Current status and perspectives of phytoplasma disease research and management

February 1st and 2nd 2010

Sitges, Spain

COST Action FA0807

Integrated Management of Phytoplasma Epidemics in Different Crop Systems

IRTA
RECERCA I TECNOLOGIA AGROALIMENTÀRIES

Generalitat de Catalunya
Departament d'Agricultura, Alimentació i Acció Rural

COST Action FA0807

Integrated Management of Phytoplasma Epidemics
in Different Crop Systems

Current status and perspectives of phytoplasma disease research and management

Abstract book of the combined meeting of Work Groups 1-4

Editors
Assunta Bertaccini
Amparo Laviña
Ester Torres

Editors

Assunta Bertaccini: Alma Mater Studiorum, University of Bologna, DiSTA - Patologia Vegetale, Viale Fanin, 42 - 40126 Bologna, Italy; Bertaccini_a@cib.unibo.it

Amparo Laviña: Institut de Recerca I Tecnologia Agroalimentàries (IRTA), Ctra Cabrils Km 2, 08348 CABRILS (Barcelona), Spain; Amparo.Lavina@irta.cat

Ester Torres: Laboratori Sanitat Vegetal - DAR, Via Circulació Nord tram VI, 08040 Barcelona, Spain; ester.torres@gencat.cat

Preface

The abstracts contained in this book are the presentations of participants of the first COST Action FA0807 meeting held on the 1 and 2 February 2010 in Sitges, Spain.

The main objective of this Action is the enhancement and exchange of scientific knowledge and technologies related to phytoplasma diseases, through the establishment of a multidisciplinary scientific European Network, aimed at developing strategies to detect and prevent biological invasion, and the spread of phytoplasma diseases of plants.

Phytoplasmas are insect-transmitted plant pathogenic prokaryotes causing serious diseases in important crops such as grapevine, vegetables, corn, sugar beet, oil-seed crops and fruit trees. Recent advances in phytoplasma genomics have generated an impetus for research into control and management of these diseases. New approaches for disease management based on understanding the phytoplasma-plant interaction at a molecular level are one of the main research aims. This will result in improved diagnostic methods; reduction of disease spread; improvement of insect-vector monitoring and a reduction in the pesticides used for control.

Information on the activities of the COST Action FA0807 is available on the WebPages:

http://www.costphytoplasma.eu/index.htm

http://www.cost.esf.org/domains_actions/fa/Actions/integrated_management_of_phytoplasma_epidemics

http://www.cost.esf.org/index.php?id=181&action_number=FA0807

We would like to dedicate this book to our colleague Dr. Luigi Carraro who very recently passed away while still in the blooming of his research work on epidemiology and management of stone fruit phytoplasma diseases.

The editors

‘Recovery’ from apple proliferation disease: an integrated approach

R. Musetti[1], A.R. Paolacci[2], M. Ciaffi[2], O.A. Tanzarella[2], R. Polizzotto[1], F. Tubaro[3], M. Mizzau[3], P. Ermacora[1], M. Badiani[4] and R. Osler[1]
[1]Dipartimento di Biologia e Protezione delle Piante, Università di Udine, via delle Scienze 208, 33100 Udine, Italy; Rita.Musetti@uniud.it
[2]Dipartimento di Agrobiologia e Agrochimica, Università della Tuscia, Via S. Camillo de Lellis snc, 01100 Viterbo, Italy
[3]Dipartimento di Scienze e Tecnologie Chimiche, Università di Udine, via Cotonificio 108, 33100 Udine, Italy
[4]Dipartimento di Biotecnologie per il Monitoraggio Agro-Alimentare ed Ambientale, Università Mediterranea di Reggio Calabria, Contrada Melissari, 89124 Reggio Calabria, Italy

Recovery is the spontaneous remission, sometimes permanent, from disease symptoms. Phytoplasmas surviving in the roots are not able to recolonise the plant crown. The causes that induce recovery remain still unknown and its physiological bases are poorly understood. In this research the modifications in the phloem tissue related to recovery-induced resistance in apple have been investigated through ultrastructural, chemical, cytochemical and gene expression analyses of leaf tissues from recovered, healthy and apple proliferation-diseased plants. Ultrastructural observations detected abnormal callose and P-protein accumulations in the phloem of recovered apple plants. Callose synthesis and P-protein plugging, which are Ca^{2+}-dependent, would form physical barriers preventing the *in planta* movement. The cytochemical localization by potassium pyroantimonate detected the presence of Ca^{2+} ions in the phloem in all the three groups of plants; however the Ca^{2+} concentration was remarkably higher in the cytosol of the recovered apple plants. This observation would support the hypothesis that resistance mechanisms would be related to an increased Ca^{2+}-dependent signaling activities. Apple genes coding for callose synthases and phloem proteins were identified by an *in silico* approach. The expression patterns of five genes encoding callose synthases (MDCALS1/5) and of four genes encoding phloem proteins (MDPP2-1/3 and MDERG1) were analysed by quantitative real time RT-PCR. Four of the nine analysed genes were up-regulated in recovered plants in comparison to healthy and diseased ones, supporting the hypothesis that recovered apple plants were able to develop resistance mechanisms dependent from Ca^{2+} signal activities.