

铝胁迫下蕹蓐与饭豆根系有机酸分泌特性比较

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A comparative study on aluminum induced oxalate secretion in *Polygonum aviculare* L and citrate secretion in *Vigna umbellata* Ohwi & OhashiYOU Jiang-feng^{1,4};ZHANG Lei²;YANG Jian-li¹;ZHENG Shao-jian^{1,3}*

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摘要

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摘要 以蕹和饭豆为试验材料,从对Al胁迫的响应时间、蛋白质合成抑制剂的影响、体内有机酸含量变化及阴离子通道抑制剂的影响等方面,比较研究了Al诱导根系分泌有机酸的差异,以进一步明确铝(Al)诱导植物根系有机酸分泌的过程。结果表明,蕹蓐根系在Al胁迫后30.min内分泌出草酸,而Al胁迫至少4.h后饭豆根系才开始分泌柠檬酸;蛋白质合成抑制剂环己亚酰胺(Cycloheximide, CHM)不影响蕹蓐根系草酸的分泌,但抑制了84%Al诱导的饭豆根系柠檬酸的分泌,表明前者不需要新蛋白质的诱导合成,却是后者所必需的。Al处理不改变蕹蓐根尖草酸的含量,但明显提高了饭豆根尖柠檬酸的含量;阴离子通道抑制剂苯甲酰甲醛(Phenylglyoxal, PG)和蒽-9-羧酸(Anthracene-9-carboxylic acid, A-9-C)分别有效抑制Al诱导蕹蓐根系草酸的分泌及饭豆根系柠檬酸的分泌,再次证明两者有机酸的分泌是通过某种被Al所诱导或激活的阴离子通道所实现的。

关键词: 抗Al机理 蛋白质合成抑制剂 阴离子通道抑制剂 有机酸分泌 抗Al机理 蛋白质合成抑制剂 阴离子通道抑制剂 有机酸分泌

Abstract: To clarify the processes of aluminum(Al)-induced organic acid anions secretion in different plants with different patterns, the characteristics of Al induced organic acid anions efflux in the roots of rice bean (*Vigna umbellata*[Thunb]Ohwi & Ohashi) and *Polygonum aviculare* L. was investigated. Oxalate secretion in *P. aviculare* roots occurred within 30 min of Al exposure, while citrate secretion in rice bean roots was induced by at least 4 h Al exposure. Therefore, the former was classified to be pattern I, and the latter pattern II. A broad protein-synthesis inhibitor CHM(cycloheximide) had no obvious effect on the Al-induced oxalate secretion in *P. aviculare*, but inhibited the Al-induced citrate secretion in rice bean roots by about 84%. This suggested that novel protein synthesis didn't involved in the Al-induced oxalate secretion in *P. aviculare*, but was essential in regulating the Al-induced citrate secretion in rice bean. Al exposure did not affect the oxalate content in *P. aviculare* root apices, but stimulate citrate synthesis in rice bean. The oxalate secretion in *P. aviculare* was sensitive to anion channel blocker PG(phenylglyoxal) and the citrate secretion in rice bean was sensitive to A-9-C (anthracene-9-carboxylic acid), indicating anion channels involved in organic acids secretion in both plants but their pharmacological properties were different from each other.

Keywords:

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