

# Well-watered citrus tested in cold-acclimating temperatures

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Commercial citrus growers are often challenged by environmental conditions in winter, including low seasonal rainfall that is typical in many citrus growing regions. Growers must rely on irrigation to sustain citrus crops through dry winters, so understanding how to determine citrus irrigation needs is critical for successful operations. Authors of a study published in *HortScience* noted that current methods used to determine moisture needs for citrus are limited, in that they do not account for effects of cold acclimation on water requirements.

"Evidence suggests that at least some changes in plant water deficits occur as a result of cold temperatures and not dry soil," noted Robert Ebel, lead author of the study. "Changes in citrus water relations during cold acclimation and independent of soil moisture content are not well understood. Our study was conducted to characterize changes in plant relations of citrus plants with soil moisture carefully maintained at high levels to minimize drought stress."

Ebel and his colleagues conducted two experiments—the first in Immokalee, Florida, using potted sweet orange, and the second in Auburn, Alabama, using Satsuma mandarin trees. The [citrus](#) plants were exposed to progressively lower, non-freezing temperatures for 9 weeks. During the experiments trees were watered twice daily—three times on the days data were collected—to minimize drought stress.

Results of the experiments showed that soil moisture was higher for plants in the cold compared to plants in the warm chamber, and results showed that [cold temperatures](#) promoted stomatal closure, higher root

resistance, lower stem water potential, lower transpiration, and lower stem water potential. Leaf relative water content was not different for cold-acclimated trees compared with the control trees. The key to minimizing [drought stress](#), the scientists found, was carefully maintaining high [soil moisture](#) contents throughout the experiments, especially on the days that the measurements were performed.

"Our modern understanding of plant water relations has mainly evolved from studying growing plants at warm temperatures and in soils of varying moisture contents," Ebel explained. "However, this study demonstrates that those relationships are not consistent for [citrus trees](#) exposed to cold-acclimating temperatures."

The authors added that the study findings could have implications for commercial citrus growers who currently use traditional measures of determining irrigation scheduling during winter months.

**More information:** The complete study and abstract are available on the ASHS *HortScience* website: [hortsci.ashspublications.org/c ... /48/10/1309.abstract](http://hortsci.ashspublications.org/content/48/10/1309.abstract)

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