



Contribution ID : 92

Type : **Poster**

Influence of recipient gas-exchange capacity on axenic in vitro cultivation of *Wolffia arrhiza*

martedì 29 settembre 2026 18:00 (15)

The rising demand for sustainable food sources has brought attention to unconventional and innovative alternatives like duckweed, a small aquatic plant recognized for its rapid growth rate and high nutritional value. To initiate large-scale cultivation, sufficient sterile biomass must first be produced from axenic in vitro stock cultures. Therefore, this study evaluated the effect of recipient gas exchange capacity on relative growth rate (RGR) and nutrient medium pH for two *W. arrhiza* clones at 7 and 14 days of in vitro cultivation. Plants were grown axenically in liquid N-medium with an adjusted $\text{NO}_3^-/\text{NH}_4^+$ ratio of 90/10, under controlled environmental conditions (25.2 ± 0.8 °C, $150 \mu\text{mol m}^{-2} \text{s}^{-1}$, 50% RH, 16:8 h light:dark), with five biological replicates per treatment. Four recipient types were used: sterile parafilm-sealed jars (no gas exchange) and Microbox Eco2 containers with increasing gas exchange capacity (L, XL, XXL). One clone generally showed higher RGR than the other. Recipient effects on RGR showed no uniform significant differences among gas-exchange treatments. Medium pH decreased over time in all treatments, consistent with preferential NH_4^+ uptake and associated proton release into the medium. These results demonstrate that gas exchange influences in vitro *Wolffia* cultivation, mainly through changes in medium pH, while clone identity remains a dominant driver of growth performance

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Scientific Session

Keywords

Phytoremediation; Biodiversity; Dairy-wastewater; Duckweed

References

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