文献电子报

Plant J ¦ 非损伤微测技术突出贡献奖获得者 抗盐成果

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- 主题：Plant J ¦ 非损伤微测技术突出贡献奖获得者 最新抗盐成果
- 标题：Root vacuolar Na+ sequestration but not exclusion from uptake correlates with barley salt tolerance
- 影响因子：5.775
- 检测指标：Na+、H+
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英文摘要

Soil salinity is a major constraint for the global agricultural production. For many decades, Na+ exclusion from uptake has been the key trait targeted in breeding programs; yet, no major breakthrough in creating salt tolerant germplasm was achieved.

In this work, we have combined the MIFE technique for non‐invasive ion flux measurements with confocal fluorescence dye imaging technique to screen 45 accessions of barley to reveal the relative contribution of Na+ exclusion from the cytosol to the apoplast and its vacuolar sequestration in the root apex, for the overall salinity stress tolerance.

We show that Na+/H+ antiporter‐mediated Na+ extrusion from the root plays a minor role in the overall salt tolerance in barley. At the same time, a strong and positive correlation was found between root vacuolar Na+ sequestration ability and the overall salt tolerance. The inability of salt sensitive genotypes to sequester Na+ in root vacuoles was in a contrast to a significantly higher expression levels of both HvNHX1 tonoplast Na+/H+ antiporters and HvVP1 H+‐pumps compared with tolerant genotypes. This data is interpreted as a failure of sensitive varieties to prevent Na+ back‐leak into the cytosol and existence of a futile Na+ cycle at the tonoplast.

Taken together, our results demonstrated that root vacuolar Na+ sequestration but not exclusion from uptake played the main role in barley salinity tolerance and suggested that the focus of the breeding programs should be shifted from targeting genes mediating Na+ exclusion from uptake by roots to more efficient root vacuolar Na+ sequestration.

中文摘要（谷歌机翻）

土壤盐分是全球农业生产的主要制约因素。几十年来，Na+被吸收排除一直是育种计划的关键特征；然而，在制备耐盐种质方面没有取得重大突破。

在这项工作中，我们将非侵入性离子通量测量的MIFE技术与共聚焦荧光染料成像技术结合起来筛选45份大麦品种，以揭示Na+从细胞质中排斥到质外体的相对贡献及其在根中的液泡隔离顶点，对于整体盐度胁迫耐受性。

我们显示Na+/H+逆向转运蛋白介导的Na+从根部挤出在大麦的总体耐盐性中起着次要作用。同时

，根液泡Na+螯合能力与总体耐盐性之间存在强烈的正相关关系。与耐受基因型相比，盐敏感基因型不能在根空泡中螯合Na+与HvNHX1液泡膜Na+/H+逆向转运蛋白和HvVP1H+-泵的显着更高表达水平形成对比。该数据被解释为敏感品种的失败，以防止Na+背泄漏到胞质溶胶中并且在液泡膜中存在无效的Na+循环。

总之，我们的结果表明根液泡Na+隔离但不排除摄取在大麦耐盐性中起主要作用，并且表明育种计划的重点应该从靶向基因介导Na+排斥从根吸收到更有效的根液泡Na+隔离。

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