

Physiological integration improves nitrogen use efficiency of moso bamboo: an isotopic (^{15}N) assessment

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Abstract: **【Objective】** Physiological integration is a means of adapting to the natural selection of moso bamboo. Connected ramets can translocate and share nitrogen (N). This phenomenon may affect the nitrogen use efficiency (NUE) of moso bamboo. The aims of this study were to investigate the characteristics of N physiological integration and its relationship with NUE of moso bamboo. **【Method】** We established an in-situ experiment to trace the movement of ^{15}N between connected ramets (parent and offspring ramets) of moso bamboo in both homogeneous and heterogeneous N conditions. **【Results】** Results showed that ^{15}N sharing within the clonal systems of moso bamboo was detected in both homogeneous and heterogeneous environments, and ^{15}N translocation was bidirectional between the connected ramets. The intensity of physiological integration (IPI) was relatively low in homogeneous environments, and the connected ramets of moso bamboo were selfish. ^{15}N translocation between the connected ramets of moso bamboo was determined by the demand-driven source-sink relationship in heterogeneous environments, and the fertilized ramets of moso bamboo were selfish. The NUE of the connected treatment was significantly higher than that of the severed treatment, illustrating that physiological integration significantly improved the NUE of moso bamboo. Additionally, the NUE in heterogeneous environments was significantly higher than that in homogeneous environments. **【Conclusion】** Our results clearly demonstrate that N is readily translocated between the connected ramets of moso bamboo, particularly in heterogeneous environments, which provides reference for precision fertilization management in moso bamboo forests.

Keywords: *Phyllostachys edulis*; Physiological integration; Clonal growth; N translocation; NUE

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