



**INTERNATIONAL SYMPOSIUM ON
IRON NUTRITION AND
INTERACTIONS IN PLANTS**



Dedicated to the memory of
Prof. Dr. Dres. h.c. Horst Marschner

20.-25. July 1997
Universität Hohenheim
Stuttgart, Germany

VOLUME OF ABSTRACTS

9TH INTERNATIONAL SYMPOSIUM ON IRON NUTRITION AND INTERACTIONS IN PLANTS

July 20-25, 1997
Universität Hohenheim
Stuttgart, Germany

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SYMPOSIUM SCHEDULE

SUNDAY

SUNDAY, 20 JULY, 16:30 - 20:00
„Öko-Zentrum“, Foyer

16:30 - 18:00 **Registration**
18:00 - 20:00 **Welcome Reception**

MONDAY

MONDAY, 21 JULY, 8:00 - 11:00
„Öko-Zentrum“, room Ö2

8:00 - 8:30 **Registration** („Öko-Zentrum“, Foyer)
8:30 - 8:45 **Welcome** (Volker Römheld, Organizing Committee Chair,
President Klaus Macharzina, University of Hohenheim)
8:45 - 9:30 **Marschner Memorial Lecture**
F. Bienfait (Netherlands), R. Chaney (USA)

SESSION 1: CHEMISTRY OF IRON IN SOILS

Y. Chen (Israel), Chair

9:30 - 10:00 **Invited speaker: P. Hinsinger (France)**
Dissolution of iron-bearing primary and secondary minerals in
the rhizosphere of various crop species

10:00 - 10:30 **J. Gerke**
Mathematical modelling of iron uptake by graminaceous species
as affected by iron forms in soil and phytosiderophore efflux

10:30 - 11:00 **COFFEE-BREAK**

MONDAY

MONDAY, 21 JULY, 11:00 - 15:00
„Öko-Zentrum“, room Ö2

**SESSION 2: ENVIRONMENTAL FACTORS INFLUENCING IRON DEFICIENCY
AND TOXICITY**

J. Abadia (Spain), Chair

- 11:00 - 11:30 Invited speaker: J. J. Lucena (Spain)
Effect of bicarbonate and other environmental factors on iron chlorosis
- 11:30 - 12:00 E. Alcántara, F.J. Romera and M.D. de la Guardia
Effects of bicarbonate and iron concentration on leaf chlorosis and root Fe(III) reducing capacity of the susceptible peach rootstock „Nemaguard“
- 12:00 - 12:30 V. Römheld (Germany)
The chlorosis paradox: Fe inactivation in leaves as a secondary event in iron deficiency chlorosis
- 12:30 - 14:00 **LUNCH**
- 14:00 - 14:30 I. Cakmak, B. Erenoglu, K.Y. Gülüt, R. Derici and V. Römheld
High light intensity enhanced release of phytosiderophores in wheat and barley under iron or zinc deficiency
- 14:30 - 15:00 **Poster Presentation** Session 1, 2, 3 (room Ö2)
- 15:00 - 16:00 **Poster Discussion**
(„Bio-Zentrum“, room B11, B12, B13)
- 16:00 - 16:30 **COFFEE-BREAK**

MONDAY

MONDAY, 21 JULY, 16:30 - 18:00
„Öko-Zentrum“, room Ö2

SESSION 3: MICROBIAL PLANT INTERACTIONS IN THE RHIZOSPHERE

L. Barton (USA), Chair

16:30 - 17:00

Invited speaker: D. Crowley (USA)
Microbial siderophore production in the plant rhizosphere

17:00 - 17:30

G. Carrillo-Castaneda and M.E. Alvarado Cano
Chemical characterization of siderophores from *Rhizobium leguminosarum* bv *phaseoli*

17:30 - 18:00

B. Manunza, S. Deiana, M. Pintore and C. Gessa
Configurational aspects of iron transport by siderophores.
A molecular dynamics investigation

Evening

FREE TIME

TUESDAY

TUESDAY, 22 JULY, 8:30 - 14:00
„Öko-Zentrum“, room Ö2

8:00 - 8:30 **Registration (Öko-Zentrum, Foyer)**

SESSION 7: CRITICAL EVALUATION OF METHODS IN IRON RESEARCH

M. A. Grusak (USA), Chair

8:30 - 9:00 Invited speaker: J. Abadia (Spain)
Using the flower Fe concentration for estimating crop chlorosis status in fruit tree orchards. A summary report

