

SPATIAL DISTRIBUTION OF COFFEE AND SHADE TREES IDENTIFIED WITH ENDOPHYTIC BACTERIA USING DAS-ELISA FOR *Xylella fastidiosa*

Carlos Bolaños-Carriel and Mildred Zapata

Department of Crops and Agroenvironmental Sciences
University of Puerto Rico, Mayagüez campus, Mayagüez - Puerto Rico 00680
carlos.bolanos@upr.edu, mildred.zapatasserrano@upr.edu

Coffee (*Coffea arabica* L.) is an economically and socially important crop in Puerto Rico, that generated revenues of \$38 million in 2011. Main production problems are of biotic origin. Coffee leaf scorch (CLS), caused by the bacterium *Xylella fastidiosa* (Xf) Wells *et al.*, results in significant economic losses in many countries. In the Caribbean Basin, *Xylella fastidiosa* was reported causing disease in coffee trees in Costa Rica (Rodríguez *et al.*, 2001) while in South America the bacterium was reported causing epidemics in Brazil (Beretta *et al.*, 1996). This pathogen is transmitted by xylophagous leafhoppers which are common and abundant insects of tropical and subtropical environments and play important ecological roles in these ecosystems (Redack *et al.*, 2004). In Puerto Rico, Marino-Cardenas and Zapata (2009) studied bacteria found in potential vectors such as *Agallia pulchra*, *Apogonalia* spp., *Caribovia coffeacola* and *Hortensia similis*. At present, coffee trees showing marginal and apical leaf scorch, yellowing of new leaves, reduction of internode length, and abnormal production of new flushes (witches broom) resembling CLS disease have been observed. A serological test DAS-ELISA (AGDIA, Elkhart, IN) at 650 nanometers was performed to diagnose *Xylella fastidiosa*. Samples were taken from leaf veins and branches of: Coffee (*Coffea arabica* L.), *Citrus* spp. and *Inga* spp. Absorbance readings were separated in four groups from lowest to highest values. A total of 340 trees were located using GIS technology and, thirty one of them presented values three times higher compared to the average absorbance readings, values typically indicating the presence of *Xylella fastidiosa*. These values were mapped using Explorer ArcGIS online software (Environmental Systems Research Institute, Inc. Redlands, Cal. 92373), to visually assess trees associated with bacteria in four localities of Puerto Rico: Las Marías (N18°13'14"; W66°01'38"), Adjuntas (18°09'30", W66°45'27"), Yauco (N18°09'57"; W66°49'36") and Jayuya (N18°09'35"; W66°38'45"). Adjuntas and Jayuya showed the highest levels of absorbance. Absorbance was related with higher numbers of potential vectors at these localities (Brodbeck *et al.*, 2011). In contrast, Yauco showed the lowest absorbance in all the tree species sampled. This research is part of the project "Potential effects of *Xylella fastidiosa* on shade coffee establishment in Puerto Rico" (AES-ZTS-51). This is the first report using GIS technology for mapping coffee and shade trees associated with different bacterial populations in four localities of Puerto Rico.