About the book

Foliar fertilization is a widely used crop nutrition strategy of increasing importance worldwide. Used wisely, foliar fertilizers may be more environmentally friendly and target oriented than soil fertilization though plant responses to foliar sprays are variable and many of the principles of foliar fertilization remain poorly understood.

The aim of the book is to provide up-to-date information and clarification on the scientific basis of foliar fertilization and plant responses to it with reference to the underlying environmental, physiological and physico-chemical determinants. Information drawn from research, field trials and observational studies, as well as developments in formulation and application techniques, are discussed.

About the authors

Victoria Fernández

Forest Genetics and Ecophysiology Research Group, School of Forest Engineering, Technical University of Madrid (Universidad Politécnica de Madrid), Madrid, Spain.

Victoria Fernández holds a research tenure at the Technical University of Madrid, Spain. She gained a Bachelor of Science in Horticulture at University College, Dublin, Ireland and a PhD at Humboldt University of Berlin, Germany. For more than 12 years, Dr. Fernández has been implementing applied and fundamental research approaches to foliar fertilization as a means to improve the effectiveness of foliar sprays and has published various peer-reviewed articles in this regard. She is currently focusing on analyzing the physico-chemical properties of plant surfaces from an eco-physiological and agronomic viewpoint and also in relation to their interactions with foliar-applied agro-chemicals.

Thomas Sotiropoulos

Ministry of Rural Development and Food, Greek Agricultural Organization 'Demeter', Pomology Institute, Naoussa, Greece.

Thomas Sotiropoulos received a Bachelor of Science in Agriculture at the Aristotle University of Thessaloniki, Greece in 1993, a MSc in Plant Breeding and Plant Physiology in 1996 and a PhD from the same University in 1999. Dr. Sotiropoulos is currently an Associate Researcher in the Greek Agricultural Organization 'Demeter', Pomology Institute, Naoussa. His main interests include applied and fundamental research dealing with fertilization as well as cultivar breeding and evaluation, mainly on deciduous fruit trees. He has participated in several national and European research projects and published various peer-reviewed articles on the previous topics. He also served as a part time Professor in the School of Agriculture of the Aristotle University of Thessaloniki and the Alexander Technological Educational Institute of Thessaloniki.

Patrick Brown

Professor, Department of Plant Sciences, University of California, Davis, California, USA.

Patrick Brown received a Bachelor of Science (Hons) in agronomy and biochemistry at the University of Adelaide, Australia in 1984 and a PhD in agronomy and international agricultural development from Cornell University, USA in 1988. Dr. Brown is currently Professor of Plant Nutrition in the Department of Plant Sciences at the University of California, Davis. His research focusses on the role of micronutrients in plant growth and development and encompasses research from fundamental biology to field application and extension. Dr. Brown is author of 150 scientific articles, books and book chapters with significant contributions in the area of the physiology of boron, the role of nickel in plant biology and the mechanisms of elemental transport in plants. Current research focuses on the optimization of nutrient use in orchard crops and the development of decision support systems for growers. Dr. Brown has served as the Director of International Programmes at the University of California, Davis and as President of the International Plant Nutrition Colloquium, as well as frequently serving in an advisory role for governmental, industrial and grower organizations.

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List of abbreviations, acronyms, and symbols

ATP	Adaptation to Technical Progress (*as used in the book*)
B	boron
$B(OH)_3$ or H_3BO_3	boric acid
Ca^{2+}	calcium ion
$CaCl_2$	calcium chloride
$Ca(H_2PO_4)_2$	calcium phosphate
$Ca(NO_3)_2$	calcium nitrate
Cu	copper
DAFB	days after full bloom
EC	European Commission
EDDHSA	ethylenediamine-di-(2-hydroxy-5-sulfophenylacetate)
EDDS	ethylenediaminedisuccinate
EDTA	ethylenediaminetetraacetate
EU	European Union
Fe	iron
$FeCl_3$	iron chloride
$Fe(NO_3)_3$	iron nitrate
HEDTA	N-2-hydroxyethyl-ethylenediaminetriacetate
H_3PO_4	phosphoric acid
IDHA	iminodisuccinic acid

K	potassium
kg ha^{-1}	kg per hectare
KCl	potassium chloride also known as muriate of potash (MOP)
K_2CO_3	potassium carbonate
KH_2PO_4	monopotassium phosphate
K_2HPO_4	dipotassium phosphate
KM	potassium metalosate
KNO_3	potassium nitrate
K_2SO_4	potassium sulphate
KTS	potassium thiosulphate
lbs $acre^{-1}$	pounds per acre
Mg	magnesium
mg kg-^{1}	milligram per kilogram
mg L^{-1}	milligram per litre
$MgCl_2$	magnesium chloride
$Mg(NO_3)_2$	magnesium nitrate
$MgSO_4$	magnesium sulphate
MKP	monopotassium phosphate
mM	millimole
Mn	manganese
mN m^{-1}	miliNewton per meter
$MnSO_4$	manganese sulphate
Mo	molybdenum
N	nitrogen
Na	sodium
$Na_2B_4O_7$	borax
$Na_2B_8O_{13}$	sodium-octoborate
$NH_4H_2PO_4$	ammonium dihydrogen phosphate
$(NH_4)_5P_3O_{10}$	ammonium tripolyphosphate
Ni	nickel
nm	nanometer
P	phosphorus
^{32}P	phosphorus isotope
PHP	polyhydroxyphenylcarboxilate
PO_4^{3-}	phosphate
POD	point of deliquescence
$PO(NH_2)_3$	phosphoryl triamide
Q10	temperature coefficient
Rb	rubidium
S	sulphur
SEM	Scanning Electron Microscopy
µg cm^{2-}	microgramme per square centimeter
µL	microlitre
µM	micromolar

US	United States (of America)
UV	ultra violet
Zn	zinc
$ZnSO_4$	zinc sulphate
°	degree
°C	degree Celsius

List of terms

Uptake	The process of transport of foliar applied nutrients through the leaf cuticular surface into cellular space where they can affect plant physiology and metabolism.
Adsorption	The adherence of foliar applied nutrients to the leaf cuticular surface. At any time a portion of adsorbed nutrients may not be available for uptake into the cellular space where they can affect plant physiology and metabolism.
Absorption	The term absorption is used here to include both the uptake and adsorption of nutrients.