is not recommended to use neat compost as a topdressing on tees and greens or to fill in deep holes. However, it is an excellent topdressing for large turf areas, such as fairways, where it is too expensive to use a sand-based topdressing.

ECONOMICS - Fertiliser

Most composters have avoided comparing their compost products to chemical fertiliser, however, the innate content of slow release nutrients in compost, both macro and micro-nutrients, can be a huge asset to golf course superintendents. As we know, fertilisers can contain macro and/or micronutrients. Most chemical fertilisers contain primarily N:P:K, whereas compost contains these three nutrients plus all of the micronutrients too. Artificial fertiliser formulations vary depending on the end use of the product.

Comparison of Compost and Chemical Fertiliser Nutrients

Fertilisers on the market today are sold with a guaranteed N:P:K value. For example, two newer fertiliser formulations used on sports turf are 12-3-24 and 3-3-32, and they contain high quality, controlled slow release nitrogen sources. These products are often applied at a rate of 300 kg per hectare. At these rates, the 12-3-24 product provides:

- 36 kg/hectare of nitrogen*
- 9 kg/hectare of phosphorous
- 72 kg/hectare of potassium

*Calculation example: 300 kg/hectare fertiliser x 12% nitrogen fertiliser
= 36 kg/hectare of nitrogen

Perhaps more common fertilisers used within the sports turf industry include a 12-6-6 or 12-3-9, used in the spring/summer, and 3-12-12, used in the autumn. These products contain quick release forms of nitrogen, and therefore, are much less expensive than the controlled release products (costing as little as £0.50 per kg). These products would also be applied at a 300kg per hectare application rate. A compost possessing a typical nutrient ratio of 0.8-0.3-0.6 (N-P-K, on a wet weight basis) with a 37% moisture content, and applied at 62 cubic metres per hectare (a typical 6mm topdressing rate), will provide:

- 210kg/hectare of total nitrogen - approximately 21kg/hectare of available nitrogen (typically estimated at 10% availability the first year)
- 79kg/hectare of total phosphorous - approximately 12kg/hectare of available phosphorous (typically estimated at 15% availability the first year)
- 157kg/hectare of total potassium - approximately 126kg/hectare of available potassium (typically estimated at 80% availability the first year) during the first year of application.

Using this example, you can see that using compost at a common topdressing application rate can often provide enough nutrients to replace a typical application of chemical fertiliser.

Fungicide

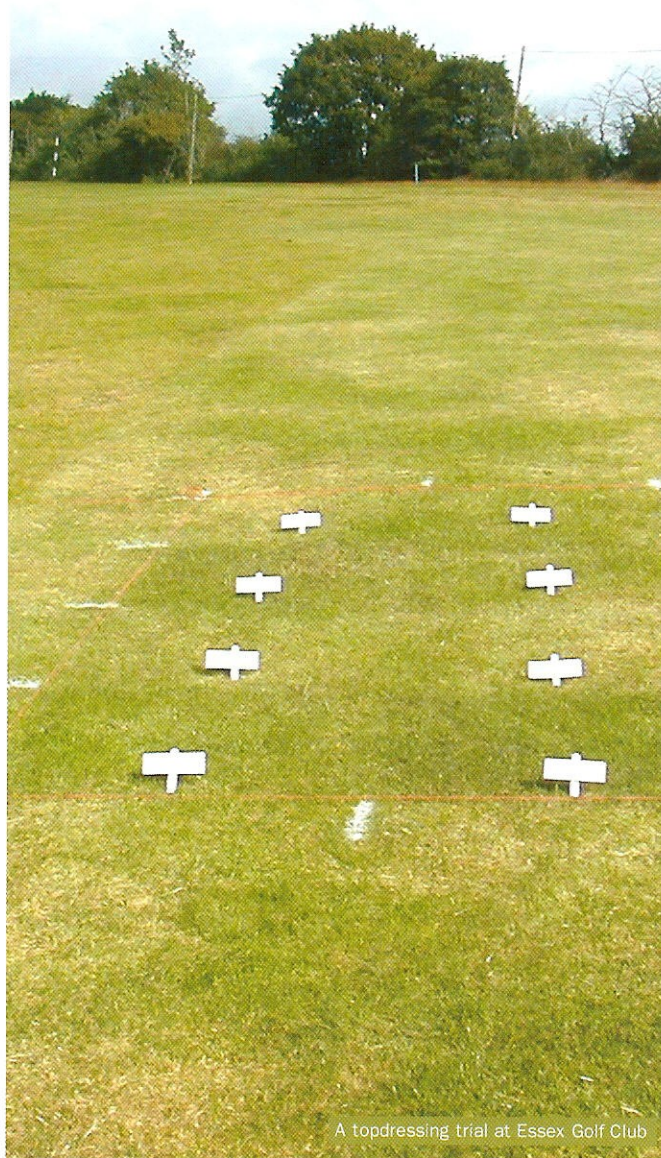
Research from around the world has shown that many composts possess disease (fungal) suppressive properties. Various Ohio State University (USA) research studies completed throughout the 1980's and 1990's, primarily spearheaded by Dr. Harry Hoitink, have even identified the specific modes in which suppression occurs. Commercial labs in the US are now testing composts for microbial populations in order to help predict disease suppression. It should be noted that compost provides preventative disease control, and not curative control.

