UNIFORMITY AND SPATIAL VARIABILITY OF SOIL MOISTURE AND IRRIGATION DISTRIBUTION ON NATURAL TURFGRASS SPORTS FIELDS

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Sports field irrigation systems are a common management tool that aid in maintaining turfgrass growth during dry periods. A uniform application of water is desired to promote water conservation and homogeneous playing conditions. The catch can (CC) method to calculate the lower quarter distribution uniformity (DUlq) is the most widely used method of evaluating irrigation system performance in turfgrass. However, this technique provides no indication of water infiltration and redistribution following application. Emerging technology that couples spatial irrigation distribution data with spatial plant and soil property data may provide a more robust assessment of system performance. Research was conducted on a native soil and sand capped sports field to 1) compare the DUlq and spatial variability of soil moisture (volumetric water content; VWC) and irrigation distribution (using the CC method), 2) investigate the influence of CC amount, soil compaction (penetration resistance), and turfgrass vigor (normalized difference vegetative index; NDVI) on VWC, and 3) delineate and compare site-specific management units (SSMUs) for VWC and CC amount in order to generate more informed irrigation-based management decisions. VWC DUlq was much higher than CC DUlq on the native soil field. Spatial maps of VWC and CC amount indicated that the spatial variability of VWC was not reflected in the spatial variability of CC amount on either field. Penetration resistance and NDVI were significant at predicting VWC on the native soil field ($P < 0.001$ and 0.01, respectively), and their spatial maps resembled the VWC map. Only CC amount was significant at predicting VWC on the sand capped field ($P < 0.001$), but their spatial maps were dissimilar. In conclusion, CC amount SSMUs would be useful to visually identify deficiencies in an irrigation system. VWC SSMUs would be useful for site-specific irrigation applications, soil moisture sensor placement, or aerification to improve irrigation efficiency.

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