Iron Nutrition in Plants

Abstracts of the 18th International symposium on Iron nutrition and Interaction in plants

UAM UNIVERSIDAD AUTONOMA DE MADRID

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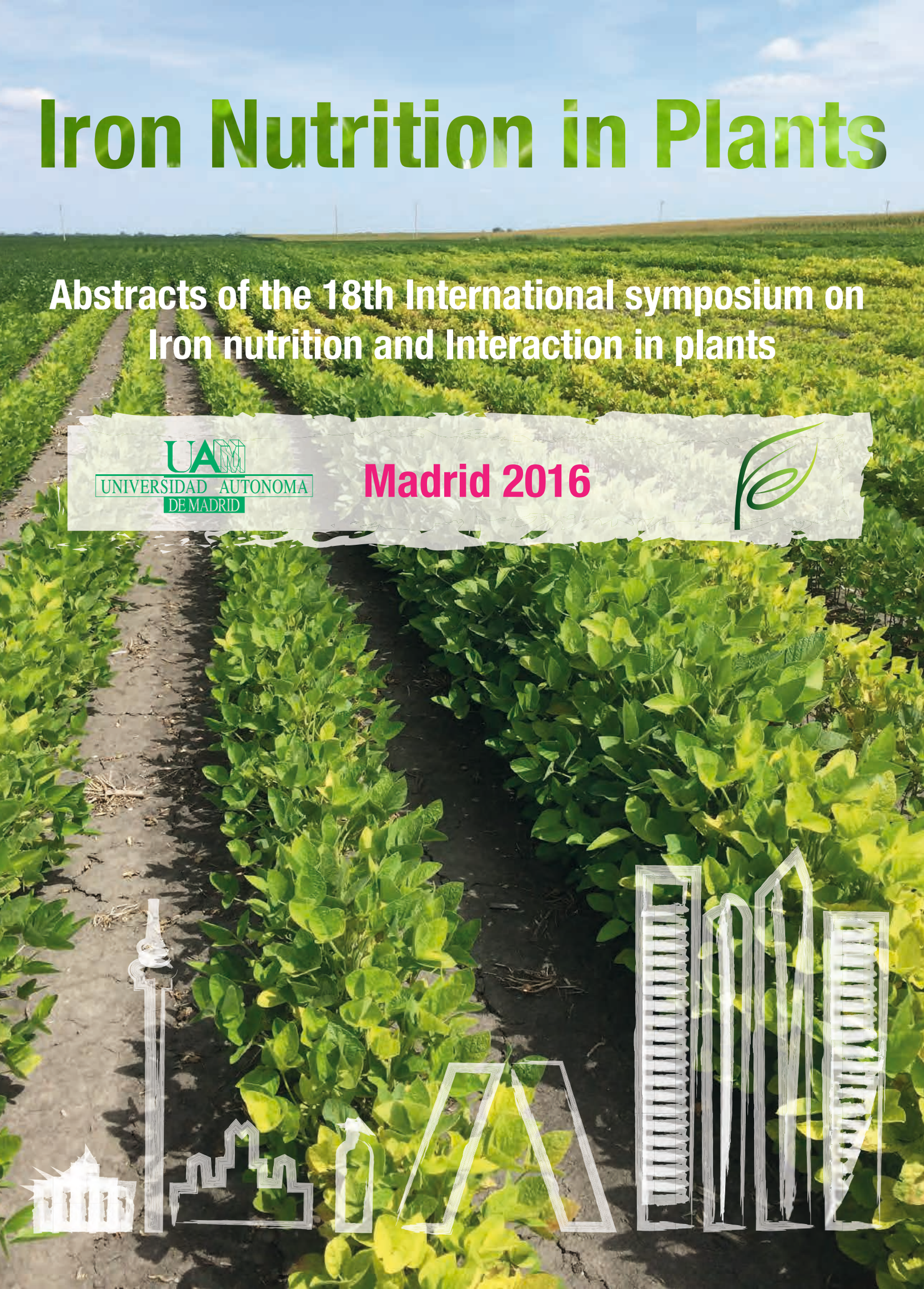

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Abstracts of the 18th International Symposium on Iron Nutrition and Interaction in Plants

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Department of Agricultural Chemistry and Food Sciences
Faculty of Sciences
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Welcome to the 18th International Symposium on Iron Nutrition and Interaction in Plants. (ISINIP 2016)

On behalf of the Organizing Committee, I want to give my most friendly welcome to all of the participants to Madrid, Spain. We are proud to host the ISINIP 2016 at the University Autónoma of Madrid campus in Spain.

