COMPARATIVE STUDY OF *XYLELLA FASTIDIOSA* SURFACE PROTEINS EXHIBITING HIGH CONTENTS CYSTEINE RESIDUES: IMPACT IN PATHOGENICITY

Project Leaders:
Breno Leite
CVSFR, Florida A&M University
Tallahassee, FL 32317

Peter C. Andersen and Maria L. Ishida
NFREC, IFAS, University of Florida
Quincy, FL 32351

ABSTRACT
The Calcium Bridging Hypothesis (CBH) validity is highly dependent on the existence of thiol moieties on the surface of *Xylella fastidiosa* (*Xf*) cells. The major question that remains to be addressed is how surface thiol and divalent ions would mediate aggregation. Strong evidence was revealed form studies with the Cowpea Mosaic Virus (CMV), by the Scripps Research Institute, California. Dissimilar patterns of surface cysteine on the surface of CMV particles resulted in distinct attachment properties. Likewise, cell-cell and cell-xylem interactions may also be mediated by the establishment of ionic bonds involving Ca^{++}, and Mg^{++}. Cysteine residues located on the outer membrane region of *Xf* surface proteins can form covalent disulfide linkages with thiol residues from other cells. Calcium and magnesium ions could also bridge negatively charged surface areas. Our objective in the present work was to search for potential surface proteins with thiols (negative charge) on the *Xf* cell surface. Several adhesion related proteins were investigated. We especially targeted domains localized outside the cell, and focused on the extracellular cysteine-rich residues regions. Hemagglutinin-like proteins presented the desired characteristics to fit the hypothesis. Other surface proteins are discussed, including type IV fimbriae, recently demonstrated to be involved in *Xf* twitching.

INDUCTION OF AGGREGATION *IN VITRO* OF *XYLELLA FASTIDIOSA* CELLS BY DIVALENT IONS

Project Leaders:
Breno Leite
CVSFR, Florida A & M University
Tallahassee, FL 32317

Peter C. Andersen
NFREC, IFAS, University of Florida
Quincy, FL 32351

Elliot W. Kitajima
ESALQ, University of São Paulo
Piracicaba, SP 13418, Brazil

ABSTRACT
Xylella fastidiosa (*Xf*) aggregates within xylem vessels. Aggregation is followed by biofilm formation and ultimately vessel plugging. Characteristic Pierce`s disease (PD) symptoms are visualized right after vessel plugging. Nutritional and water stress are the most common deficiencies and may result in leaf yellowing, leaf scorching and interveinal chlorosis. We hypothesize that xylem fluid chemical composition strongly influences aggregation and biofilm formation. Divalent ion availability is dissimilar in susceptible and resistant plants. In order to clarify these findings, we assayed aggregation of *Xf* in different concentrations of $MgCl_2$ and $CaCl_2$ (20, 50 and 100 mg/L) with two *Xf* PD strains (UCLA and STL). Our results indicate that calcium or magnesium induced approximately a 10-fold increase in aggregation of *Xf* cells. Controls were treated with deionized water. Aggregation of UCLA cells was greater than for STL cells either with calcium or magnesium treatments. However, calcium and magnesium induced aggregation. These results support the hypothesis that divalent ion availability is important in determining PD susceptibility and or resistance.