

籽粒苋富钾基因型筛选研究

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Screening grain amaranths for genotypes of the capability of enrichment in potassium

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摘要

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摘要 在营养液培养或土壤培养条件下,采用植株含钾量、单株吸钾量和植株吸钾率等作为富钾基因型的筛选指标,对不同籽粒苋(红苋 *Amaranthus crenentus*)品种的富钾能力进行了筛选。结果表明,D8-1、R109、R104和K12等品种对钾具有较强的富集能力,在低钾溶液培养30d(不包括25d的育苗期)和缺钾土壤培养60d时,其植株含钾(K)量一般都在3%~4%之间,单株吸钾(K)量分别在50~75mg和100~120mg范围内,植株(鲜根)吸钾速率大于1.70 μmol (g·h),为富钾基因型;而M9和Cr047等品种对钾的富集能力则相对较弱,其植株含钾量一般在2.7%以下,单株吸钾量低于40mg和80mg,植株(鲜根)吸钾速率小于1.35 μmol (g·h),属一般型。在供钾正常(K5mmol L)时,所有品种的含钾量和吸钾量均大幅上升,但随着培养基中钾浓度的提高,两基因型的富钾能力差距逐渐缩小,低钾溶液培养时含钾量和吸钾量最高的品种分别是最低时的2.5倍和2.3倍,而供钾正常时含钾量和吸钾量最高的品种仅分别为最低的1.3倍和1.8倍。因此,在缺钾土壤上播后60d或0.5mmol L的低钾溶液培养30d,能较好地反映两种基因型在富钾能力上的差异。同时,两种基因型在缺钾土壤上的根冠比和主根长仅为低钾溶液培养时的一半左右。但无论在那种介质中,富钾型的根冠比和主根长均大于一般型;在供钾

关键词: 籽粒苋 富钾能力 基因型 籽粒苋 富钾能力 基因型

Abstract: The experiments of solution culture and soil culture were conducted to screen the genotype of grain amaranth (*Amaranthus crenentus*) in capability of enrichment in potassium, the content, uptake rate and uptake ratio of potassium in plant was used to the screening index of genotype of enrichment in potassium. The grain amaranths were cultured in low potassium solution for 30 days and in deficiency potassium soil for 60 days, the results showed that the species or cultivars of D8-1、R109、R104 and K12 had high capability of enrichment in potassium, the contents of potassium in plant were usually between 3% and 4%, the uptake rates of potassium in per plant were 50-75mg and 100-120mg, respectively, and the uptake ratios of potassium were over 1.70 $\mu\text{mol}/(\text{g}\cdot\text{h})$, fresh root, the species or cultivars of D8-1、R109、R104 and K12 were called genotype of enrichment in potassium. However, the species or cultivars of M9 and Cr047 had low capability of enrichment in potassium, the contents of potassium in plant usually were below 2.7%, the uptake rates of potassium in per plant were below 40mg and 80mg, respectively, and the uptake ratios of potassium were below (1.30 $\mu\text{mol}/(\text{g}\cdot\text{h})$), fresh root, which were called general genotype of uptake potassium. The differences of capability enrichment in potassium were very significant between different species of grain amaranths grown on deficient potassium soil after 60 days of seeding and in solution culture after 30 days of transplanting. The contents and uptake rates of potassium, which were between 2 and 5 times, 4 and 10 times, respectively than that in low potassium solution, were greatly increased in all species or cultivars, when the level of potassium was 5mmol/L in solution culture. However, the capability of enrichment in potassium was reduced with increase of potassium concentration in solution. Under the low potassium solution culture, the maximal contents and uptake rates of potassium were 2.5 and 2.3 times than the minimum in all experimental species respectively, and only 1.3 and 1.8 times in normal potassium solution culture. While, the ration of roots and shoots and the length of main root of two genotypes on deficient potassium soil were only half than that in low potassium solution culture. No matter what kinds of medium culture was used, ration of roots and shoots and the length of main root in genotype of enrichment in potassium were more than that of general genotype.

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