COCOPEAT

AN ENVIRONMENTALLY FRIENDLY AMENDMENT

by Phillip Ford, Northern Melbourne Institute of TAFE

As we approach the end of this century, we should be conscious of our responsibilities to the local and the global environment. To my way of thinking, there are four current areas where Turf Managers can make a specific choice to reduce the environmental impact of their management:

1. Reducing pesticide use and adopting IPM principles – including investigating the new crop of non-pesticide products (see article on Carbo-Aid in this issue), and biological controls (see article on Entomopathogenic Nematodes in this issue)

2. Reducing nutrient losses from the turf system

3. Refusing to use fumigation (methyl bromide is an ozone depleting gas), and

4. Refusing to use products harvested in a non-sustainable way

Peat moss is one product that is harvested in a non-sustainable way. Various forms of peat moss are used in horticulture, mostly from the genus Sphagnum. This moss plant grows very slowly in bogs, and when it dies it partially decomposes, leaving the cell structure intact. This material is resistant to further rapid decomposition, and can retain its structure under compaction (which is why it is especially good in greens construction). It is able to absorb and hold a lot of water, and the typical case in greens construction is to use a 10% amendment rate (by volume), to achieve an increase in Moisture Retention of around 4 – 5%.

Peat mosses have received bad press because of the non-sustainable nature of the harvest. In many European countries peat mining is banned, although a number of the former communist countries still mine it. Much of this peat is not Sphagnum peat, but black peat or other forms that are used for domestic or industrial fuel.

The Sphagnum peat moss used in Australian greens construction probably comes from either Tasmania or Canada. In both cases, the companies mining this peat do so under strict environmental guidelines, but the fact remains that the peat harvest is a form of mining, and the end result is a hole in the ground and the destruction of the peat habitat.

The point for us to consider is this – if an alternative product could be sourced that gave the same amendment to greens sands, at a similar cost, and yet that product was harvested in a sustainable way, would you use it?

Cocopeat may be such an alternative, so its worth looking at the facts.

Cost Comparison

Canadian sphagnum peat moss will cost you around $85 to $105 per cubic metre of baled, dry product. Cocopeat from Galuku (Sydney) will cost around $70 to $102 per cubic metre (baled). In both cases the price varies according to delivery factors. This makes Galuku's Cocopeat slightly cheaper on average, but the difference is minor, especially in the context of the overall construction budget.

Comparison of Amendment Benefits

The major role of the peat moss in a sand rootzone is to increase moisture retention. There are other benefits – a reduction in Bulk Density, and a slight increase in nutrient retention and CEC. On the downside, peat moss addition will reduce the Infiltration Rate of the rootzone. Careful soil testing is required to ascertain the exact quantity of peat moss amendment required to ensure the final rootzone has adequate Moisture Retention (probably in the range 12 – 16%) yet adequate Infiltration Rate (probably in the range 150 – 300 mm/hr). The usual experience is that a 10% addition (by volume) of loose peat moss into loose sand will achieve these outcomes, but this can vary depending on the sand being used.

1. Moisture Retention

The rule of thumb for Sphagnum peat moss is that a 10% amendment (by volume) will give a 4-5% increase in Moisture Retention of a rootzone mix. Tests by Rootzone Laboratories (McIntyre and Jakobsen) show that a 10% amendment rate using Cocopeat gave a 5.7% increase in Moisture Retention. It appears that Cocopeat has a slightly higher Moisture Retention than sphagnum peat.

2. Organic Matter content

Sphagnum peat moss should have a minimum organic matter content around 95%. Cocopeat has an organic matter content of 93% (Turspec test result). The USGA specification requires peat moss to be at least 85% in organic matter content, so both products exceed that requirement quite easily.

3. Infiltration Rate

The rule of thumb for Spagnum peat moss is that a 10% amendment will roughly halve the Infiltration Rate of a sand (ie: a 50% reduction in IR). Tests on a 10% cocopeat amendment show it has less effect on IR, with only a 17% reduction in IR (ATRI test, 1997). In another test (Stokes, Urban Soil Consultant) a 3% amendment (by weight), which is roughly equivalent to a 20% amendment by volume, gave only a 44% reduction in Infiltration Rate. It seems that cocopeat might not reduce the IR to the same extent as Spaghnum peat moss.

4. Cation Exchange Capacity

Peat moss gives only a moderate increase in CEC. The rule of thumb is that a 10% peat moss addition will increase CEC by around 0.6 meq/100g. Cocopeat has a CEC of 52 meq/100g (Northern TAFE test), so an amendment rate of 10% by volume should give a measureable increase in CEC. In both cases, however, the increase in CEC is minor given that the minimum CEC of a rootzone mix should be around 5 meq/100g.