All pesticides sold in the UK must be registered through DEFRA. Although specific disease suppression claims cannot be made by compost producers, without proper registration, DEFRA allows the following to be stated: "This product is not a pesticide. However, it contains low levels of naturally-occurring soil micro-organisms which may help to suppress soil-borne populations of some plant diseases." Although specific claims cannot be made, research and practical experience has shown that the use of disease suppressive composts could replace, or reduce, the use of fungicides in many turf maintenance scenarios.

Specific chemical fungicides can work as either preventatives or curative, and some possess both properties. Fungicides can be costly to apply, with preventative fungicides such as Myclobutonil and Fenaromol costing £450 to £750 per hectare (we are using £600 per hectare in the example below as a realistic average price). There can be a huge variation in the cost of different fungicides, based on application rate, product type, mode of action, etc. However, the cost figures above, estimate the two fungicides used at a 6 to 8 litre per hectare application rate, at a price of £75 to £100 per litre.

Topdressing

Topdressings physically improve the soil structure, improving drainage and aeration, and may also be used to incorporate organic matter. Many composters market their finely screened composts as turf topdressings, which are used on golf course fairways, sports pitches and even home lawns. Furthermore, many composters are now blending their composts with industry standard sands to create high value topdressings that possess fertilising and disease suppressive properties from the compost.



Green composts can be considered as alternatives to peat and topsoil in standard sand-based topdressings.

In the UK golf industry, sand-based topdressings cost approximately £25 to £32 per tonne, delivered, and similar products used to construct tees and greens (using less expensive sand) costs approximately £15 to £20 per tonne, delivered. In the example below, we estimate a finely screened compost being sold at a price of £16 to £17 per cubic metre, delivered, although they often cost less. One tonne of sand-based topdressing is the same approximate volume as one cubic metre of compost, since compost possesses approximately half the bulk density of a sand-based topdressing. Typically, in sports pitch topdressing applications, sand-based topdressings are applied at a 3, 6 or 12mm application rate, depending upon the requirements of the project and available funds.

Replacement Values

Taking into account the economics outlined in this articles text, the cost to use compost as a topdressing would be £1023 per hectare, or £102.30 per 1,000 square metres, when applied at an approximate 6mm application rate (or 62 cubic metres per hectare). When considering the potential fertiliser and fungicidal benefits of compost, and its value as a replacement for sand-based topdressing, the cost is 40 to 54% of a typical sand-based topdressing.

Relevant product costs are found in Table 1. They represent products used by many turf managers, and those which may be replaced if compost is used as a topdressing.

