



## GLASS SAND

Cameron Dawson, formerly of Keighley Golf Club, writes about the potential use of Glass Sand in Sports Turf Applications.

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On returning from my summer vacation I was surprised to receive a phone call asking me if I could attend a seminar at the STRI two days later. I was to deputise for the much written about, and august Brian Stockley, the GCMA representative at the STRI. The subject of the seminar was “Highlighting the potential of Glass Sand in Sports Turf Applications” I don’t think it was my knowledge in glass sand that brought my name to the fore it was more likely the fact that I am only 4 miles from Bingley.

### **WRAP (Waste and Resources Action Program)**

Is a company, who specialises in recycling various waste materials for use in many different applications, glass being one of those materials. Clear glass is recycled back into the glass industry but this leaves a surplus of over ½ million Tonnes of green and amber glass.

The challenge to WRAP was to find a high value use for this excess.

Their findings showed that as Golf Courses were high users of natural sand, with an estimated annual usage of 450,000 Tonnes, it was decided to fund a study by the STRI to assess the potential uses of glass sand on golf courses. The project was designed to determine whether sands derived from recycled glass would give comparable performance to good quality sands already used in the sports turf industry or indeed for certain applications whether this greater angularity may be an advantage.

Three potential areas of use for glass-derived sands were determined:

1. To assess whether glass-derived sands could be incorporated in rootzone mixtures. For golf this has particular relevance because preferred uniform, medium-coarse sands (0.25 – 1.0 mm diameter) are becoming increasingly difficult to obtain.
2. To assess whether glass-derived sands can be successfully used to improve the firmness and drainage of golf fairways. In addition, their abrasive and more angular nature may discourage earthworm casting, which is now a major problem on golf courses. If successful this would reduce the current reliance on pesticides for earthworm suppression.
3. To assess whether glass-derived sands can be successfully used in golf bunkers. Because of the greater angularity of the grains, there are potential advantages for stability, both in terms of ball impact and footing for the golfer.

## Rootzone

The objective of this section of the work was to compare selected rootzone mixes constructed with glass-derived sand with rootzones constructed with conventional sand for use in golf green construction.

## Conclusion

Glass sand had satisfied the physical needs of rootzone giving a satisfactory playing surface with good visual results. Two problem areas needed further development. The reason for the high pH value of the sand had to be addressed to give the confidence of no increase in the possibility of disease and the quality control of the glass product had to be standardised to ensure the correct size of granule could be guaranteed.

## Topdressing

The objective of this section of the study was to assess whether glass-derived sands can be used to improve the firmness and drainage of golf fairways. In addition, their abrasive and more angular nature may discourage earthworm casting and consequently may reduce the need for pest control which is now a major problem on golf courses because of the withdrawal of all pesticides which have long lasting control.

## Conclusion

Fairway topdressing with sand is slightly more beneficial than natural sand, giving an improved surface that was firmer and better drained with a good appearance. However, as with all fairway topdressing, this is an expensive operation and may be more practical if used in problem areas only on most courses. There were only occasional significant differences between the number of earthworm casts recorded on the different plots, with no differences being found between the three grades of sand, and very few differences between the three sand types. A comparison between the number of earthworm casts measured on top dressed plots with the control plots, which received no sand top dressing, was inconclusive, with no clear benefit from sand application realised in terms of a reduction in earthworm casts. However, the more sandy casts from a top-dressed area can break down more quickly with the expelled material being re-incorporated into the soil leading to a better visual quality. The theory that soils with predominantly coarse sands can deter earthworms was not supported by the evidence from this trial. However, the soil was disturbed during construction and it is recognised that earthworm populations may take some time to recover. Differences could become apparent if the trial was continued for an additional year.

## Bunkers

The objectives of this section of the study were to assess whether glass-derived sands could be successfully used in golf course bunkers. Conventional bunker sands are ideally based on relatively angular materials to give stability underfoot, better stacking of the sand against the bunker face and to reduce the risk of ball plugging excessively on impact. The angular nature of glass-derived sand may be particularly suited for this application.

## Conclusion

The increased fine material (<0.125 mm) present in the glass-derived sand significantly increased the volumetric moisture content of all grades of glass-derived sand when compared with conventional sand.

The presence of fine material within the glass-derived sand needs to be carefully screened at the production stage. The glass-derived sand was more angular than conventional sand and this led to a number of significant differences measured in the bunker sand testing. The glass-derived sand had a higher penetration resistance, lower depth of golf ball penetration and lower hardness (drop four) than the conventional sand.

These characteristics will be affected to some extent by the increased moisture content of the glass-derived sand. However, they can probably also be ascribed to the increased inter-particle friction of the glass-derived sand due to its increased angularity. These results suggest that glass-derived sands would perform well as bunker sands, providing good stability underfoot, with some golf ball plugging (to provide a challenging lie), but not as severe as many conventional sands.

Glass-derived sands also stack at a significantly steeper angle than conventional sands, which is another attribute, which may be important for some golf clubs, which wish to incorporate steep sided bunkers into their course design. The greater angle of repose will help the sand to remain against bunker faces and reduce slumping.

The traditional view of bunker sands is that they should be white / tan / light grey to provide a strong contrast with the fairways, and to stand out to the golfer whilst on the tee or playing an approach shot to the green. The predominantly green glass of the glass-derived sand has provided a source for discussion for the many visitors to the STRI over the course of the trial. The traditional outlook of many golfers may be an obstacle, which needs to be overcome before glass-derived sands would be accepted or perhaps blends incorporating clear or brown glass could be used. The issue of player safety from 'sand fly' following a golf shot from a bunker has not been addressed as it was beyond the remit of the study, however the player perception to the glass-derived sand will be an important issue, which needs to be addressed.

## Overall Conclusion

This study has highlighted that glass-derived sands would appear to pass most of the fitness for use criteria needed for applications within the sports turf area. Cost comparisons stand up well and a probable saving of over 25%, or £4 per Tonne delivered, is expected. However, issues such as the interaction between players and glass-derived sand and their perceptions to it, were beyond the remit of the study. A number of monitored on-course trials might help to address these issues of playability, and player interaction, and this could be an important next step to take to getting glass-derived sands accepted within the golfing world.

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