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Microbiome Assembly and Transmission Across the Turion–Vegetative Growth Cycle in *Spirodela polyrhiza*

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Duckweeds are small, fast-growing aquatic plants that provide a useful model for studying plant–microbiome interactions in aquatic environments. Among them, *Spirodela polyrhiza* is particularly interesting because it can switch from active vegetative growth to dormant turion formation (starch-rich vegetative propagules), in a turion–plant–turion cycle that allows to examine plant-associated microbiome transmission across contrasting developmental stages within a clonal lineage. We investigated the transmission of epiphytic and endophytic microbiomes across the life cycle of *S. polyrhiza*. Specifically, we examined whether microbial communities associated with turions persist during germination and vegetative growth, and whether newly formed turions retain microbial signatures from the preceding plant stage. We also compared epiphytic and endophytic fractions to determine whether they display distinct patterns of continuity, turnover, and reassembly. Our results indicate that microbiome transmission across the growth cycle involves both persistence and community reassembly. Turion-associated communities partially overlapped with those of fronds and roots, showing that a subset of microorganisms was retained across developmental transitions, yet with substantial community turnover, and variation associated with plant genotype and the surrounding medium. Epiphytic and endophytic communities were not completely differentiated based on their overall composition. We hypothesize that endophytic communities show stronger persistence across developmental transitions, whereas epiphytic communities are more strongly reshaped by interactions with the surrounding aquatic environment. By resolving microbiome dynamics across the turion–plant–turion cycle, this study clarifies the role of dormant vegetative propagules in maintaining host-associated microbial communities and improves our understanding of microbiome transmission in clonal aquatic plants.

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References

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