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有机酸对液培玉米吸收 ^{137}Cs 和 ^{90}Sr 的影响

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摘要: 利用液培方法研究胡敏酸钠等有机酸盐作用下玉米幼苗对放射性核元素 ^{137}Cs 和 ^{90}Sr 的吸收速率。研究表明:利用有机酸盐可以降低玉米幼苗对放射性核元素的吸收速率。1低活度放射性核素水平下,对照(不加有机酸盐)的玉米幼苗中发现了97%放射性核元素 ^{137}Cs ,而高活度放射性核素水平中为61%;有机酸盐不同程度地降低了玉米幼苗中放射性核元素 ^{137}Cs 的量。在低活度水平中四苯硼钠降低 ^{137}Cs 的量最多,玉米仅吸收12%,而酒石酸钾钠处理中玉米吸收量最高,为45.5%。对 ^{137}Cs 的吸收率,在胡敏酸钠处理中为23.9%, EDTA-Na处理中为41.3%;在高活度放射性核素水平中吸收率的顺序为四苯硼钠11%,胡敏酸钠26%,酒石酸钾钠28.7%,EDTA-Na 37%。2低活度水平下,对照中放射性核元素 ^{90}Sr 的56%被玉米幼苗吸收,而高活度水平中达61%。有机酸盐在低活度水平中降低放射性核元素 ^{90}Sr 的顺序为胡敏酸钠 23.9%,EDTA-Na 26%,酒石酸钾钠28%和四苯硼钠36%;在高活度水平中为四苯硼钠11%,EDTA-Na 24%,胡敏酸钠26%,酒石酸钾钠 31%。3低活度和高活度水平中,四苯硼钠和胡敏酸钠降低玉米幼苗体内的放射性核元素性质为最佳。4所有有机酸盐处理与对照之间的差异都达到极显著水平。

关键词: 玉米 胡敏酸钠 ^{137}Cs ^{90}Sr 吸收速率

EFFECTS OF ORGANIC ACIDS ON ABSORPTION OF ^{137}Cs AND ^{90}Sr BY MAIZE CULTIVATED IN LIQUID CULTURE MEDIUM

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Abstract: In this paper, a solution-culture experiment was conducted to study absorption rates of radioactive elements ^{137}Cs and ^{90}Sr by Maize under the condition of different organic acids. Result showed that the absorption rates of radioactive ^{137}Cs and ^{90}Sr by Maize seedling decreased under treatments of organic acids. 1 The 97% of ^{137}Cs was observed in Maize seedlings under the treatment of low activity ^{137}Cs without organic acid, while the absorption rate was only 61% under high activity treatment without organic acid. The absorption rates under the condition of low activity with different organic acids followed the order of $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (12%) < humic acids (23.9%) < EDTA-Na (41.3%) < $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ (45.5%). Under high activity treatment, the order was $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (11.0%) < humic acids (26.0%) < $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ (28.7%) < EDTA-Na (37.0%). 2 The 56% of ^{90}Sr was found in Maize seedlings under the condition of low activity treatment without organic acid, while the absorption rate was little higher under high activity treatment without organic acid, reached up to 61.0%. The absorption rate under the condition of low activity with different organic acids was in the order of humic acids (23.9%) < EDTA-Na (26.0%) < $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ (28.0%) < $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (36.0%). The sequence under high activity condition was $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ (11.0%) < EDTA-Na (24.0%) < humic acids (26.0%) < $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ (31.0%). 3 In the two treatments, humic acids and $\text{Na}_2\text{B}_4\text{O}_7$ were the most effective in decreasing the radioactive elements in plants. 4 Significant differences were found between all the treatments and their control.

Keywords: maize organic acids ^{137}Cs ^{90}Sr absorption rate

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