PROCEEDINGS OF THE VIth INTERNATIONAL SYMPOSIUM ON MINERAL NUTRITION OF FRUIT CROPS

Co-Conveners
M. Pestana
P.J. Correia

Faro, Portugal
May 19-23, 2008

ISHS Section Pome and Stone Fruits
ISHS Section Tropical and Subtropical Fruits
ISHS Working Group on Mineral Nutrition of Fruit Crops

Acta Horticulturae 868
June 2010
LIST OF CONTENTS

Foreword 6
Preface 6
List of Contents 7
List of Authors 13
List of Participants 17

Opening Lectures

Tomorrow's Challenges in Fruit Nutrition Research: Quo Vadis? 27
G.H. Neilsen, D. Neilsen F. Peryea and E. Fallahi

Nutritional Implications of Organic Management in Fruit Tree Production 41
M. Toselli

Effects of Mineral Nutrition on Fruit Quality and Nutritional Disorders in Apples 49
E. Fallahi, B. Fallahi, G.H. Neilsen, D. Neilsen and F.J. Peryea

Water Saving and Mineral Nutrition

Effect of Irrigation and Crop Load Management on Fruit Nutrition and Quality for Ambrosia/M.9 Apple 63
D. Neilsen, G.H. Neilsen, L. Herbert and S. Guak

Nutritional Implications of Water Stress in Grapevine and Modifications of Mechanical Properties of Berries 73
D. Porro, M. Ramponi, T. Tomasi, L. Rolle and S. Poni

Effect of Nutrient and Water Management on Nutrition and Growth of Young 'Cristalina' and 'Skeena' Sweet Cherry on Gisela 6 Rootstock 81
G.H. Neilsen, D. Neilsen, F. Kappel and L. Herbert

Effects of Irrigation and Nitrogen Fertilization on Growth, Yield and Fruit Quality Parameters of Peaches for Processing 87
J. Rufat, A. Arbones, P. Villar, X. Domingo, M. Pascual and J.M. Villar

Effects of Method and Level of Nitrogen Fertilizer Application on Soil pH, Electrical Conductivity, and Availability of Ammonium and Nitrate in Blueberry 95
D.R. Bryla, A.D. Shireman and R.M.A. Machado

Preliminary Results on the Effects of Partial Rootzone Drying, Regulated Deficit Irrigation and Sustained Deficit Irrigation, on 'Vermentino' Grapevine in Sardinia (Italy) 103
M.G. Mameli, L. De Pau, D. Satta, L. Zucca and F. Sanna

Alleviation of Salt Stress Using Exogenous Proline on a Citrus Cell Line 109
M.E. Lima-Costa, S. Ferreira, A. Duarte and A.L. Ferreira
Cycling of Nutrients and Organic Management

Net Primary Productivity and Partitioning of Absorbed Nutrients in Field-Grown Apple Trees
F. Scandellari, M. Ventura, D. Malaguti, C. Ceccon, G. Menarbin and M. Tagliavini

The Influence of Plant Co-Culture of Tomato Plants with *Piriformospora indica* on Biomass Accumulation and Stress Tolerance
C. Cruz, M.A. Martins-Loução and A. Varma

Effectiveness of Soil-Applied Fresh-Ground Melia (*Melia azedarach* L.) Fruits on Nitrogen Uptake for Peach Trees
E. Baldi, M. Toselli, G. Sorrenti, M. Quartieri and B. Marangoni

Relationships between Soil Characteristics and Leaf Nutrient Concentrations in Grapevine
A.M. Stellacci, E. Armenise, A. Caliandro and P. Rubino

Mineral Concentrations in Leaf Dry Matter and Leaf and Petiole Sap in Strawberry Depend on Leaf Age and Plant Developmental Stage
N. Opstad

Fine Root Growth and Longevity in a High-Density Pear Orchard on Quince C Rootstock as Affected by Nitrogen Supply
M. Quartieri, G. Castellani, E. Baldi, B. Marangoni and M. Tagliavini

Nutritional Status of Kiwifruit in Organic and Conventional Farming Systems
V. Otero, M.E. Barreal, L. Martínez-Niñez and P.P. Gallego

Low Input and Precision Agricultural Systems

Nickel Deficiency Symptoms Are Influenced by Foliar Zn:Ni or Cu:Ni Concentration Ratio
B.W. Wood

