XVII Congresso Brasileiro de Floricultura e Plantas Ornamentais
IV Congresso Brasileiro de Cultura de Tecidos de Plantas
Sociedade Brasileira de Floricultura e Plantas Ornamentais – SBFPO
Associação Brasileira de Cultura de Tecidos de Plantas – ABCTP

Calibration of TDR sensors in container substrate for growing woody ornamentals[*]

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There are many advantages of ornamental plant production in containers. However, due to specific characteristics of the substrate used in this type of production, reliable monitoring of moisture content in the plant root zone is difficult to perform. This monitoring is necessary for efficient and economical irrigation management in containerized plant production. The objective of this paper was to present the calibration curve of Time Domain Reflectometry (TDR) sensors for monitoring substrate water content (SWC) of a growing medium (45% peat, 50% pine bark, and 5% sand) used for commercial production of woody ornamental plants (*Magnolia grandiflora* 'D.D. Blanchard'), in Florida, USA. Six containers with substrate were brought from the production nursery to the laboratory and subjected to 24 hours of saturation. Each 56.8-L plastic container received one sensor, which was connected to a CR10 datalogger, allowing continuous moisture monitoring in the substrate during three months. The values of substrate moisture content (SMC), in cm^3cm^{-3}, were obtained gravimetrically and compared to the output period (OP), in μs, from the TDR sensors, stored in the datalogger, at several levels of substrate moisture. The specific calibration curve showed that 11 to 25% more volumetric water was available in the substrate when compared to the factory curve, which is normally used for mineral substrates. The resulting calibration equation for the studied growing medium was $SMC = -0.00003(OP)^2 + 0.0339(OP) - 0.3863$, with $R^2 = 0.9753$. Determination of specific calibration equation for each type of growing substrate for containerized plant production is highly recommended.

Key-words: *Magnolia grandiflora*; nursery production; irrigation management; instrumentation.