

Rooting for Success

Mick Higgins and Peter Jefford of Rufford look beneath the surface and try to clear up the ambiguity and confusion surrounding the issue of rootzones.

The importance of a rootzone is a subject often overlooked and frequently misunderstood. We're not sure whether this is because it is out of sight or whether its importance has not historically been communicated properly. Whatever the reason, it's a fact that the rootzone is really the starting point in the long-term success of any green. Get it wrong and you'll have an uphill struggle on your hands from the beginning. So let's start with a brief refresher.

What is a rootzone and why is it important?

We all need a nice place to live. In order to thrive as human beings we need air to breathe, space in which to grow, water to drink and food through which to gain essential nutrients. And a grass root is no different - it needs an environment providing all of these elements if it is to grow and flourish. We call this environment the rootzone i.e. the layer under the sward in which the grass roots live and breathe.

The problems begin when this environment isn't right and this is mainly to do with the space (or pore size) between the particles of material that make up a rootzone, otherwise known as the total porosity. Porosity can be divided into two categories:

Capillary porosity refers to the smaller spaces in a material that fill with water – these are great for water retention but poor for aeration and can subsequently lead to slow drainage rates and weak, shallow root growth.

Non-capillary porosity refers to the larger spaces that are filled with air – great for aeration but poor for water retention and therefore may cause higher drainage rates and the need for frequent irrigation and fertiliser application.

The trick, therefore, is to achieve the right balance between the two.

A little bit of history

When golf started in Scotland during the mid 18th Century, greens were built on relatively free-draining dune sands - an ideal environment for grass roots and perfectly adequate for the needs of clubs at the time. But as the game spread south more inland courses were constructed using native soils to create what are often referred to as push-up greens. Initially, these early rootzones weren't too much of a problem given the relatively low volumes of course traffic back in those days.

But now it's a different story. Today's greenkeepers are faced with much greater numbers of players, all demanding perfect playing conditions seven days per week under all conditions. These demands have been fuelled further by TV coverage via which players see the standard of championship courses throughout the year and develop similar expectations of their own club. All of which leaves the poor greenkeeper with a major headache in creating surfaces that can accommodate this demand. This is where a good rootzone plays a major role.

So what makes a good rootzone?

An ideal rootzone for healthy grass is natural soil and if you were building a lawn at home then this would be the first choice. But then you wouldn't anticipate hundreds of golfers walking over your turf every day of the year, even in saturated winter conditions. If they did then your new lawn would quickly turn into a mud bath!

Soil alone does not provide the drainage (or in the case of football and rugby, the stability) needed for a good commercial playing surface. This is basically because there is insufficient pore space between the particles in a compacted natural soil. Water drains through soil primarily via voids created by earthworms and particle aggregation. But excessive foot traffic and play quickly compacts these voids and subsequently slows drainage right down leading to a waterlogged profile.

Hence, to create a rootzone for commercial applications, an addition is needed and this comes in the form of sand, the physical properties of which provide the drainage and stability sometimes lacking in natural soils. This is because the space between sand particles (provided you use a correctly graded sand) remains even when compacted, hence allowing drainage.

And so a good rootzone is composed mostly of a well-graded sand together with the addition of an organic amendment (of which there are numerous forms but the most commonly used are soil, peat, compost etc.)

The need to specify

This does not, however, mean that you can use a blend of any old sand and soil. And asking for a 70/30 mix isn't going to help either. This specification tells you nothing about the physical properties of the sand in terms of lime content and grading, nor anything about the soil which could range from peat-based to a heavy clay content. Unfortunately you need to adopt a slightly more technical approach that takes into account such factors as:

- **particle size distribution** (the separation of sand grains into distinct diameter sizes)
- **silt and clay content**
- **saturated hydraulic conductivity** (the constant rate at which a saturated material is able to transmit water downwards - usually measured in mm/hr)
- **organic matter content**
- **pH** (or the acidity of a substance)

Unfortunately we don't have enough space here to go into detail about the implications of these factors, but suffice to say that each can have a significant impact on the performance of a rootzone. The important thing is to work with your rootzone provider to understand and establish your precise requirements. You can also find more information on our website at www.rufford.com

Colour

A common misunderstanding we've encountered when speaking to greenkeepers is the concern some people have with the colour of sand used in a rootzone believing that it makes a difference to its performance. Believe us, it doesn't! Sand is obviously a naturally occurring mineral and colours are unique to each deposit / quarry. Technically speaking, the whiter the sand the fewer impurities it contains but this shouldn't influence how your grass grows.

USGA Construction

The current benchmark for putting green construction is laid out in the USGA Recommendations (2004 Revision). This utilises the suspended water table design which allows the surface to drain whilst still retaining essential moisture above a gravel layer. It is important to remember that USGA refers to the **whole** construction, from the particle size of the rootzone through to the grading and depth of the drainage gravel and the diameter of drainage pipes.

The individual elements of the USGA Recommendations only work to their full potential in conjunction with one another. And so there's little point having a USGA rootzone sitting on a clay bed rather than gravel. Similarly, if a green is constructed using a USGA rootzone of insufficient depth then the rootzone will not drain as designed and may even remain waterlogged.

Issues to consider when constructing a new green

Green construction can be an expensive business and your club will need to think hard about the budget available before undertaking any construction project. But it's important to bear in mind that using inappropriate materials to cut initial construction costs could end up costing you more in the long run.

Once the green is built you obviously have to consider maintenance. Many greens are built perfectly well only to be ruined by the application of just any old top dressing. Construction is only the start of the story and, as we emphasised in our previous article, the top dressings you apply will add to and become part of the rootzone, eventually either altering or sustaining its physical (and to some extent biological) properties. This can result in the creation of 'layers' of the different materials used over time, which in turn can slow drainage considerably as the water is forced to pass through the varying particles and pore spaces of each.

Conclusions

Whilst it may be out of sight, the rootzone really is the starting point of a good green and therefore can't be overlooked. Before commencing construction it is worth taking the time to think about your long-term performance expectations and sourcing a rootzone material that can help deliver these.

This doesn't have to (and shouldn't) be left to chance if you are sourcing materials from a reputable provider. All Rufford products have been developed and tested by our Group Central Laboratory in Staffordshire - an extensive in-house laboratory that's a member of the USGA-PT programme. This allows us to provide our customers with consistent quality materials time after time.

Whilst there are many technical aspects to consider when choosing a rootzone, essentially you are looking to create (in conjunction with other construction elements) an environment in which grass roots will flourish through an optimum balance of air, space, water and nutrients. Achieve this and you'll be a long way to creating greens that will perform consistently in even the most demanding conditions!

For further information on golf course construction and maintenance visit the *Technical Pages* at www.rufford.com