compost for soils

Turf Grass

Compost on Turf Grass in Western Australia - a case study

The health of turf grass can be influenced by a number of factors including poor water holding capacity and low plant available soil nutrient levels. If turf roots have inadequate access to water and nutrients then growth can be hampered and plants can become stressed if environmental conditions aren't favourable.

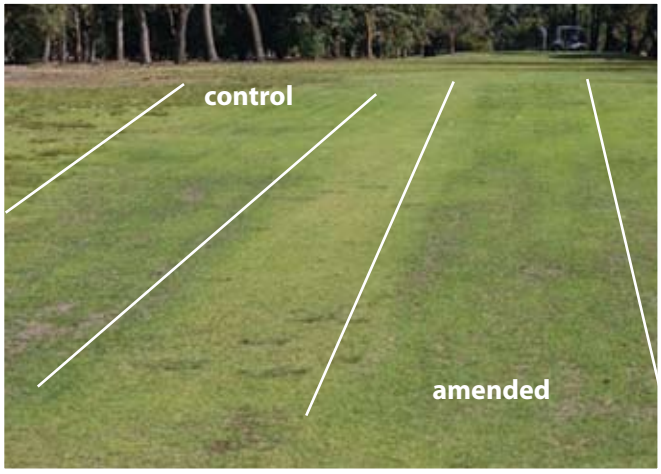
In Western Australia, most of the soils of the Swan Coastal Plain are characterised by low water holding capacity and in some cases they have the tendency to be water repellent. Soils in this area also have low natural soil fertility and poor nutrient retention within the soil.

Compost has been shown to improve soil structure in a wide range of soil types leading to increased water holding capacity and soil fertility. Recent research in WA investigated the potential of compost to improve water holding capacity, soil fertility and turf grass health on four golf courses in the Swan Coastal Plain area. Compost was applied at 50 dry tonnes per hectare (70 m^3/ha) on trial sections of the golf courses and soils moisture and soil fertility characteristics were measured.

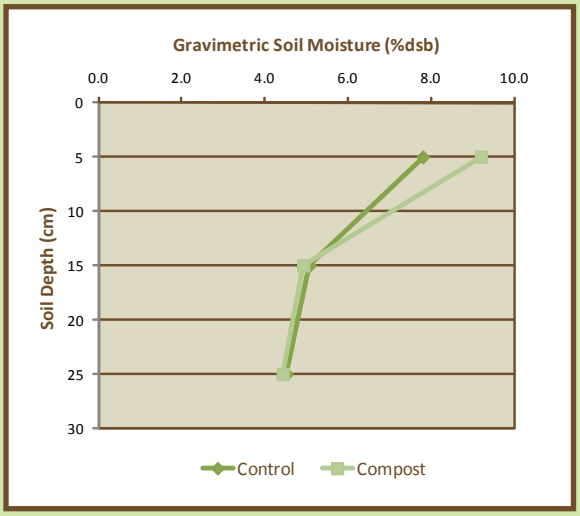
Soil Moisture

Soil moisture near the turf surface was greater when compost was applied compared to areas without compost. In an associated controlled trial, an application rate equivalent to 50 dry t/ha resulted in a soil moisture increase equivalent to approximately 2 mm of rainfall or irrigation. While this change may seem minor, it can make a big difference to plant health. This was particularly evident when one golf course suffered an irrigation failure over several hot days during the field trial. The areas where compost had been applied looked much healthier than areas without compost, despite both areas experiencing the same hot conditions.

Water repellence can also be a significant issue for some Western Australian soils (especially Bassendean Sands) and low water infiltration can be a problem with some turf. These trials showed that water infiltration was either maintained or improved with compost applications under field conditions, when accompanied by turf renovation. The immediate structural changes to turf thatch caused by turf renovation can compliment soil improvements normally associated with compost application.



