

# 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  $\text{NO}_3^-$  and  $\text{NH}_4^+$  uptake at seedling stage (31-day-old) with two cultivars of sugar beet, including Tianyan7 and Tianyan8.  $\text{NO}_3^-$  uptake by sugar beet seedlings at cotyledon stage (11-day-old) reached equilibration after 2 hours of adaptation, and  $\text{NH}_4^+$  uptake reached equilibration after 6 hours of adaptation.  $K_m$  values of  $\text{NH}_4^+$  uptake by Tianyan7 were lower than Tianyan8, and  $V_{max}$  values were higher. It was benefit for Tianyan7 to uptake  $\text{NH}_4^+$ . The kinetics of  $\text{NO}_3^-$  and  $\text{NH}_4^+$  uptake by the cultivars changed after cultivated in nutrient solution contained different  $\text{NO}_3^- / \text{NH}_4^+$  for 20 days.  $\text{NO}_3^-$  uptake by sugar beet was stimulated by lower concentration of  $\text{NH}_4^+$  in the nutrient solution. The  $\text{NH}_4^+$  uptake by sugar beet changed complicatedly. Even cultivated in nutrient solution contained pure  $\text{NH}_4^+$ , the uptake ability of Tianyan7 was higher. Above all, it showed that  $\text{NH}_4^+$  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

Volume 2, Number 3, October 2004, ISSN 1545-0740