

Precision Turf Management - A Look To The Future ?

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Environmental and soil conditions can vary widely on a golf course, often resulting in distinct differences in turf quality, even within a given fairway or green. Turf management problems encountered by managers, including drought stress, pests, disease, fertility, compaction, and drainage, are often site-specific rather than uniformly expressed over a management area. While current practices often treat such problems "wall-to-wall", the spotty nature of management problems raises questions as to how these varying conditions can or should affect turf management practices. Does the entire fairway need the same aerification or fertilization? Or does the entire green need the same topdressing or grooming program? How much variation in management is needed when there are multiple tees that receive different levels of traffic?

Variations in some environmental conditions on a golf course are often obvious. Examples include shade, air flow, slope, or traffic. It is no surprise to superintendents that traffic patterns of golfers are nonuniform. Turf diseases are classically nonuniform and therefore spatially variable as well. However, not all variations in environmental and soil conditions are so obvious. For example, considering the amount of soil that has been moved on many courses during construction, one might expect considerable variation in soil texture. Also, either because of soil movement or natural variation in Michigan soils, wide variation can be expected in the amount of clay, organic matter or fertility levels. A sense for the amount of variability observed in golf courses can be had by inspecting maps of soil test P and K and the corresponding fertilizer recommendations for one hole of a local golf course near Lansing, MI. The maps were developed from data obtained by the students in the spring 1998 soil management class at MSU.

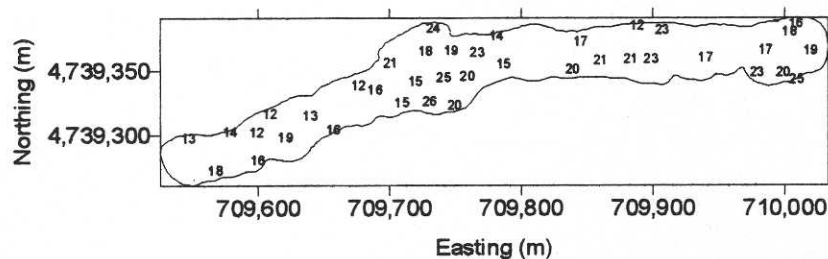
Because spatial variation in turf condition is common and to be expected, it makes sense that differing conditions should justify differing management practices. But is site-specific turf management possible? The answer is forthcoming.

Precision turf management involves the precise application of turf management practices to localized soil and turf conditions. Precision turf management is enabled by the emergence of specific technologies including computers, global position systems (GPS), geographic information systems (GIS), sensors, and application control systems. These enabling technologies make it possible to assess the spatial and temporal variability in turf conditions across a golf course, identify and diagnose potential problems, and treat problems site-specifically with accurately controlled inputs. This type of management can not only improve turf quality but should have both economic and environmental benefits to golf courses. Several companies are now working on developing hard ware and soft ware to help turf managers adapt precision turf management. For example, the Toro Co. is currently supporting this type of research at M.S.U. Other commercial ventures have emerged, such as PRECISION TURF, AGRI-GROWTH, INC., of Hollandale, MN, which offers aerial imagery services to golf courses. Aerial imagery, properly interpreted, can be successfully used to identify and diagnose management problems on a timely basis for effective turf management.

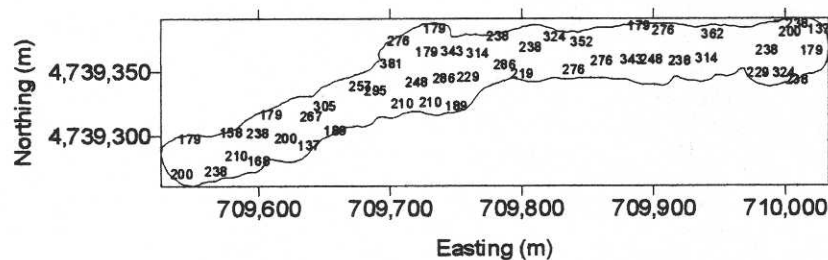
It appears that precision turf management will soon become a reality. It is only a matter of time before such practices are used in Michigan turf management.

Figure 1. Maps showing posted values of soil properties for a single hole at a local golf course near Lansing Michigan (Pierce, unpublished data).

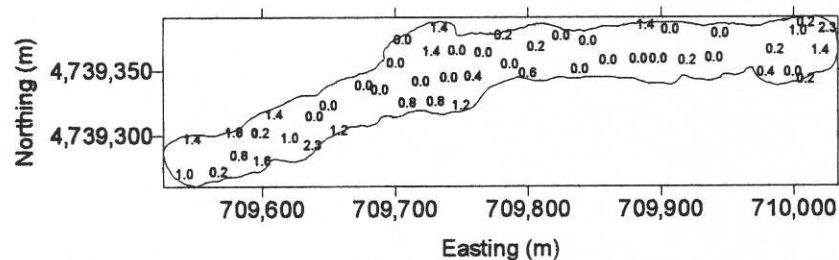
1/3 bar available water capacity



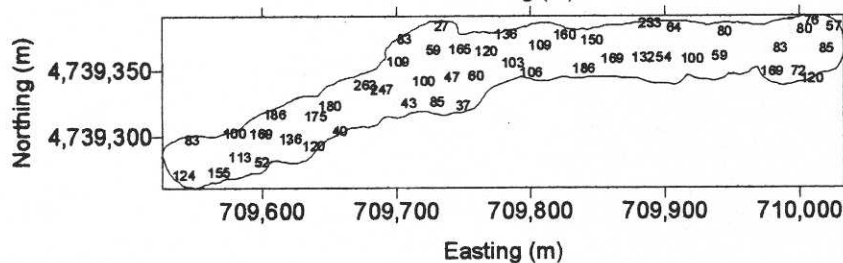
Soil Test P (lbs K/acre)



K Fertilizer Recommendations
Lbs K₂O/1000 ft²



Soil Test P (lbs P/acre)



P Fertilizer Recommendation
Lbs P₂O₅/1000 ft²