9:00 - 9:30 Invited speaker: R. Chaney (USA)
Application of chelator-buffered nutrient solutions on screening chlorosis resistance genotypes and on induction of heavy metal induced iron deficiency

SESSION 4: PHYSIOLOGICAL ASPECTS OF IRON NUTRITION

M. A. Grusak (USA), Chair

9:30 - 10:00 F.J. Romera, E. Alcántara, M. Bartels and W. Schmidt
Role of auxin and ethylene on the regulation of iron stress-induced morphological changes in roots of strategy I plants

10:00 - 10:30 S. Mori
Reevaluation of iron deficiency induced enzymes, peptides and genes in barley root which have been identified till date

10:30 - 11:00 **COFFEE-BREAK**

11:00 - 11:30 **Poster Presentation Session 7, 4 (room Ö2)**

11:30 - 12:30 **Poster Discussion**
(„Bio-Zentrum“, room B11, B12, B13)

12:30 - 14:00 **LUNCH**

TUESDAY

TUESDAY, 22 JULY, 14:00 - 17:30
„Öko-Zentrum“, room Ö2

**SESSION 4A: FE(III) REDUCTION, ATP-ase ACTIVITY AND Fe MEMBRANE
TRANSPORT**

R. Chaney (USA), Chair

- 14:00 - 14:30 Invited speaker: M. L. Guerinot (USA)
Characterization and function of the regulated metal transporters
in *Arabidopsis thaliana*
- 14:30 - 15:00 Invited Speaker: M. A. Grusak (USA)
Whole-plant communication in the regulation of root Fe(III)
reductase activity
- 15:00 - 15:30 M.C. Mok, A.I. Samuelsen, R.C. Martin and D.W.S. Mok
The yeast FRE1 and FRE2 genes confer increased Fe(III)
reduction in transgenic tobacco
- 15:30 - 16:00 M. Dell'Orto, P. de Nisi and G. Zocchi
Regulation of the H⁺-ATPase activity under Fe-deficiency in
cucumber roots
- 16:00 - 16:10 K. Mengel
Fe(III) reduction in the apoplast of leaves
- 16:10 - 16:30 **COFFEE-BREAK**
- 16:30 - 17:00 U. Pick
Transport of Fe ions via a transferrin-like protein in the
halotolerant alga *Dunaliella*
- 17:00 - 17:30 **Poster Presentation Session 4A (room Ö2)**
- 17:30 - 18:00 **Poster Discussion**
(„Bio-Zentrum“, room B11, B12, B13)

Evening

20:00 **WINE TASTING (Wine cellar, Hohenheim Castle)**

WEDNESDAY

WEDNESDAY, 23 JULY, 8:30 - 14:00
„Öko-Zentrum“, room Ö2

SESSION 4B: THE ROLE OF NICOTIANAMINE IN IRON METABOLISM

J. F. Briat (France), Chair

8:30 - 9:00

Invited speaker: B. Hider (UK)

Physicochemical characterization of Fe-nicotianamine complexes and their physiological implications

9:00 - 9:30

Invited speaker: N. Nishizawa (Japan)

Enzymes for nicotianamine biosynthesis and their genetical regulation

9:30 - 10:00

A. Herbig, A. Giritich, H. Bäumlein, U.W. Stephan and H.-P. Mok

Characterization and purification of nicotianamine synthase

10:00 - 10:30

U.W. Stephan

Transport and circulation of iron, other metal micronutrients, and nicotianamine in *Ricinus communis* L. seedlings

10:30 - 11:00

COFFEE-BREAK

11:00 - 11:30

E. Marentes, B.W. Stephens and M.A. Grusak

Characterization of a phloem mobile chelator involved in the phloem transport of iron from vegetative tissues to developing seeds of pea

11:30 - 12:00

Poster Presentation Session 4B (room Ö2)

12:00 - 12:30

Poster Discussion

(„Bio-Zentrum“, room B11, B12, B13)

