

MAGCS Directors Column

WHERE'S THE ROOTS?

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When you are out changing cups this spring and you examine the plug, what do you observe? Stratified layers of sand, soil, thatch, and mat on top of more coarse sand and muck (the original greens mix). Oh, and there's a small amount of calcined clay down there too. Your next question is, where's the roots? Mostly in the thatch and mat but there's a few white ones reaching into the "original soil". This is ridiculous, it's only May 1st, by August 1st the roots will be microscopic. Let's put the plug back before it breaks, besides, the odor of this anerobic soil is quite offensive.

Hopefully, this is not your scenario, but poor soils do exist on many golf courses in the Chicagoland area. We must remember that we are dealing strictly with an artificial ecosystem in regards to soils used as a growing medium for creeping bentgrass. Whether they consist of sand, silt, clay, peat, muck, or various mixtures and percentages of each, they must be able to support plant life. A soil capable of producing optimum plant growth contains 50% solids and 50% pores. 25% of those pores should contain water and the other 25% soil air.

The majority of the golf greens I have sampled exhibit far less than 50% pore space. Numerous factors such as foot traffic, mower traffic, extended use of arsenicals, heavy metals, persistent insecticides, and poor cultural practices all tend to reduce the percentage of pore spaces. Remember that turfgrass roots don't grow in soil, they proliferate in soil air. The less soil pore space (aeration porosity), the less total root area the plant will attain. Top growth is directly proportionate to root growth and vice versa. For example, when you place a roll of sod on concrete it can be kept alive with daily watering. After three months the grass is still "surviving", but exhibits little leaf, stolon, or rhizome growth and stunted roots. Plant roots must have oxygen to survive, and they will take the path of least resistance to obtain it. Even if it means the development of adventitious roots in the airy thatch layer. This is the basis for thatch development, hydrophobic thatch and soil, localized dry spots, wet wilt, puffiness, footprinting, scalping, and poor plant response to fertilizers and pesticides.

Roots are the best indicator of poor soil conditions. If the roots can't survive in the soil, what can? All chemical and biological soil processes are adversely affected. All complex processes of natural soil formation, mineralization, oxidation of organic matter, etc., are reduced, rendering soils less productive. The soil fauna such as earthworms and beneficial insect populations are also greatly reduced or eliminated. How long has it been since you've seen earthworms on your greens after a heavy summer rain? Earthworms are the best aerators we will ever possess. Admittedly, their castings are unsightly and undesirable on the putting greens, but they are responsible for the mechanical mixing of surface organic matter debris with soil. They are our primary means of organic matter introduction into the soil leading to the subsequent humus forming process. All of these processes are virtually non-existent on golf course greens.

As superintendents, what programs can we implement to improve soil conditions? We have no alternative but to improve our management of the soil through cultural practices, which

will in turn stimulate nature's production of a healthier soil and turfgrass plant. I define cultural practices as any entity in the turfgrass environment that we as superintendents have control over. The following are some of the most important prerequisites for better soil conditions.

1. Observe your soils periodically, look for structure, feel the texture, smell if the soil is sweet or sour.
2. Have your soil tested every three years by the best laboratory you can find. They should test for essential elements N, P, K, Ca, Mg, S, Fe, Mn, B, Cu, Zn, also pH, total exchange capacity, % base saturation, % organic matter, sodium content, chlorides, and salt concentration. Have the irrigation water tested regardless of the source - ponds, wells, municipal supply, etc.
3. Correlate tissue tests with soil tests.
4. Balance your fertility program around soil test recommendations and the individual turfgrass species and cultivar nutritional requirements.
5. Avoid use of high salt index fertilizers.
6. Supply no more nutrients than is necessary to achieve the desired turfgrass response.
7. Avoid use of arsenicals, heavy metals, and persistent insecticides. Research has proven these materials have a deleterious effect on the soil flora and fauna.
8. Apply no more fungicides, herbicides, insecticides, or wetting agents than is absolutely necessary for control of pests. Many of these products have a harmful side-effect on soil bacteria.
9. Hire a soil laboratory to perform a mechanical analysis of your soil to determine percent sand, silt, clay, organic matter content.
10. Provide for surface and subsurface drainage.
11. Don't over irrigate.
12. Restrict player and equipment traffic when soils are saturated or cold.
13. Core cultivate with a Greensaire as frequent as possible, preferably spring and fall. With any other machine, you're just 'whistling Dixie'. We all know the benefits coring can provide, for we're now using them on fairways. The benefits will far outweigh the costs of such a program.
14. Incorporate topdressing that will improve not only the soil physical properties such as aeration porosity, infiltration percolation, lateral movement but also the chemical and biological properties. Topdressing material should consist of a texture comparable to that of the underlying soil assuming the root zone has good physical characteristics. Fine textured problem soils would benefit most from a long term use of a coarse textured sand soil mix. At this time, I cannot recommend the use of pure fine sand topdressing unless it is used on a green constructed of pure fine sand. I agree with Warren Bidwell and others who agree that this type of program is a quick fix for an underlying problem.
15. Vertical mow and brush to provide a grain-free, smooth, dense putting surface.
16. Mow at the proper height for your particular cultivar.

In summary, we must realize that golf green soils and the resulting turfgrass ecosystem is extremely complex. We must help Mother nature in all her processes rather than inhibiting them. Let's get to the root of the problem.