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不同供磷状况下CO_2浓度升高对番茄根系生长及养分吸收的影响

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Effects of elevated CO2 on the root growth and nutrient uptake in tomato (Lycopersicon esculentum Mill.) plants under different P application status

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摘要 采用培养试验研究了磷缺乏与正常供磷条件下,CO_2浓度由350μL/L升高至800μL/L苗期番茄的生物量、根系特征和不同器官N、P、K养分含量的变化。结果表明,无论缺磷与否,CO_2浓度升高均能显著增加番茄地上部及根系的干物质积累量,提高根冠比。在磷缺乏条件下,CO_2浓度升高对番茄根系生长的促进主要表现为增加根系的体积和表面积;而在磷正常供应条件下主要表现为同时增加根体积和分根数,有利于形成强壮的根系。在两种供磷水平下,CO_2浓度升高对番茄各器官的N、P、K含量产生不同的稀释效应,但N、P、K总积累量却随CO_2浓度升高而显著增加;而且CO_2浓度与供P水平对番茄植株的N、P、K积累量具有极显著的正交互效应。

关键词: CO_2浓度升高 供磷状况 根系生长 养分吸收 番茄 CO_2浓度升高 供磷状况 根系生长 养分吸收 番茄

Abstract: The effects of CO_2 elevated from 350 μL/L to 800 μL/L on the biomass,root characteristics and nutrient uptake of tomato seedlings were studied by carrying out a hydroponics experiment with conditions of P deficiency and normal P supply.The results showed that elevated CO_2 significantly increased the dry matter accumulation of shoot and root,and root/shoot ratio of tomato seedlings no matter P was deficient or not.The effect of elevated CO_2 on promoting root growth was mainly indicated by increase of root volume and surface area under P deficient conditions while by increase of not only root volume and surface area but also root forks under normal P supply conditions,which was beneficial to form a strong root system.Under both conditions of P deficient and normal P supply, elevated CO_2 showed a diluting effect with different degrees on N,P and K contents in different organs of tomato plant.However,the total accumulation of N,P and K in tomato plant was markedly increased by elevated CO_2.Moreover,an obviously significant positive interaction between CO_2 concentrations and P supply on N,P and K accumulation in tomato plants was also observed.

Keywords:

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