Case study: Landscape and regeneration

Compost is top performer in unique UK golf course trial

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The 12-month trial was sponsored by WRAP (Waste & Resources Action Programme) and conducted at the renowned Monifieth Golf Links, on the Tay Estuary, in East Central Scotland.

The complex, which hosted the final qualifying rounds for the British Open Championship at Carnoustie in July 2007, comprises two 18-hole courses and a substantial practice area.

Thanks to its coastal location, the course has a number of sought-after playing characteristics. These include a firm, bouncy surface, and dry, well drained turf, with grass that is usually mown much tighter on the fairways than is the norm for other courses because the grass is very tolerant of short cutting. However, the well drained soils can be a problem in summer as rainfall quickly dissipates and turf may not retain enough moisture to remain healthy. The course is also exposed to the elements as it has low lying gorse bushes, rather than trees.

The compost trial was run by waste management training and consultancy provider, Wamcal Ltd and conducted between September 2006 and September 2007. It involved the application of approximately 40 tonnes of 10mm screened quality compost as a top dressing for tees and as a divot mix.

The ‘Discovery’ compost was sourced locally from Dundee City Council’s Riverside Composting site, which has achieved BSI PAS 100 certification - the nationally recognised quality assurance scheme for compost.

The four par three tees from Monifieth’s ‘Ashludie’ course were selected for the trial. The sixth and sixteenth were treated with compost and the third and ninth were used as control plots and treated with a conventional ‘fensoil’-based topdressing that is usually used on the course. This allowed progress to be monitored in a number of areas, including turf growth, consistency, moisture content and cost. The fensoil and compost were applied at rates of 25 tonnes per hectare to a depth of 6mm using a Cushman spreader.
In addition to the four trial tees, the target green on the practice area and part of the practice ground teeing area (which would both have normally been left untreated) were spread with compost and changes were noted. The compost was again applied at a rate of 25 tonnes per hectare and to a depth of 6mm.

In the top dressing trials, levels of Potassium were higher in soil on the compost-treated tees than the control ones (approximately 120mg/l and 70mg/l respectively), which may explain greener looking turf in tees six and sixteen. The compost also led to a fairly neutral soil pH being maintained across the course. It also slightly raised the pH level at tee six to a more neutral level, where the soil tends to be acidic because it is located under a canopy of pine trees.

Given the relatively wet year, the benefits of compost's high water holding capacity were less obvious. However, to test how the tees might perform in sustained dry weather, sampling continued into the second week of September 2007, which proved mostly sunny with little rainfall.

When compared to the wetter weather in August, the moisture content of the conventionally treated tees (three & nine) had dropped significantly from 31 per cent and 33 per cent to 11 per cent and 20 per cent respectively. However, tee 16 had retained almost all its moisture, dropping just two per cent from 38 per cent to 36 per cent. Although tee six, which is close to a copse of trees, had dried out a little, this reduction was far less dramatic than on tees three & nine and fell from 29 per cent to 17 per cent. The ideal average water content for a golf links course is about 35 per cent.

There were clear indications that consistency of growth within the compost-treated areas had improved during these trials. Tee sixteen (compost) had overtaken tee nine (conventional) as the one with the most consistent turf growth, and the consistency of grass cover had also improved on the sixth tee (compost). Overall, growth on the compost treated plots was less patchy than on the conventionally treated ones.
Although there was no obvious incidence of disease, during winter and spring, an unsightly purpling effect occurred on isolated areas of grass sward on both the untreated tees, but not on the compost-treated areas. Following consultation with the Sports Turf Research Institute (STRI), it is believed that this purpling effect was caused by phosphate deficiency rather than disease, and indicates that the compost treated plots had sufficient phosphate levels.

By the end of the trial, levels of phosphorous were consistent on the compost-treated trial tees at around the 10mg/l mark. However, on the untreated tee three, levels of phosphorous were much higher at around 50mg/l. Since this tee has a much lower consistency of growth, this suggests that excessive levels of phosphorous are detrimental to links turf.
There were also clear cost-savings involved in using compost. Twenty nine tonnes of fensoil dressing, which is usually mixed with sand, costs in the region of £41.95 per tonne (delivered). In comparison, at £14 per tonne delivered, the compost costs just a third of the fensoil and, crucially, will cost the same per tonne regardless of load size (whereas the fensoil would be increasingly expensive per tonne if delivered in less than 29 tonne loads). Typically, two 29 tonne loads would be required per year, and annual cost savings would, therefore, be in the region of £1,620.

As the compost was applied on its own, without any sand, it took a little longer to be incorporated into the soil than the fensoil mix, resulting in a temporary unsightly muddying effect on the turf surface. This problem could potentially be solved by screening the compost to a finer (5mm) grade, mixing it with sand and aerating the soil before spreading. This would help to ensure that the compost-based mix had the same characteristics as the conventional product, whilst maintaining its intrinsic benefits; making it a truly competitive alternative to existing top-dressings.

On the practice green, which has historically been left untreated and has suffered lacklustre growth in the past, the consistency of growth and depth of colour increased noticeably following the application of compost. (This depth of colour aspect would be of more benefit on inland/parkland courses rather than links courses for which a browner hue is considered desirable).

In the divot mix trials, where the mix comprised 50:50 compost and sand, the potential cost savings involved in using this product over a conventional treatment such as fensoil, were £1,482 per annum. This was calculated by comparing the cost per tonne of the divot mix versus the cost per tonne of compost. The mix had the same consistency and properties as the conventional product, making it easy to apply.

Alastair Rogers, Project Manager for Wamcal Ltd, said: “These trials showed that compost can match and exceed fen dressings in terms of some key technical aspects and cost considerations. Not only can it help with issues such as moisture retention and

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1 These figures assume that the compost-sand blend is manufactured on-site and without the necessary labour and machinery costs.
consistency of turf growth, it can also bring significant savings when compared to the cost of applying conventional products.”

Scott Rennie, Course Manager at Monifieth, said: “We were encouraged by the performance of the compost, which offers an environmentally friendly and technically sound alternative to conventional products. We were also pleased with its overall performance on the tees and on the practice target green where consistency of growth and depth of colour noticeably increased in time for the Open Championship.”

**Conclusion**

These trials show that quality compost has great potential for challenging golf courses such as Monifieth where the well drained sandy soils are exposed to harsh coastal elements and the soil has a tendency to dry out. Not only does it enhance water retention and turf growth, it can also save money on turf treatments making it a serious alternative to conventional materials, particularly if the temporary aesthetic issues following spreading are avoided by incorporating the compost into a sand-based mix and aerating the turf prior to application.
Key Facts About Compost

- Compost provides nutrients such as nitrogen to the soil in a slow release form that greens up grass without leading to excessive grass growth. A good supply of potassium is also present that will aid grass hardiness and suppress disease.

- Compost supplies organic matter that improves soil structure, water infiltration rates and water holding capacity. The compost can also increase grass seed germination and re-growth in divots on tees and fairways, which is always a concern for green-keepers.

- There is also evidence to suggest that compost can help to prevent the onset of plant diseases, thereby reducing the need for chemical fungicides. An overview of published research, conducted by the University of Warwick (Warwick HRI) for WRAP indicates that compost can suppress a range of wilts, rots and turf grass diseases – see http://www.wrap.org.uk/document.rm?id=2638

- The optimum time to spread compost is when the weather is warm and the soil moist, during the autumn or spring.

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