Appearance of fairway 6 months after compost application



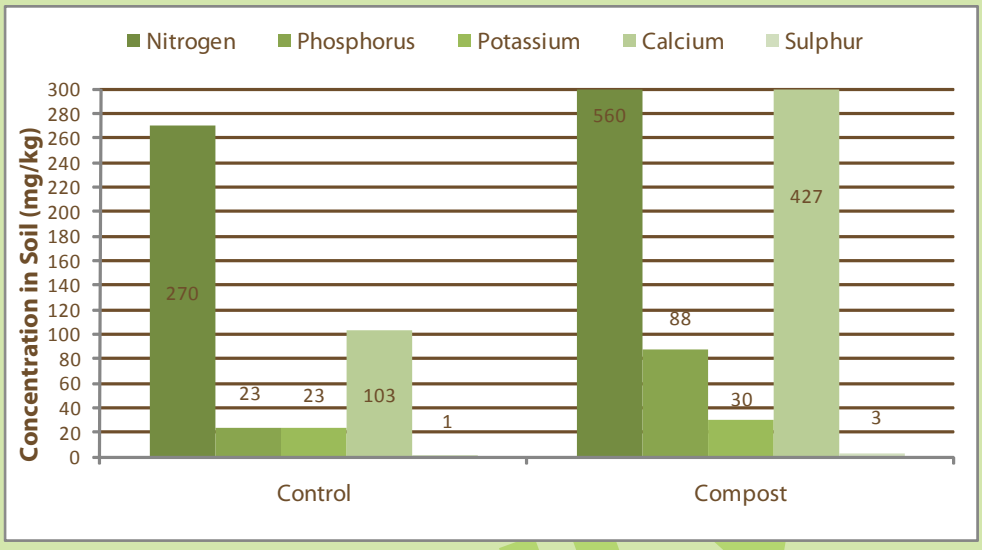
Soil Nutrients

Compost has been shown to supply key plant nutrients like phosphorus (P) and nitrogen (N) to the soil and plants – the controlled turf trials also demonstrated this effect. Compost can be used in this way to supplement traditional turf fertilisation.

The concentrations of several plant nutrients including potassium, calcium and sulphur were measured in the soil as well as in the turf grass plant tissue. Several of these nutrients increased when compost was applied to the system. While the increased levels did not equal the plant requirements for some nutrients such as potassium, these extra nutrients would still assist with plant health. Over time, provision of these additional nutrients by compost could off-set a proportion of the turf fertilisation requirements.

Another factor that can affect soil nutrient levels is turf renovation. Mechanical disturbance of turf can increase mineralisation of soil organic matter and thatch located around the turf root zone due to the increased exposure to air and the subsequent new opportunities for biodegradation by microbes.

On soils with low nutrient holding capacity, some care should be taken to manage soil nutrient levels and monitor the effect of all types of fertilisation, whether by traditional means or with compost application. This is particularly true with regard to monitoring phosphorus in soils. On soils with a higher phosphorus holding capacity, higher rates of compost application are possible to increase soil water holding capacity and maintain plant available soil nutrient levels.



Concentration of several nutrients increased when compost was applied.

The bottom line....

Using compost in turf can:

- improve turf resilience to moisture stress.
- improve or maintain soil water infiltration.
- provide additional key turf nutrients.

Where there is low risk of phosphorus leaching, higher compost application rates seem possible to increase soil water holding capacity and maintain plant available soil nutrient levels.

Acknowledgements

This research was conducted by ChemCentre and project partners Dale and Associates, with technical assistance from David Allen (MBS Environmental). This research project was supported by the Western Australian Waste Authority.

References

Walton, K.S. and Allen, D.G. 2009. Encouraging the Golf Industry to take Strategic Waste Initiatives (Part1: Soil Amendment Field Trials on Four Perth Golf Courses). ChemCentre, East Perth, Australia.

Please Note: A copy of the research report can be downloaded from both ChemCentre's website (www.chemcentre.wa.gov.au) and the Waste Authority website (www.zerowastewa.com.au).

Nutrient Loss and Water Pollution

In soils with a low nutrient holding capacity such those in Swan Coastal Plain, care should be take when increases to soil nitrogen and phosphorus levels are likely. The movement of these nutrients off-site with surface and subsurface water can contribute to the eutrophication (increase/excess of nutrients) of nearby water ways. This is more of a problem on certain types of sandy soils (such as Bassendean Sands) which have a low Phosphorus Retention Index (PRI), normally <2. On soils with low to moderate PRI (<5), the trial indicated that application of compost along with an inorganic amendment of a high PRI material (such as certain clays, fly ash, mineral oxides or mineral carbonates) can improve the phosphorus retention of the soil and help minimise the risk of polluting nearby waterways.

Waste Authority

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