Table 1 - Relevant Product Costs

Product	General Costs	Area Costs
Sand-Based Topdressing ^a	£25 to £32 per tonne (estimated as £28.50 per tonne for economics)	£1767/hectare or £176.70/1,000m ²
Sand-Based Tee/Green Construction Mixes (used as Topdressing)	£15 to £20 per tonne (estimated as £17.50 per tonne for economics)	£1085/hectare or £108.50/1,000m ²
Compost (used as Topdressing) ^a	£16 to £17 per cubic metre (estimated as £16.50 per metre for economics)	£1023/hectare, or £102.30/1,000m ²
Fertiliser 1 ^b (containing controlled release nitrogen)	£1.25 to £1.30 per kg (estimated as £1.27 per kg for economics)	£381/hectare, or £38.10/1,000m ²
Fertiliser 2 ^b (containing quick release nitrogen)	£0.50 per kg	£150/hectare, or £15.00/1,000m ²
Fungicide ^c	£75 to £100 per litre (estimated as £75 per litre for economics)	£600/hectare, or £60/1,000m ²
Seed	£5 per kg (Dwarf Perennial Ryegrass)	£833/hectare, or £83.30/1,000m ²

- a Applied at 6mm, or 62 metres/hectare
- b Using nutrient examples from the text, compost with a nutrient ratio of 0.8-0.3-0.6 applied at 6mm layer, an Autumn 3-3-32 fertiliser (with controlled release nitrogen) or a 3-12-12 fertiliser (with quick release nitrogen) applied at 300kg/hectare.
- c Using Myclobutonil (at 8 litres/hectare) or Fenaramol (at 6 litres/hectare)

A detailed cost comparison can be developed using these estimated cost figures (see Table 2 and 3). This comparison illustrates that a compost topdressing can fulfill the function of three products normally used in the management of high quality turf (a physical topdressing, with fertilising and disease suppressive properties). To be fair, two scenarios are illustrated – one comparing a compost topdressing to more expensive products and one to lower cost products. Either way, these figures illustrate that compost used in a turf topdressing application may be able to fulfill a cultural and economic niche within the golf industry. And you will see, that the results will speak for themselves.



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Going one step further as far as the economics, and using football pitch experience from the Northeastern region of the US, the use of compost as a sports pitch topdressing allowed the managers of the largest sports pitch venue in New England to reduce the amount of grass seed they used by two-thirds (Compost for turfgrass: multifaceted organically, Sports Turf Magazine, August 2005). Dwarf Perennial Ryegrass is commonly used on sports pitches in the UK. At an application rate of 167kg per hectare, the cost of treating a hectare would be £833. Even if the use of compost would decrease the application rate of grass seed by only fifty percent, that would further save the sports turf manager an additional £400 per hectare.

Table 2 – High Cost Comparison on a 1000m2 Basis

Product Costs	Sand-Based Topdressing	Compost used as Topdressing
Topdressing (using STRI/USGA approved tee/green topdressing)	£176.70	£102.30
Autumn Fertiliser (containing controlled release nitrogen)	£38.10	£0
Fungicide	£60	£0
Total Costs	£274.80	£102.30
Grass Seed	£83.30	£41.65
Total Costs (with grass seed)	£358.10	£143.95

Table 3 – Low Cost Comparison on a 1000m2 Basis

Product Costs	Sand-Based Topdressing	Compost used as Topdressing
Topdressing (using tee/green construction mix as the topdressing)	£108.50	£102.30
Autumn Fertiliser (containing quick release nitrogen)	£15.10	£0
Fungicide	£60	£0
Total Costs	£183.50	£102.30
Grass Seed	£83.30	£41.65
Total Costs (with grass seed)	£266.80	£143.95

Obviously, different cost figures and application rates could be used within the economic comparison within this paper, based on specific project requirements. That said, however, it is obvious that significant cost savings can be obtained through the use of compost in the management of golf courses.

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For more info on compost use, go to the WRAP website at www.wrap.org.uk