Whole Plant Excavations to Determine Nutritional Requirements in ‘Hort16a’ Kiwifruit Vines
L. Boyd, A. Barnett, C. Civolani and E. Fini

Nitrogen Uptake, Growth and Biomass Accumulation in the First Growing Season of Cherry Trees on Gisela® 6
C. Bonomelli, H. Gilabert and M. Ayala

Nitrogen Foliar Uptake and Partitioning in Cabernet Sauvignon Grapevines
D. Porro, M. Stefanini, C. Dorigatti, L. Ziller, F. Camin and M. Policarpo

$^{15}$N Natural Abundance Technique Does Not Reveal the Presence of Nitrogen from Biological Fixation in Field Grown Carob (*Ceratonia siliqua* L.) Trees
S. La Malva, E. Tribulato, A. Gentile, M. Ventura, P. Gioacchini and M. Tagliavini
Means of Weed Control and Application of Nitrogen Fertilizer under the Canopies of Apple Trees
I. Dimza, M. Skrivele, A. Gross and E. Rubauskis

Effect of Soil pH Reaction on Manganese Content and Dynamics in Grapevine (Vitis vinifera L.)
L. Coga, S. Slunjski, M. Herak Čustić, T. Horvat, M. Petek and J. Gunjača

The Reliability of the Established Critical Leaf Nitrogen Concentration in Olive Orchards
C. Molina-Soria and R. Fernández-Escobar

A. Osvalde and A. Karlsons

Zinc (^{65}Zn) Sources for Feeding the Orange Tree New Flushes
R.H. Sartori, T. Muraoka, H.M.G. Fernandes, F.C. Alvarez Villanueva, V.F. Nascimento Filho and A.E. Boaretto

Preliminary Reference Values for Leaf-Analyses of Vitis vinifera ‘Trincadeira’/99R in the Portuguese Region of Borba/Alentejo

Seasonal Pattern of Accumulation of Nutrients by Kiwifruit ‘Hayward’ in Acid Soils of Northern Portugal
M.J. Lema, P. Rodriguez, C. Salinero and F. Veloso

Inflorescence Analysis as Alternative to Leaf Analysis to Evaluate the Nutritional Status of Olive Trees
M. Ben Khelil, S. Mustapha, A. Larbi, M. Msallem, V. del Rio, J. Abadia and A. Abadia

Sweet Cherry Leaf Composition as Influenced by Genotype, Rootstock and Orchard Management
A. Roversi, G.L. Malvicini, D. Porro and C. Plessi

Fertilisation Practices and Their Environmental Impacts

Efficacy of a HJB/Fe^{3+} to Provide Fe to Nectarine Plants in Calcareous Soils

Using Controlled-Release Fertilizers for Perennials Increases Productivity while Reducing Fertilizer Application Rates
O. Achilea, O. Rottenberg and M. Thomas

Effect of Potassium Foliar Sprays on Royal Glory Peach Tree
M. Ghanem and M. Ben Mimoun
Effect of Foliar Boron Application on Olive (Olea europaea L.) Fruit Set and Yield
A.M. Stellacci, A. Caliandro, M.A. Mastro and D. Guarini

Properly Timed Foliar Fertilization Can and Should Result in a Yield Benefit and Net Increase in Grower Income
C. Gonzalez, Y. Zheng and C.J. Lovatt

Study of the Effect of Nitrogen Fertilization Supplied by Foliar Sprays or by Fertigation in Apple Trees - Preliminary Results
J.L. Parés, E. Mongé, A. Blanco, J. Val and J.L. Espada

Effect of Soil Application of KCl plus CaCl₂ on Table Grapes
C. Bonomelli, J. Pereira and R. Ruiz

The Effect of AlgaeGreen 200 (Cold Process Seaweed Liquid Extract) on the Mineral Content of ‘Bramley’s Seedling’ Apple Leaves and Fruit
S. Mac an tSaoir and J. Archer

Management of Nitrogen and Potassium Fertilizer Inputs on Fertigated Pear Orchards and Its Influence on Yield and Fruit Quality
L. Duarte, P.V. Jordão, F. Calouro and R. Sousa

