



Cracking in clay soils – implications for sportsturf management

The summer of 2018 clearly demonstrated the difficulties of managing sportsturf where the soil type is a clay which shrinks and swells on wetting and drying. Much of England and Wales is covered by clay dominated soils which have a moderate to high level of shrinkage associated with them as they dry. Clay soils with high amounts of 2:1 clay minerals such as Montmorillonite, Vermiculite and Smectite are especially prone to significant shrinkage on drying which can lead to extensive, wide and deep cracks. Where shrinkage occurs near poorly designed buildings it can lead to structural damage or even collapse of walls and structures. In sportsturf, the issue is likely to result in cracks which are so large a surface becomes unsafe for use. In drained sites, as the soils shrink so the drains open up, the permeable fill drops into the trenches leaving depressions at the surface which will need topping up. In 2018, conditions were so severe even drain systems as old as 30 years dropped and required topping up again.

These soils are known as Pelosols and are described and classified in part by their propensity to crack and the degree to which they crack. In the absence of irrigation to keep the soils damp it is impossible to stop these types of soil from cracking as it is a function of the chemistry and physics of the clay minerals themselves. Put simply, with no way to water such fields, as soon as they begin to dry the soils will begin to crack. As the drying continues the cracks will become wider, deeper and more widespread. The cracks will only begin to close once it rains and the soils begin to wet again, swelling and closing the cracks as they do. In drains that have dropped, even when the soil wets and swells, the displaced permeable fill will wedge open the drain runs. In these cases, the drains will need topping up as the soil cannot push the dropped sand and gravel back up the sides of the trench to the original level.

So what can be done? Ideally install irrigation and manage the cracks that way. If you cannot water, then try the following:

- Maintain as good a grass cover as possible with as deep a root system as possible. This may mean leaving the grass longer than you normally would in dry periods. This will help to remove water from a greater depth and thus volume of soil, thus drying it on mass more slowly. Though the soil will crack, the roots will help to bind it together somewhat minimising the issues unless the dry period is prolonged.
- Soils shrink by a fixed percentage depending on the type of clay minerals in the soil. For instance, if your soil shrinks by up to 30% as it dries then if all that 30% happens along one crack line it will be very deep and very wide. Using an Earthquake or Shockwave type machine

to cut additional lines of weakness into the soil will give more cracks but the cracks will be narrower and shallower. This is a risky approach, however, as some of the cracks you introduce may dry and open more than others leading to worse surface levels.

- Work to maintain the best soil structure you can. This will aid in developing a strong sward with deep roots. As well-structured soils dry and shrink the shrinkage occurs at many scales, from the small intergranular scale to the gaps between blocks and prisms to the larger scale cracking in extreme events. As much of the shrinkage occurs between smaller structural units in the soil the overall visual impact is much less and with far less surface disruption. This means regular spiking, slitting and decompaction works to offset compaction from use. Compacted, massive clay soils will have the biggest shrinkage cracks due to a lack of good soil structure.

In some cases, such as summer 2018, even with all these mitigation measures the conditions were so dry most clay soil pitches suffered with dropped drains and cracking. In the soils that shrink the most on drying this led to astonishingly cracked surfaces that were unsafe for play. Without the ability to water groundstaff can do no more and cannot be blamed for this entirely natural process. Thankfully the summer of 2018 was a once in a generation event and unless climate change increases the occurrence of such exceptional summers, things should be easier this year.

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