

CO₂与养分交互作用对番茄幼苗叶片碳、氮积累及碳、氮比动态的影响

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The interactive effects of carbon dioxide enrichment and fertilizers on the dynamic changes of growth and C and N accumulation and C/N ratio in tomato seedling leaves

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摘要 营养液栽培条件下,以番茄(品种,合作906)为材料,研究CO₂施肥与4种不同养分供应强度的交互作用对番茄幼苗生长及其叶片中的碳、氮浓度与碳、氮比动态变化的影响。结果表明,在不同营养液养分浓度下,CO₂施肥能增加番茄幼苗生物量的积累,提高生长速度;增加番茄幼苗叶片中氮、碳积累量与吸收速率;而且对CO₂作用效果的响应随营养液养分浓度的提高而增加。在所有处理中碳、氮积累量与吸收速率随生育期的延长呈上升趋势。说明在番茄育苗后期要增加施肥量,而且在CO₂施肥的情况下施肥量增加的量要大。CO₂施肥对生长在不同营养液中番茄叶片中的碳、氮比在不同生长阶段的影响是不同的,但在同一CO₂浓度条件下,番茄幼苗各个取样阶段均表现为碳、氮比随营养液浓度的降低而增加。对番茄幼苗碳、氮积累量、总干生物量与生长时间的关系研究表明,氮积累量、总干生物量与生长时间均符合二次曲线变化。

关键词: CO₂施肥 番茄 碳、氮积累量 碳、氮比 CO₂施肥 番茄 碳、氮积累量 碳、氮比

Abstract: The objective of this study was to study the interactive effects of elevated CO₂ and various strengths of nutrient supply on the dynamic of the growth and N,C accumulation in tomato seedling stage under hydroponic cultivation for 55 days. The CO₂ concentration in the growth chambers were set as 360 μL/L and 720 μL/L respectively. The results showed that the elevation of CO₂ significantly accelerated the growing speed and increased the biomass accumulation of the tomato seeding at all sampling periods, but their response to CO₂ enrichment strongly depended on the strength of nutrient supply. The increased extent went up along with the increase of nutrient concentration. Elevated CO₂ increased C and N accumulated rate, and C and N uptake rate in tomato seedling leaves at all sampling periods, the higher nutrient solution concentrations and the higher elevation. C and N accumulated rate and C and N uptake rate appeared an upward tendency with the prolongation of growing period. This indicated that fertilizer application rate must be increased at later growth stage, furthermore, the application rater should be higher under elevated CO₂. The ratio of C and N response to elevated CO₂ was different at different growth stage under different nutrient solution treatments. At the same CO₂ concentration, the ratio of C and N became increased along with the decrease of the nutrient solution concentration. The experimental (results) indicated that the correlation between C and N accumulated amount, C and N absorbed rate and growth time all fit the conic equation.

Keywords:

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