



**HAL**  
open science

## **Pseudomonad siderophore promotes iron nutrition of Arabidopsis thaliana**

Gérard G. Vansuyt, Agnès Robin, Jean-François Briat, Catherine Curie,  
Philippe P. Lemanceau

► **To cite this version:**

Gérard G. Vansuyt, Agnès Robin, Jean-François Briat, Catherine Curie, Philippe P. Lemanceau. Pseudomonad siderophore promotes iron nutrition of Arabidopsis thaliana. International Conference Rhizosphere 2, Aug 2007, Montpellier, France. , 2007. hal-02758263

**HAL Id: hal-02758263**

**<https://hal.inrae.fr/hal-02758263>**

Submitted on 4 Jun 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

### **Pseudomonad siderophore promotes iron nutrition of *Arabidopsis thaliana***

Vansuyt Gérard<sup>1</sup>, Robin Agnès<sup>1</sup>, Briat Jean-François<sup>2</sup>, Curie Catherine<sup>2</sup>, Lemanceau Philippe<sup>1</sup>

<sup>1</sup> INRA UMR MSE SPE 17 rue Sully BP BP 86510 21065 Dijon Bourgogne France

<sup>2</sup> CNRS/INRA UMR 'Biochimie et Physiologie Moléculaire des Plantes', Montpellier, France

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 <sup>15</sup>N of <sup>15</sup>N-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.

Vansuyt G., Robin A., Briat J.-F., Curie C., Lemanceau P. 2007. Iron acquisition from Fe-pyoverdine by *Arabidopsis thaliana*. MPMI. (in press).