

DROUGHT TOLERANCE OF SUGAR MAPLE ECOTYPES

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Abstract: Sugar maple declines periodically occur in rural and urban areas. These declines usually follow periods of below-average precipitation leading to the speculation that moisture deficiency is a primary cause of the decline. Sugar maple ecotypes with greater tolerance to drought should have greater longevity and vitality as a result of this tolerance. Sugar maple and black maple trees from the western and southern range of these species purportedly have greater drought tolerance. However, the quantification of physiological, morphological, and anatomical characteristics to explain and substantiate this purported tolerance is lacking. We present results on the response of greenhouse grown seedlings of five ecotypes from Oklahoma, Missouri, Iowa, Tennessee, and Ontario to experimental drought. Plant water relations (net photosynthesis, stomatal conductance, and water use efficiency) and tissue water relations (modulus of elasticity, osmotic potential at 0 and 100 percent turgor, and relative water content at 0 turgor) were used to test for variation in drought tolerance. Xylem anatomy, leaf structure and biomass partitioning further differentiated ecotypic variation.

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