

研究简报

铝浸种对荞麦种子萌发和幼苗生理的影响

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摘要 对2个荞麦(*Fagopyrum esculentum* Moench)品种(小白花叶和溪荞5号)在铝浸种后萌发特性和幼苗的生理变化进行了初步研究。结果表明, 10~1000mg•L⁻¹的铝浸种处理对2个荞麦品种的发芽率和发芽指数影响不明显, 低浓度铝(≤100mg•L⁻¹)处理可降低荞麦种子细胞膜透性, 减少细胞内营养物质的外渗, 促进种子的萌发。5000mg•L⁻¹的铝处理降低了荞麦的发芽指数。种子萌发后, 铝对荞麦根的伸长有抑制作用, 并且随着铝浓度的增加, 抑制作用增大。10~1000mg•L⁻¹的铝浸种处理对荞麦叶片内MDA含量影响较小, 但高浓度的铝处理(5000mg•L⁻¹)明显增加了MDA的含量; POD、SS、Pro随着铝浓度增加都有先降低后增加的趋势; 不同品种叶片内CAT活性变化趋势不同, 小白花叶内CAT活性对铝的敏感性大于溪荞5号。试验结果可以看出, 荞麦种子和幼苗对环境中的铝都有较强的耐受性, 在铝胁迫下, 荞麦可以通过升高POD活性以及增加SS和Pro含量来缓解铝毒害, 不同荞麦的基因型对铝毒害的反应有一定的差异性。

关键词 铝; 荞麦; 种子萌发; 幼苗生理

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Effect of seed soaking with aluminum on seed germination and seedling physiology of buckwheat

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Abstract Aluminum (Al) toxicity is a serious agricultural problem in acid soils which account for about 40% of the world's arable land. Tolerance study on the Al toxicity in some resistant plants is helpful to find an economic and sustainable approach for improving crop production on acid soils. In this research, two buckwheat (*Fagopyrum esculentum* Moench) varieties (Xiaobaihua and Xiqiao No.5) seeds were soaked in Al solutions (0, 10, 100, 1000 and 5000 mg•L⁻¹ Al³⁺) for 5 hours to investigate the effect of Al on seeds germination and seedling growth. The result indicate 10 and 100 mg•L⁻¹ Al³⁺ soaking can decrease the seeds membrane permeability by 6.2%、34.3% in Xiaobaihua and 54.7%、44.6% in Xiqiao No.5. Accordingly, less main nutrition substance accumulated in seeds was leaked. Al (10~5000 mg•L⁻¹ Al³⁺) soaking can not significantly change the germination percentage of two varieties, but 5000 mg•L⁻¹ Al³⁺ can restrain the germination index and the vigor index by 3.2% and 23.2% in Xiaobaihua, 46.3% and 41.6% in Xiqiao No.5. After seed germination, Al inhibited the root elongation by 7.0%~50.1% in Xiaobaihua, 12.1%~39.6% in Xiqiao No.5. On the seventh days after germination, 10、100、1000 mg•L⁻¹ Al³⁺ had no significant effects on the malonaldehyde (MDA) content in buckwheat leaves of two varieties compared with the control. However 5000 mg•L⁻¹ Al³⁺ increased the MDA content by 19.1% and 9.6% in Xiaobaihua and Xiqiao No.5 respectively. 5000 mg•L⁻¹ Al³⁺ also promoted the activity of peroxidase (POD) by 53.4% in Xiaobaihua leaves and 11.6% in Xiqiao No.5. Lower concentrations of Al can decrease the content of soluble sugar (SS) and proline (Pro) in the leaves of two varieties. Higher concentrations, especially 5000 mg•L⁻¹ Al³⁺, can increase the content of SS and Pro by 42% and 18.1% in Xiaobaihua, 68.1% and 12.6% in Xiqiao No.5. The reaction of catalase (CAT) to Al in two varieties was different. The CAT activity in leaves of Xiaobaihua was more sensitive to Al than that in Xiqiao No.5. The tes

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ting dates showed that buckwheat seeds and seedlings had high resistance to Al, and lower concentrations of Al could promote germination of buckwheat seeds by decreasing the membrane permeability. The promotion of POD activity and the increasing of SS and Pro contents in two varieties

leaves played an important part under Al stress. And different buckwheat varieties had different reaction to Al.

Key words [aluminum](#) _ [buckwheat](#) _ [seed](#) [germination](#) _ [seedling](#) [physiology](#)

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