

FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Regulatory mechanisms of accumulation and polar localization of mineral transporters and their application in plants

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1. Background of research

Plant roots take up minerals and translocate them toward tissues where they are utilized. For efficient transport of minerals, transporters, which facilitate mineral transport across membranes, should be localized in specific membrane domains of specific cells only when they are required.

2. Research objectives

The objectives of this study is to understand regulatory mechanisms of localization and accumulation of plant mineral transporters in the plasma membrane. We investigate mechanisms for polar localization and substrate-dependent degradation of plasma-membrane localized boron transporters. We will then investigate whether the identified mechanisms apply to regulation of various mineral transporters in plants. The identified mechanisms will be utilized to manipulate localization and accumulation of transporters for improvement of mineral-use efficiency.

3. Research characteristics (incl. originality and creativity)

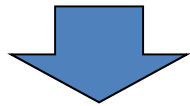
There have been many trials to improve mineral-use efficiency by over-expressing mineral transporters. However, there are only few successful cases by this simple approach. The aim of this study is to understand and utilize regulatory mechanisms of localization and accumulation of mineral transporters in the plasma membrane in order to improve mineral-use efficiency of plants.

4. Anticipated effects and future applications of research

Crop production is dependent on a large input of mineral fertilizers. However, mineral resources are limited and thus the use of mineral fertilizers should be reduced for sustainable agriculture. This study will be a foundation for improving mineral-use efficiency of crop plants and contribute to reduce the use of mineral fertilizers and to enable crop production on mineral-poor soils.

Understanding regulatory mechanisms of polar localization and accumulation of mineral transporters in plasma membrane

- **Boron transporters**

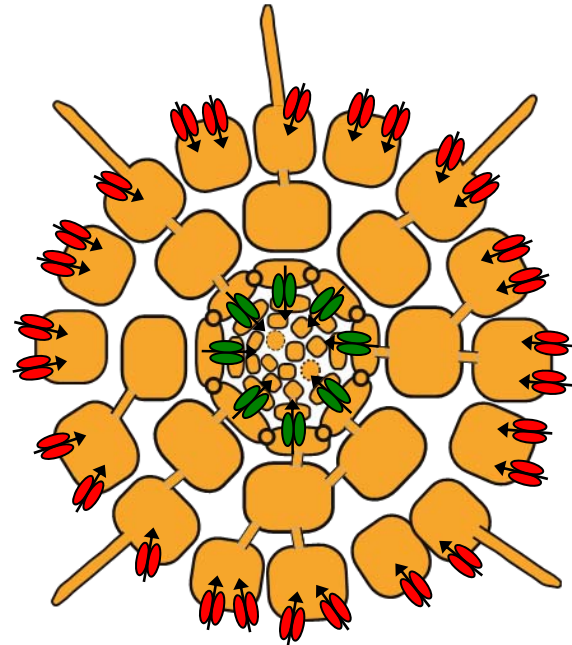


- **Various mineral transporters**

Application

Improvement of mineral-use efficiency of plants

- **Reduction of use of mineral fertilizers**
- **Crop production in mineral-poor soils**



Localization of mineral transporters on a root cross-section