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Amendments for Sandy Rootzones

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Sandy rootzones are used all over the world in golf green, golf tee, and athletic field construction. Rootzone is a technical term that describes well-graded, usually amended, sand that meets certain criteria regarding particle size distribution and soil physical properties. These high sand content soil media provide desirable aeration, resistance to compaction, and adequate drainage. Two associations, among others, that offer guidelines for particle size distribution of rootzones for greens and tees construction, are the USGA (United States Golf Association, USA) and the FLL (Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V., Germany). The United States Golf Association (USGA) introduced their putting green specifications over three decades ago to provide uniform and optimum soil conditions for turfgrass growth at any given location. Since 1960, thousands of putting greens and tees have been built in accordance, or close to, these USGA guidelines.

In order to allow for fast drainage and to resist compaction even under wet conditions, USGA and FLL specifications suggest that soil particles smaller than 0.05 mm in the rootzone should not exceed 10% (by weight) of the mix. However, rootzones with this small amount of fine particles allow only about 7% (by volume) water retention at field capacity. To increase water retention of the rootzone and keep the benefits of the high sand content (drainage and aeration), USGA and FLL both suggest mixing the sand with an amendment, preferably of organic nature. Peat is predominantly used as an amendment for sandy rootzones and up until now, USGA does not recommend the use of inorganic amendments (e.g. clay based porous ceramics, lava, aminoplast polymers). However, the use of peat in golf course construction is coming under scrutiny as the supply for high quality peat is becoming more and more limited not only in Europe, but also in the USA. Research sponsored by USGA is therefore underway to investigate the possibilities of inorganic alternatives to be used as amendments in rootzone construction.

Inorganic amendments, especially aminoplast polymers, could provide a viable alternative to organic amendments for the use in sandy rootzones. Aminoplast polymers have been used as amendment for potting soil in greenhouse plants for decades and to date no negative side effects have been reported. More recently, a aminoplast polymer with the trade name 'Fytofoam' has been used successfully all over Central and Southern Europe in the modification of rootzones in green and tee construction, in athletic field renovation and construction, and in sod production. Research conducted at Michigan State University and at New Mexico State University showed an increase in water retention from 7% to about 15% at field capacity after adding 20% (by volume) of Fytofoam to sand. This increase in water retention is comparable to an 80/20 (by volume) sand and peat mix, which is considered a standard in rootzone construction. Laboratory research also showed that the water release of the Fytofoam/sand mix appears to be more gradual over a wide water tension range compared to the steeper decline in water retention of the sand/peat mix. Based on this preliminary research, aminoplast polymer amended sand could provide more plant available water over a longer period of time than a sand peat mix. In addition to an increase in water holding capacity of the Fytofoam/sand mix, the aminoplast polymer degrades over time and releases Nitrogen that can be utilized by the grass plant. Accumulation of organic matter in the rootzone should therefore occur to a lesser extent than in a peat-amended sand.

Preliminary research data and visual observation suggest that aminoplast polymers can be used as a replacement of peat in amending sandy rootzones. Fytofoam appears to be a promising alternative for rootzone modification.