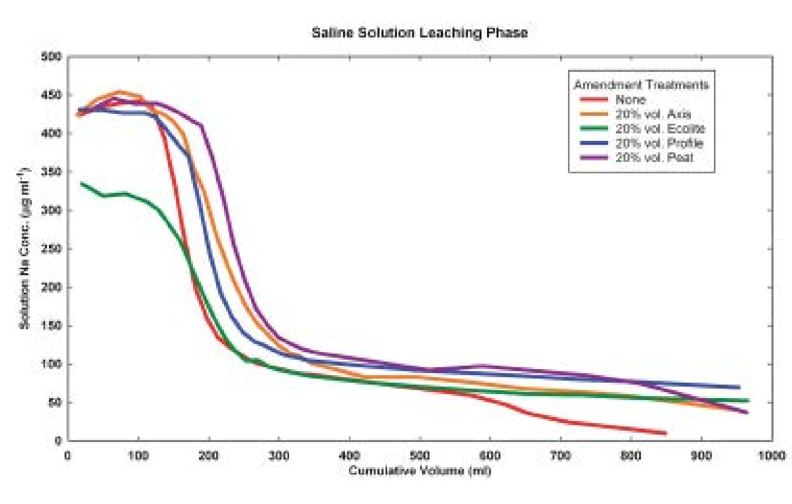
FIGURE 3



Column leachate Na concentrations as a function of cumulative leachate volume from the saline solution leaching phase.

Continued from page 43

in Na leaching were principally due to differences in initial water contents within the experimental columns. Yet following this initial Na leaching, ending at between 200 and 300 ml, there was a slower, linear decline in Na concentration that appeared quite similar for all amendment treatments. Likely this was due to cation exchange.

Thus, Na release from the root zones appeared to occur at two different rates, an early rapid rate and a later slower rate. But this too can be explained by a rule of cation exchange whereby a given cation is more easily displaced when at a high degree of saturation on the exchange complex than when at a lower degree of saturation. During the early phases of Na leaching it was likely that a high degree of Na saturation occurred on the exchange sites, resulting in easier Na displacement by the incoming solution. As Na was leached, however, the degree of Na saturation declined, making the remaining Na ions harder to displace.

Overall summary

A column leaching experiment was conducted to determine if the presence of inorganic amendments within the root zone had an influence on leaching of salts from a putting green soil profile. Comparisons were made between an unamended sand root zone and root zones containing 20 percent by volume of Axis, Ecolite, Profile, or sphagnum peat. The columns were first washed with a dilute solution and then infiltrated with a saline solution having EC_w value of 3 dS m^{-1}. Following an overnight period to drain and a drying step to concentrate the salts within the internal porosity, the columns were infiltrated with dilute $CaSO_4$. The final step was the saline solution leaching phase during which samples were collected from the outflow at the bottom of the soil profiles. These leachate solution samples were analyzed for Ca, Mg, K, Na, Cl, SO_4 and total EC_w. The resultant breakthrough curves for EC_w, Cl and Na were all similar with the earliest salt leaching occurring for the unamended sand, and the most delayed salt leaching for the peat amendment. Salt leaching for the inorganic amendments was intermediate. Further, these differences were related to the water contents of the columns prior to leaching. Thus, it appears that leaching differences between root zones are explained by the larger volume of resident, saline solution requiring greater cumulative leaching by the background solution. The Na results also showed an expected cation exchange response between the resident Na ions and the displacing Ca ions.

Consequently, the results of this research failed to find a salinity hazard from the use of high rates of inorganic amendments within turfgrass root zones. Diffusive salt exchange between the leachable, inter-particle porosity and the non-leachable, internal porosity was sufficiently rapid, such that a typical irrigation cycle should displace accumulated salts. Responses due to cation exchange, a perceived benefit of both organic and inorganic amendments, were, however, also apparent.

Ed McCoy and Keith Diedrick are in the School of Natural Resources at The Ohio State University. Inquiries can be directed to mccoy.13@osu.edu.

FUNDING SOURCES

This research was funded by Profile Products, LLC, Buffalo Grove, Ill.

REFERENCES

Bigelow, C.A., D.C. Bowman and D.K. Cassel. 2004. Physical properties of three sand size classes amended with inorganic materials or sphagnum peat moss for putting green rootzones. Crop Sci. 44:900–907.

McCoy, E.L. and R.C. Stehouwer. 1998. Water and nutrient retention properties of internally porous inorganic amendments in high sand content root zones. J. Turfgrass Mgmt. 2(4):49-69.

Ad Index