

长白落叶松幼苗对铵态氮和硝态氮吸收的动力学特征

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Dynamic kinetic characteristics of different forms of nitrogen absorbed by Larix olgensis seedling

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摘要 采用养分吸收动力学原理并利用溶液培养法研究了不同生长期的长白落叶松苗木对 NH_4^+ 和 NO_3^- 的吸收特点。结果表明,单一氮源条件下,苗木根系吸收 NH_4^+ 、 NO_3^- 的速率均随着苗木的生长呈下降趋势,并且苗木对于 NH_4^+ 的吸收速率整体上高于 NO_3^- 。与无 NO_3^- 时相比,在速生期加入 NO_3^- 会影响载体与 NH_4^+ 的亲合力,从而大幅度降低苗木对于 NH_4^+ 的吸收速率,但不会明显影响苗木在生长初期和木质化期对于 NH_4^+ 的吸收速率。与单一 NO_3^- 为N源时相比, NH_4^+ 的加入会降低苗木在速生期对于 NO_3^- 的载体亲合力,从而影响其吸收速率,但是会明显提高根系在生长初期吸收 NO_3^- 的载体数量和速率。在长白落叶松苗木的养分培育过程中,为了提高苗木对于氮的利用效率,建议以铵态氮肥为主,但是在其生长初期可以适当增施硝态氮肥。

关键词: 落叶松 吸收动力学 氮 根系

Abstract: Hydroponic experiments were carried out to study the kinetics of NH_4^+ and NO_3^- uptake by root of Larix olgensis seedling. The results indicate that the uptake rates of NH_4^+ and NO_3^- uptake are both decreased as the seedling growth, and NH_4^+ uptake is totally more efficient than NO_3^- . When both NH_4^+ and NO_3^- are supplied, compatibility of seedling root with NH_4^+ and NO_3^- in fast growing period would be influenced negatively, which leads to the decrease of uptake rates of both ions. However, when both NH_4^+ and NO_3^- are supplied in early growth period, the uptake rates of the ions would be influenced negatively, or even NO_3^- uptake would be promoted because of carriers of NO_3^- stimulated by NH_4^+ input compared to single NO_3^- as N source. It is concluded that NH_4^+ fertilization is recommended in Larix olgensis seedling cultivation throughout the whole growth period, which could improve the efficiency of N uptake, and both NH_4^+ and NO_3^- as N source of fertilizers should be applied at the early growth period.

Keywords: Larix olgensis absorption kinetics nitrogen root

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