

毛竹实生苗氮素吸收与分配利用特征研究

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摘要:【目的】探究毛竹 (*Phyllostachys edulis*) 苗期生长过程中养分的分配利用规律, 为指导毛竹林的精准施肥及可持续经营提供科学依据。【方法】在氮饥饿环境下, 运用尿素-¹⁵N 分别标记毛竹实生苗克隆分株 (母株) 及克隆分株 (子株), 进行氮素异质性处理实验, 通过 ¹⁵N 同位素示踪技术, 分析各克隆分株之间 N 素的分配及利用情况。【结果】毛竹实生苗丛克隆系统对 ¹⁵N 的吸收、分配及利用趋势均一致。1) ¹⁵N 标记一年生子竹时, 克隆系统各器官对氮素的吸收、分配及利用均为 ¹⁵N 子竹鞭根>¹⁵N 子母竹间鞭根>¹⁵N 子竹叶>¹⁵N 子竹竹鞭=¹⁵N 子母竹间竹鞭>¹⁵N 子竹枝>¹⁵N 子竹秆>母竹叶>母竹枝>母竹秆>子竹叶=子竹竹鞭=子母竹间竹鞭>子竹枝=子竹秆>子竹鞭根>母竹鞭根>子母竹间鞭根; 2) ¹⁵N 标记二年生母竹时, 克隆系统分株各器官对氮素的吸收、分配及利用均为: ¹⁵N 母竹竹鞭>¹⁵N 母竹鞭根>¹⁵N 母竹叶>子竹叶>¹⁵N 子母竹间鞭根>子竹竹鞭>¹⁵N 母竹秆>子竹鞭根>子竹枝>子竹秆。【结论】毛竹克隆整合存在明显的“向顶运输”规律及年龄效应, 只施氮肥于 1 年生子竹整个克隆系统对氮素的吸收及分配利用高于只施 2 年生母竹, 且二者都比均匀施肥于整个克隆系统更利于毛竹克隆系统对氮素的吸收及分配利用。因此实际生活中, 可以选择喷施叶肥以减弱“向顶运输”规律, 增强竹秆的养分吸收; 同时, 只对 1 年生子竹进行施肥, 可以最有效的减少肥料的使用量, 提高整个克隆系统肥料的利用率。

关键词: 毛竹; ¹⁵N 同位素示踪; 分配; 利用

Study on the characteristics of nitrogen absorption, Distribution and Utilization of *Phyllostachys pubescens* seedlings

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Abstract: 【Objective】To explore the distribution and utilization of nutrients in the growth process of *Phyllostachys pubescens* (*Phyllostachys edulis*) at seedling stage, so as to provide scientific basis for guiding precise fertilization and sustainable management of Moso bamboo forest. 【Methods】Under the condition of nitrogen starvation, the clonal ramet (one year plant) and clonal ramet (2-year-old plant) of *Phyllostachys pubescens* seedlings were labeled with urea-¹⁵N respectively, and the nitrogen heterogeneity treatment was carried out by ¹⁵N isotope tracer technique. the distribution and utilization of N among clonal ramets were analyzed. 【Results】The absorption, distribution and utilization of ¹⁵N in the clone system of *Phyllostachys pubescens* seedlings were consistent. 1) When the annual bamboo was labeled with ¹⁵N, the absorption, distribution and utilization of nitrogen in each organ of the cloning system were ¹⁵N bamboo whip root > ¹⁵N mother bamboo whip root > ¹⁵N bamboo

leaf > ^{15}N bamboo whip = ^{15}N bamboo whip > ^{15}N bamboo branch > ^{15}N bamboo culm > mother bamboo leaf > mother bamboo branch > mother bamboo stalk > bamboo leaf = bamboo whip = gt Bamboo branch = bamboo stalk > bamboo whip root > mother bamboo whip root > mother bamboo whip root 2) When the biennial mother bamboo was labeled with ^{15}N , the absorption, distribution and utilization of nitrogen in each organ of the clone were as follows: ^{15}N mother bamboo whip > ^{15}N mother bamboo whip root > ^{15}N mother bamboo leaf > leaf > ^{15}N mother bamboo whip root > bamboo whip > ^{15}N mother bamboo culm > bamboo whip root > bamboo branch > bamboo stem. 【Conclusion】 The clonal integration of *Phyllostachys pubescens* had obvious law of "transport to the top" and age effect. the absorption, distribution and utilization of nitrogen in the whole clonal system of 1-year-old daughter bamboo was higher than that of 2-year-old mother bamboo only, and both of them were more beneficial to the absorption, distribution and utilization of nitrogen than uniform fertilization in the whole clonal system. Therefore, in real life, we can choose to spray leaf fertilizer to weaken the law of "Transport to the top" and enhance the nutrient absorption of bamboo culms; at the same time, only fertilizing 1-year-old son bamboo can most effectively reduce the amount of fertilizer use. improve the fertilizer utilization rate of the whole cloning system.

Key words: *Phyllostachys pubescens*; ^{15}N isotope tracer; distribution; utilization