Salinity Sensitivity of Anemone and Ranunculus Flowers

Full-spectrum Quantum PAR Meter SP-230-SS Heated Pyranometer
MC-100 Chlorophyll Concentration

Introduction:

In response to the growing demand for specialty cut flowers, floral crops are increasingly produced in semiarid areas where soil salinity can impact crop timing, reduce stem length, and decrease yield. The goal of this study was to investigate the salinity sensitivity of 'Carmel' and 'Galilee' anemone (*Anemone coronaria*), and 'Amandine' and 'LaBelle' ranunculus (*Ranunculus asiaticus*) with respect to physiological characteristics and marketable yield. Anemone and ranunculus are cool-season perennials typically cultivated for cut flower production.

Set Up:

This study took place at the Utah State University Research Greenhouse. Flower tubers were obtained of each flower and were eventually transplanted into soilless growing media. Nine plants, a total of 108 ranunculus and 54 anemones, were irrigated weekly for eight weeks with a nutrient (control) solution with an electrical conductivity (EC) of 0.5 $dS \cdot m^{-1}$ or saline solutions prepared by adding sodium chloride and calcium chloride dihydrate to a nutrient solution to obtain an EC of 1.5, 2.5, 3.5, 4.5, or 5.5 dS·m−1. Light intensities were recorded hourly using an Apogee heated, silicon-chip pyranometer mounted to a weather station. Supplemental light was also measured with an Apogee quantum meter. The flower's leaf greenness was measured using an Apogee handheld chlorophyll meter.

Results:

Flower yield was evaluated by dividing stems into marketable and cull grades based on length and bloom quality. At the end of the study, the visual quality of the plants was scored, and gas exchange data were collected using a portable photosynthesis system. Cultivars of each species responded similarly, and marketable yields were low across all treatments, with average marketable yields (mean ± SD) of 1.7 ± 0.6 stems/plant for anemone and 1.2 ± 0.1 stems/plant for ranunculus. Visual quality (0–5 scale, with 0 = dead and 5 = excellent) decreased from 3 to 1 for anemone and 3 to 2 for ranunculus as EC increased from 0.5 to 4.5 $dS \cdot m^{-1}$ and 0.5 to 5.5 $dS \cdot m^{-1}$, respectively. Anemone leaf greenness decreased by 48%, stomatal conductance decreased by 79%, transpiration decreased by 75%, and net photosynthesis decreased by 92% when irrigation solution EC increased from 0.5 to 4.5 $dS \cdot m^{-1}$. The ranunculus growth index decreased by 17%, leaf greenness decreased by 45%, and transpiration decreased by 23% as irrigation solution EC increased from 0.5 to 5.5 $dS \cdot m^{-1}$.

Conclusion:

Both anemone and ranunculus flowers can be considered sensitive to salinity, indicating the importance of careful soil management in cut flower production systems in semiarid areas that are at risk for elevated soil salinity.

Application Summary

Summary:

Apogee's pyranometer, full-spectrum quantum meter, and chlorophyll concentration meter were used to study the salinity sensitivity of anemone and ranunculus flowers.

Apogee Sensors Used:

- SP-230-SS Pyranometer
- Full-spectrum Quantum Meter
- MC-100 Chlorophyll Meter

Organization:

Department of Plants, Soils, and Climate at Utah State University

Location:

Logan, Utah, USA

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Reference Article:

Visual Quality, Gas Exchange, and Yield of Anemone and Ranunculus Irrigated with Saline Water