

WATER USE AND DROUGHT RESPONSES
OF COOL-SEASON TURFGRASSES

BY

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ABSTRACT

Evapotranspiration (ET) rates of four turfgrass species were compared in Rhode Island to aid in the selection of grasses with lower water requirements. ET was measured under well-watered conditions using weighing lysimeters placed into field plots of mature turf. Measurements were obtained regularly from July to September in 1984 and 1985. Average daily ET ranged from 0.23 to 0.41 cm of water/day for: Poa pratensis L. cvs. 'Baron' and 'Enmundi', Lolium perenne L. cv. 'Yorktown II', Festuca rubra var. *commutata* Gaud. cv. 'Jamestown', and Festuca ovina var. *duriuscula* L. Koch cv. 'Tournament'. Significant differences in ET rates were found between species. Kentucky bluegrass and perennial ryegrass transpired more than the fescues.

Potential ET was computed using the modified Penman equation and the pan evaporation methods. Crop coefficients (KCs) were calculated to determine the predictive consistency of the methods. Seasonal KCs based on the Penman equation ranged from 0.88 to 1.09. KCs based on pan evaporation showed more variability, ranging from 0.86 to 1.35.

The response of the same turfgrasses to moisture stress was investigated. Six lysimeters of each species and six well-watered control lysimeters were included in a greenhouse study; four lysimeters of each were used in a field study. The relationship between water loss due to ET and soil water potential was determined using tensiometers and electrical resistance blocks installed in separate lysimeters.

ET rates of all species remained unaffected by decreasing soil water potential until it reached -0.6 to -0.8 bars, after which ET rates declined. This decline corresponded to a decline in turf quality, growth rate, and relative leaf water content. Leaf water potential decreased 50-75% when soil water potential declined to -0.8 bars but did not continue to decrease when soil water potential became more negative. No consistent increase in canopy temperature was noted until available soil water approached permanent wilting point.

Kentucky bluegrass and perennial ryegrass showed the most rapid response to moisture stress. Hard fescue was the most drought tolerant of the four species.