Journal of Aquatic Plant Management – Volume 57, 2019

January

Utilizing remote sensing technology for monitoring chemically managed giant salvinia (*Salvinia molesta*) populations

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Thousands of acres of giant salvinia (*Salvinia molesta*) are managed annually in Louisiana and Texas, but management success is difficult to measure quantitatively. The objective of this research was to evaluate and develop remote sensing techniques to quickly and accurately assess giant salvinia health and herbicide efficacy in a field scenario. Field sampling data from Saline Lake, LA documented a negative correlation (R^2 = 0.785) between Landsat near-infrared (NIR) reflectance and visual percent control ratings. Additional research utilizing high-resolution WorldView-3 reflectance data indicated that percent control and NIR reflectance of giant salvinia in sampled plots were significantly correlated at 2 and 6 wk after treatment, with $P = 0.047$ and $P < 0.0001$, respectively. Additional data collected with a DJI Phantom drone and low-cost RGNIR Sentera Single Sensor during an 8-wk mesocosm study documented the strongest linear relationship (R^2 = 0.914) between percent control and NIR reflectance values, and the resulting linear regression equation was used to predict percent control values utilizing data collected in previous studies. The relationship between predicted and observed percent control values was linear and significant ($P <= 0.0001$) and yielded R and R^2 values of 0.918 and 0.843, respectively. On the basis of the NIR spectral response of giant salvinia to herbicide applications, remote sensing can provide beneficial information on the success or failure of large-scale herbicide applications.

Key words: drone, efficacy, herbicide, near-infrared, predict, reflectance, regression, satellite imagery.