5. Other Chemical Properties

Tests by Cresswell show that Cocopeat is less acidic than peat moss (pH 5.1 for Cocopeat, compared to 3.3 for sphagnum peat). Later tests have the cocopeat pH ranging from 5.8 – 6.2. The cocopeat can have a higher potassium level, but a higher sodium and chlorine level compared to sphagnum peat. While it can be argued that the sodium and chlorine will readily leach out once in the rootzone, there have been some concerns with the salt levels in cocopeat. A reputable cocopeat supplier should provide a product low in salinity and chlorine, and be able to supply a recent lab analysis to prove it.

6. Consistency

Another concern is the consistency of the product. In a turf construction it is essential that the moisture content of the rootzone mix is uniform otherwise the surface will show greener patches and stressed patches. Experience has shown the Canadian peats to have a high consistency, and the increasing experience of constructions using cocopeat has shown a similar consistency of the product. Not only the product itself, but the mixing of the product also needs to be consistent. The USGA spec is quite adamant on the need for off-site mixing of amendments (through the whole profile, by the way), and most of the large and reputable sand supply companies are well equipped to mix amendments to very precise specifications. Turf Managers should be well armed with a rootzone specification, and be prepared to sample deliveries to see the material conforms to that specification. If you have specified that the material must have a gravitational Moisture Retention of, say, 14% plus or minus 1%, and back this up with testing of deliveries, then this will encourage the soil suppliers to measure and mix the amendments accurately.

Summary of comparison with Sphagnum

In summary, cocopeat compares well with sphagnum peat for use in turf constructions. Rootzone Laboratories conclude that the rates of Cocopeat they recommend for addition to various sands is very similar to the rates of sphagnum peat moss for those sands. There have been no real objections raised by the main players in the turf construction industry, so it appears that cocopeat can be considered as a direct alternative to sphagnum peat moss in turf rootzones.

Cocopeat is made from the husk of coconuts, and is a by-product of the coconut industry in India, Sri Lanka, Indonesia and other countries. The coconut husk yields longer coir fibres, used for making ropes, matting, netting etc. Previously the non-fibrous material (a corky, pith like material) was dumped, but now it is screened to give consistent particle size and organic matter content, and baled for use as an alternative to peat moss. Since its introduction to the market, cocopeat has found uses in many horticultural applications – including greens constructions.


Joe Davids, Marketing Manager, Galuku

There are a couple of companies importing the product, but most of the information for this article has been provided by Galuku Pty Ltd, from Sydney. The company is organising a number of outlets for Cocopeat, equipped with hydrating units that take the dry, compressed product and hydrate it to a uniform, consistent moisture content. This product can then be supplied in bulk to the end user, whether that be a golf course or the sand supplier.

How can it be used in a rootzone?

As mentioned earlier, cocopeat can be used as a direct alternative to peat moss in a rootzone mix. The old practice of specifying a straight 10% amendment by volume (that is, one front end loader bucketload of loose peat mixed with nine bucketloads of sand) is giving way to more precise specifications. This more objective approach might follow the steps outlined below:

1. A turf soil testing laboratory will mix several combinations of sand and amendment until they have a rootzone within the specified range of Moisture Retention, Porosity and Infiltration Rate.

2. The laboratory then specifies that rootzone mix, based either on:

i) organic matter content – the rootzone is specified according to the OM content of the optimum mix (eg: 1.5% OM)

ii) volumetric rate – the rootzone is specified according to the volume of loose peat moss to be mixed with a volume of loose sand (eg: 10% amendment rate)

iii) gravimetric rate – the rootzone is specified according to a weight of dry peat moss to be mixed to a certain weight of sand (eg: 1.2% by weight)

iv) Moisture Retention specification – the rootzone is specified according to the final Moisture Retention required (eg: 14%, plus or minus 1%).

Of the four methods, the Moisture Retention method is probably the most sensible. After all, the Moisture Retention is the reason the peat moss or Cocopeat is added, and will have the most dramatic effect on the surface if you get it wrong (green patches and stressed patches). It is also reasonably easy to test – a Turf Manager or a consultant can take a sample from a truckload and test it for Moisture Retention relatively quickly (over a 2 day period using the conventional method, but more quickly using a moisture sensing method). This method is probably not favoured by the sand suppliers, who are better equipped for volumetric or gravimetric specifications. This is a topic that needs further research, obviously.

Summary

All the evidence suggests that cocopeat is a direct alternative to sphagnum peat moss. Where Turf Managers have strong beliefs about being environmentally responsible, and feel that sphagnum peat moss mining is undesirable, then they can use cocopeat with confidence and a clear conscience. Like any new product, you should do your homework – we suggest you discuss it with your sand supplier and your consultant, or contact Galuku in Sydney who will gladly refer you to Turf Managers who have used and endorse their product.

Contact the Marketing Director, Joe Davids, or Galuku's horticulturalist Andy Swan on (612) 9337 2198 (fax: 612 9337 2648).