As human beings, we have the challenge of feeding with healthy food a quickly growing population. In the next 35 years, we have to increase Agricultural production by 70%, and this is only possible if all the factors affecting crop development are well equilibrated. And among them, mineral nutrition. Large areas in the world suffer from iron deficiency, decreasing production. Iron deficiency in humans is still one of the world's main health problems. The research on iron nutrition and iron biofortification is indispensable to cope with this problem, but also the participation of private companies developing new solutions is required. The ISINIP is an international scientific conference where prestigious researchers present the latest knowledge on iron nutrition in plants and is an excellent forum for scientific discussions and the exchange of ideas among young and leading researchers. Participants will have the opportunity to share their research results in oral or poster presentations, grouped in eight sessions. We hope that with these activities, along with the traditional field trip , cultural visit and the banquet, this symposium will be a great chance for updating collective knowledge on iron nutrition, allowing research collaborations with new ideas and topics. The success of the meeting depends on you.

Madrid is the capital of Spain. People from different regions of Spain and from other countries have made Madrid a place of crossing roads. History and modernity meet in the streets of Madrid. Take your time enjoying it.

Several companies and institutions have made this symposium possible through different forms of sponsorship. I want to thank all of them for their help and interest in iron nutrition.

Special thanks for my university and the people that have worked hard for the success of the meeting.

Finally, I want to wish all of you a pleasant stay.

Juan J Lucena
Chairman
Organizing Committee

S4-PO-01 SILICON ENHANCES NICOTIANAMINE-MEDIATED IRON TRANSPORT IN CUCUMBER LEAVES

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Silicon (Si) and iron (Fe) are the second and the fourth most abundant minerals respectively in the earth's crust. While the essentiality of Fe for plants was discovered in the middle of the 19th century, Si is still not accepted as an essential element. However, its beneficial effect on plant growth and development, especially under stress conditions, is well documented in the literature. As a consequence of poor Fe availability for higher plants, especially in alkaline and calcareous soils, Fe deficiency represents a major nutritional disorder responsible for reduction in both yield and quality of a wide range of crops. Iron deficiency in crops has thus a strong negative impact on human health worldwide. Retranslocation of Fe from source tissues enhances plant tolerance to Fe-deficiency. Here we investigated the role of Si in Fe mobilization in older leaves and the subsequent retranslocation of Fe to young leaves of cucumber (*Cucumis sativus*) plants growing under Fe limiting conditions. We determined Fe (^{57}Fe or naturally-occurring isotopes) in leaves at different positions on plants growing with or without Si supply. In parallel the content of the Fe chelator nicotianamine (NA) and the expression of nicotianamine synthase (NAS) involved in its biosynthesis were also measured.
In plants not receiving Si, approximately half of the total Fe content remained in the oldest leaf. By contrast, Si-treated plants showed an almost even Fe distribution between leaves at four different developmental stages, thus providing evidence of enhanced Fe remobilization from source leaves. This stimulated Fe export was paralleled by increased *NAS1* gene expression and NA content in expanded leaves of Si-supplied plants.
In conclusion, our results for the first time show that Si induces Fe mobilization in older leaves and increases its retranslocation to younger expanding leaves. Supply of Si enhances expression of *NAS1* gene responsible for NA biosynthesis and hence increased NA accumulation which in turn enhances chelation of Fe and phloem loading of Fe-NA in the source (expanded) leaves to facilitate phloem transport of Fe and enhanced phloem unloading of Fe in the sink (expanding) leaves.

Keywords: iron retranslocation, leaves, nicotianamine, nicotianamine synthase (NAS), phloem transport, silicon