A Long-Term Experiment on Olive Tree with Nitrogen, Phosphorus and Limestone Fertilization
P.V. Jordão, M. Encarnação Marcelo, J.I. Lopes and P. Simões Lopes

Influence of Nitrogen and Potassium Fertilization on Mineral Composition of Kiwifruit
C. Pacheco, F. Calouro, F. Santos, S. Vieira, N. Neves, F. Curado and S. Rodrigues

Overcoming Iron Deficiency Chlorosis in Citrus through Intercropping with Perennial Grass Species
T.G. Ammari and A.D. Rombolà

Effects of Controlled-Release Fertiliser versus Fertigation on Citrus Thomson Navel Vegetative Growth, Yield and Nitrogen Status
N. Bettaga and M. Ben Mimoun

Effect of Mineral Nutrition on Fruit Quality and Nutritional Disorders

Polyphenoloxidase Isozymes in Bitter Pit Affected Apple Tissues either Natural or Locally Induced by Ammonium Oxalate Injections
J. Val, A. Blanco, E. Monge and M. Pérez

Assessment of Pre-Harvest Physiological Infiltration Methods for Predicting Commercial Bitter Pit in ‘Braeburn’ and ‘Golden Delicious’
E. Lötze, K.I. Theron and J. Joubert

Influence of Foliar Fertilization on Mineral Composition, Sugar and Organic Acid Content of Sweet Cherry
Soil Calcium Application and Pre-Harvest Calcium and Boron Sprays on Mangosteen Fruit Quality Attributes
S. Poovarodom and N. Boonplang

The Effect of Pre-Storage Application of Calcium Chloride on Chilling Resistance and Calcium Concentration of Pomegranate Fruits
M. Sayyari, M. Babalar and S. Kalantari

Effect of Fertilization and Training on the Sensory Properties of Kiwifruit in Orchards in Northern Portugal
C. Salinero, P. Piñón, M.J. Lema and L. Martinez

M. Toselli, E. Baldi, B. Marangoni, M. Noferini, G. Fiori, A.M. Bregoli and M. Ndagijimana

Vitamin C Content of Citrus from Conventional versus Organic Farming Systems
A. Duarte, D. Caixeirinho, M.G. Miguel, V. Sustelo, C. Nunes, M. Mendes and A. Marreiros

Root Endophytic Fungi and Boron Nutrition: Effect on Avocado (Persea americana Mill.) ‘Hass’ Plants Growing on an Andisol

Relationship between Soil and Leaf Potassium Content and ‘Valencia’ Orange Fruit Quality
J. Aular, M. Rengel, M. Montañó and J. Aular-Rodríguez

The Effects of Ca Applications on Peach Fruit Mineral Content and Quality
J. Val, E. Monge, A. Blanco and J.L. Espada

Effects of Foliar Ecological Products Application on Apple Growth, Yield and Quality
V. Chitu, E. Chitu, F.C. Marin, A.D. Ionita, M. Cirjaliu-Murgea and L. Filipescu

Relationship between Postharvest Diseases Resistance and Mineral Composition of Citrus Fruit

Evaluation of Fe Deficiency Effects on Strawberry Fruit Quality
M. Pestana, F. Gama, T. Suávedra, P.J. Correia, S. Dandlen and M.G. Miguel

Effects of Controlled-Release Fertilizer on Fruit Yield and Quality of Clementine Citrus Trees
N. Bettaga and M. Ben Mimoun
Mineral Nutrition of Pear and Apricot Trees Cultivated in Southern Italy Area Damaged by Phytoplasma Microorganisms
G. Rossi, C. Beni, S. Socciarelli, S. Marconi, M. Pastore, M. del Vaglio and F. Gervasi

Nutrients Uptakes in Hazelnut Orchards
A. Roversi

Influence of Nitrogen and Magnesium Fertilization of Olive Tree Picual on Yield and Olive Oil Quality
M.E. Marcelo, P.V. Jordão, H. Matias and B. Rogado

Effect of Nitrogen Levels and Climate Factors on Susceptibility of Peach Trees to Phomopsis amygdali
M.P. Simões, J.P. Luz, A. St. Aubyn and A. Mexia

Effect of Boron and Calcium Sprays on Photosynthetic Pigments, Total Phenols and Flavonoid Content of Sweet Cherry (Prunus avium L.)