12:30 - 14:00

LUNCH

WEDNESDAY

WEDNESDAY, 23 JULY, 14:00 - 18:00
„Öko-Zentrum“, room Ö2

**SESSION 4C: INTERACTION OF DIVALENT CATIONS WITH ACQUISITION IN
STRATEGY I AND II PLANTS**

S. Mori (Japan), Chair

- 14:00 - 14:30 Invited speaker: J. F. Ma (Japan)
Interaction of divalent metal cations with the iron phytosidero-
phore uptake
- 14:30 - 15:00 A. O’Nan, L.L. Barton and G.V. Johnson
Inhibition of ferric-chelate reductase in alfalfa roots by cobalt
- 15:00 - 15:30 D. Gries, S. Klatt and M. Runge
Cu deficiency-induced phytosiderophore release in the calcicole
native grass *Hordelymus europaeus*
- 15:30 - 16:00 **COFFEE-BREAK**
- 16:00 - 16:30 **Poster Presentation** Session 4C (room Ö2)
- 16:30 - 17:30 **Poster Discussion**
(„Bio-Zentrum“, room B11, B12, B13)
- 17:00 - 18:00 **Round Table On Request**

Evening

- 20:00 - 21:30 **CONCERT** (Euroforum, University of Hohenheim)
Orchester of the University of Hohenheim
- 20:00 - 22:20 **MISS SAIGON** (Musical Hall, Stuttgart)

THURSDAY

THURSDAY, 24 JULY, 8:30 - 14:00
„Öko-Zentrum“, room Ö2

SESSION 6: CORRECTION OF IRON DEFICIENCY IN PLANTS

I. Cakmak (Turkey), Chair

- 8:30 - 9:00 Invited speaker: Y. Chen (Israel)
Remedy of iron chlorosis - present and future
- 9:00 - 9:30 Invited speaker: M. Tagliavini (Italy)
Alternatives to iron chelates for overcoming fruit tree iron chlorosis in Mediterranean countries
- 9:30 - 10:00 C. Caris, P. Baret, J.P. Laulhère, J.L. Pierre, H. Boukhalfa, C. Béguin and G. Serratrice
A new abiotic siderochelate, O. Trensox: its efficiency in iron assimilation by plants and its non reactivity in Fenton reaction
- 10:00 - 10:30 W.A. Dick and L. Chen
Iron nutrition of oat and soybean using chelators from compost
- 10:30 - 11:00 **COFFEE-BREAK**

SESSION 4D: IRON TOXICITY

F. Bienfait (Netherlands), Chair

- 11:00 - 11:30 Invited speaker: M. Becana (Spain)
Iron dependent oxygen free radical generation in senescent plant tissue: Toxicity and antioxidant protection
- 11:30 - 12:00 Invited speaker: J. F. Briat (France)
Fe as a signal controlling ferritin synthesis and activity
- 12:00 - 12:30 P. Lucca, J. Wünn, R.F. Hurrell and I. Potrykus
The development of iron-rich rice and the improvement of its absorption in humans by genetic engineering
- 12:30 - 14:00 **LUNCH**

THURSDAY

THURSDAY, 24 JULY, 14:00 - 18:00
„Öko-Zentrum“, room Ö2

SESSION 5: GENETIC ASPECTS OF IRON NUTRITION

M. L. Guerinot (USA), Chair

- 14:00 - 14:30 Invited speaker: D. J. Fairbanks (USA)
Progress in development of genetic resistance to iron-deficiency chlorosis in soybeans
- 14:30 - 15:00 S.F. Lin, S.R. Cianzio and R.C. Shoemaker
Molecular marker detection of two genetic mechanisms responsible for iron deficiency chlorosis in soybeans
- 15:00 - 15:30 B. Basso, A. Motta, C. Soave
Two maize mutants altered in iron uptake - gene cloning strategies
- 15:30 - 16:00 **COFFEE-BREAK**
- 16:00 - 16:30 **Poster Presentation Session 4D, 5, 6 (room Ö2)**
- 16:30 - 17:30 **Poster Discussion**
(„Bio-Zentrum“, room B11, B12, B13)
- 17:00 - 18:00 **Closing Session**

Evening

- 19:30 **SYMPOSIUM DINNER (Mensa, University of Hohenheim)**