

Influence of Different $\text{NO}_3^- / \text{NH}_4^+$ on Nitrate and Ammonium Uptake Kinetics of Sugar Beet (*Beta vulgaris* L.) Seedlings

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Abstract :

Solution culture experiments were carried out to study the kinetics at cotyledon stage (11-day-old) and the effect of different $\text{NO}_3^- / \text{NH}_4^+$ on NO_3^- and NH_4^+ uptake at seedling stage (31-day-old) with two cultivars of sugar beet, including Tianyan7 and Tianyan8. NO_3^- uptake by sugar beet seedlings at cotyledon stage (11-day-old) reached equilibration after 2 hours of adaptation, and NH_4^+ uptake reached equilibration after 6 hours of adaptation. K_m values of NH_4^+ uptake by Tianyan7 were lower than Tianyan8, and V_{max} values were higher. It was benefit for Tianyan7 to uptake NH_4^+ . The kinetics of NO_3^- and NH_4^+ uptake by the cultivars changed after cultivated in nutrient solution contained different $\text{NO}_3^- / \text{NH}_4^+$ for 20 days. NO_3^- uptake by sugar beet was stimulated by lower concentration of NH_4^+ in the nutrient solution. The NH_4^+ uptake by sugar beet changed complicatedly. Even cultivated in nutrient solution contained pure NH_4^+ , the uptake ability of Tianyan7 was higher. Above all, it showed that NH_4^+ uptake of Tianyan7 was higher than Tianyan8, and when $\text{NO}_3^- / \text{NH}_4^+$ was 1:4 it reached the highest. This experiment provided a theoretical basis to realize the highly effective ammonium assimilation for sugar beet through the experiment. [Nature and Science. 2004;2(3):70-78]

Key Word :

sugar beet; nitrate; ammonium; uptake kinetics

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