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Cellular-level visualization of salinity stress responses in *Wolffia australiana*

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Wolffia australiana offers a unique opportunity to study spatial variation in stress responses given a small portion of its tissue is exposed to air while the remainder is submerged in water, creating distinct above- and below-water regions within a physically condensed space (<1 mm in diameter). As a result, in a high saline environment, the below-water region has direct exposure to sodium chloride, while the above-water tissue does not. Previous research has shown which gene regulatory networks are induced during salinity stress across the whole tissue of a variety of duckweed species. However, the spatial organization of these transcriptomic responses has not been elucidated. As a first step towards addressing this question, we sought to identify where sodium ions accumulate spatially and the corresponding physiological impacts. To visualize the cellular-level physiological impact of salinity stress on *W. australiana*, this project uses fluorescent stains and indicators under confocal microscopy. CoroNa Green, a cell-permeant compound that fluoresces upon binding sodium ions, is used to spatially observe sodium ion accumulation. In tandem, we spatially observe and quantify both chlorophyll autofluorescence and reactive oxygen species production as proxies for photosynthetic productivity and oxidative stress, respectively. Together, these measurements reveal cellular-level differences in stress exposure, suggesting compartmentalized stress responses between the above- and below-water tissues.

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References

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