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Non-invasive estimation of duckweed biomass quality can be achievable by spectral signatures

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Commercial duckweed cultivation may require regular monitoring of biomass quality, but chemical analyses can be laborious and costly. Optical signatures –that is selective light absorbance- of fronds would offer a promising alternative, yet reports on testing such proxies on duckweeds are still scarcely available. To address this knowledge gap, we tested light transmittance- and reflectance-derived indices of duckweed fronds as quick tools in estimating biomass quality.

We analyzed biochemical and optical traits in a total of 9 duckweed clones belonging to 3 widely spread species with economic potential: *Lemna gibba*, *Lemna minor* and *Spirodela polyrrhiza*. The plants were cultivated in a growth chamber under 2 different light intensities, and the studied parameters included relative growth rate, dry matter content, protein and photosynthetic pigment contents, as well as various indices derived from hyperspectral reflectance spectra and frond transmittance.

Our results indicated strongly interrelated frond traits. Reflectance indices also correlated well with protein and photosynthetic pigment concentrations in the biomass. Similarly, frond transmittance assessed by a hand-held chlorophyll meter proved to be reliable in estimating protein content of the biomass. Optical signatures, therefore, can be applicable in routine monitoring of biomass quality and physiological status of duckweed cultures in larger-scale applications too.

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References

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