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Most aerobic organisms have developed an active strategy for iron uptake. In dicotyledon plants, this strategy involves (i) the excretion of protons, (ii) the reduction of Fe(III) by reductases, and (iii) plasmalemma transport of Fe(II) by iron transporters. In microorganisms, this strategy is based on the synthesis of siderophores and ferri-siderophore membrane receptors, in iron stress conditions. Pyoverdines are the major class of siderophores synthesized by fluorescent pseudomonads. Taking into account the strong iron competition in the rhizosphere and the high affinity of pyoverdines for Fe(III), these molecules are expected to interfere with the iron nutrition of plants, as they do with rhizospheric microbes.
The impact of Fe-pyoverdine on iron nutrition of Arabidopsis thaliana was compared to that of Fe-EDTA. Iron chelated to pyoverdine was incorporated in a more efficient way than when chelated to EDTA leading to an increased plant growth and chlorophyll content. Over accumulation of iron in an over-expressor ferritin transgene of A. thaliana was enhanced upon supplementation with Fe-pyoverdine compared to Fe-EDTA. A transgene knockout iron transporter IRT1 of A. thaliana showed a significant lower iron and chlorophyll content when supplemented with Fe-EDTA than the wild-type, but not when supplemented with Fe-pyoverdine. This observation indicates that in contrast with iron chelated to EDTA, iron from pyoverdine was incorporated through a different transporter than IRT1. Incorporation of iron from Fe-pyoverdine was consistent with the presence of pyoverdine in planta as shown by ELISA and by tracing 15N of 15N-pyoverdine.
Altogether, these data demonstrate the acquisition of iron from Fe-pyoverdine by A. thaliana and indicate that this acquisition could be related to an as yet undescribed pathway. Researches are underway to identify this pathway and to localise pyoverdine in planta.

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