

Public Abstract

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Department:Forestry

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Title:Quantifying Microclimate Heterogeneity within a Contemporary Plant Growth Facility

Three separate contemporary climate controlled greenhouse rooms in the Sears Plant Growth Facility located at the University of Missouri, Columbia, MO, USA were selected for microclimate analysis. Temperature, relative humidity, and incoming solar radiation data were logged hourly between 5/9/12 and 9/5/12 to test the efficacy of current management practices and to improve understanding of the spatial and temporal climate variability inside the greenhouse rooms. The average horizontal temperature gradient was $0.08\text{ }^{\circ}\text{C}\times\text{m}^{-1}$ and the maximum horizontal temperature gradient was $0.83\text{ }^{\circ}\text{C}\times\text{m}^{-1}$. The average vertical temperature gradient was $2.27\text{ }^{\circ}\text{C}\times\text{m}^{-1}$ and the maximum lapse rate was $11.65\text{ }^{\circ}\text{C}\times\text{m}^{-1}$. Vapor pressure deficit (VPD) calculations were made using data as a proxy to assess plant physiological response to internal conditions. The average horizontal VPD gradient was $0.025\text{ kPa}\times\text{m}^{-1}$ and the maximum VPD gradient was $0.350\text{ kPa}\times\text{m}^{-1}$. Collectively, results indicate a heterogenous distribution of temperature and vapor pressure deficit created primarily by the active cooling system. Several recommendations are supplied to improve the homogeneity of the internal greenhouse climate, which will lead to increased productivity and profits for greenhouse managers.