Florida Citrus Advanced Technology Program

QUARTERLY & FINAL REPORTS: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

Instructions Complete the fields based on your project specs. When finished, save the form to your local disk using a unique name. Then, go to **http://research.fcprac.com**, and log in with your user name and password using Researcher Login in the lower left. Find this project title and click on **Submit a Report**. Update your profile information if needed, then upload this report as directed.

2009-2010 REPORT	CATEGORY (drop-down)	TODAY'S DATE (m/d/yr)
◉ *Quarterly Report* ○ *Annual Report* ○ *Final*	Canker Pathology	9/30/09

WHAT IS THE "HEADLINE" FOR THIS REPORT (e.g. a one-sentence "newspaper headline" describing what you accomplished)

Citrus canker strains labelled with GFP survive in biofilms on leaf and fruit surfaces.

TITLE and CONTACT INFORMATION

Proposal Title Survival of Xanthomonas citri ssp. citri (Xcc) to estimate risk of citrus canker transmission by infected fruit

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Organization UF, Citrus Research and Education Center	*Total Direct Funds (current year)* $124,906

REPORT UPDATE (650 words; provide details about your headline)

Under Objective 1 (Confirm biofilm formation by X. citri subsp citri [Xcc]) strains of Xcc and X. alfalfae pv. citrumelonis (Xac), the cause of citrus bacterial spot, were transformed with non-stable GFP and used to identify in situ their ability to survive and persist on leaf and fruit surfaces. When suspensions of the non-stable GFP strains were sprayed on leaf and fruit surfaces, bacterial aggregates were observed under confocal laser microscopy. Persistence of fluoresce in these aggregates confirmed the presence of metabolically active cells, but these cells had limited survivability without osmotic protection from desiccation by phosphate buffer. After inoculation of bacteria in water, scattered cells of the non-stable strain on the leaf or fruit surfaces rapidly lost fluorescence, i.e. were non-viable. Only cells in aggregates continued to fluoresce, i.e. maintained viability. These aggregates were restricted to sites on the fruit or the leaf surfaces that conserved moisture. Aggregates on leaves or fruits were located primarily in depressions where water availability was higher. Phosphate buffer acted to mitigate cell desiccation by buffering the matric and osmotic potential stresses on the plant surfaces. The aggregates resembled what has previously been described as biofilms. Under Objective 2 (Assess Xcc survival and biofilm formation under different environmental conditions and after disinfectant and bactericide treatments of leaf and fruit surfaces) persistence of metabolically active cells in biofilms explains the occasional isolation of viable Xcc cells from surfaces of asymptomatic fruits infested with Xcc even after rigorous disinfection treatments with chlorine and sodium-ortho-phenyl-phenate (SOPP). Recently, Gottwald et al. 2009 demonstrated that pre-washing with a detergent was the most effective treatment for disinfection of fruit infested with Xcc. Detergents may disrupt the aggregates, exposing Xcc to the disinfectants such as chlorine. Further investigations, now in progress, will clarify the effect of surfactants and bactericidal treatments on survival of Xcc in biofilms.