

## **Comparing Substrate Moisture-Based Daily Water Use and On-Demand Irrigation Regimes for Oakleaf Hydrangea Plants Grown in Two Container Sizes<sup>©</sup>**

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Independently controlled irrigation plots were designed to test two container nursery irrigation regimes on 1 and 3-gal oakleaf hydrangea (*Hydrangea quercifolia* 'Alice'). Plants were automatically irrigated by one of two soil moisture probe-based regimes: (1) A daily water use (DWU) system that delivered the exact quantity of water that had been lost in the previous 24 h and (2) An on-demand (OD) irrigation system based on the relationship between substrate moisture level and photosynthetic rate. In this system, irrigation was applied when the substrate moisture level fell below 33% container capacity, which corresponded to 90% maximum predicted photosynthetic rate. Both treatments delivered the exact amount of water required to return the containers to container capacity by overhead irrigation. Photosynthesis rates, leaf water potential, transpiration, and stomatal conductance were measured at the driest points throughout the experiment. Gas exchange was measured at the driest point prior to the next irrigation event. Biomass and growth index were measured after approximately 35 days in production. In plants produced in 3-gal containers, photosynthesis, stomatal conductance, and transpiration were not different for the two irrigation regimes. Leaf water potential, leaf temperature, and vapor pressure deficit were also not different for the two treatments. Also, total dry weight was not different, 161 and 121 g for DWU and OD, respectively ( $p=0.0623$ ); however, growth index was greater for DWU than OD, 70.9 and 60.6, respectively. Water use efficiency per irrigation zone was greater for OD than DWU, 5.9 and 3.8  $\text{g}\cdot\text{L}^{-1}$ , respectively. Season-long water use per zone was greater by more than 2 fold for DWU than OD, 351 and 164 L, respectively. For plants grown in 1-gal containers, total dry weight (22.9 and 24.1 g) and growth index (35.9 and 36.6) did not differ, for OD and DWU, respectively.

