CITRUS ADVANCED TECHNOLOGY PROGRAM

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

▶ INSTRUCTIONS

(●) *Quarterly Report* ( ) *Annual Report* ( ) *Final*

Required: What is the "headline" for this report (e.g. a one-sentence "newspaper headline" describing what you accomplished)

Cybrids inherit resistance via transfer of organelle genes

Proposal Title

Characterization of canker resistance in citrus plants created by 'Somatic Cybridization' without citrus transformation

Today's Date	Sponsoring Organization (drop-down)	Category (drop down)
12/22/11	Citrus Research and Development Foundation	Conventional Citrus Breeding

REPORT UPDATE (500 words; summarize your accomplishments)

Highly susceptible Red grapefruit (RG) produced abundant lesions at 15 dpi with cellular hypertrophy and hyperplasia typical of callused canker in compatible hosts. Similar lesion phenotype was observed in detached leaves and attached leaves. Valencia orange (VO) had less callus-like lesions, and more necrotic lesions. Numbers of lesions was greatest for RG (93) and least for VO (47). The different cybrids showed a variable number and phenotype of the lesions, 4 cybrids developed a higher number of lesions than VO (>50), 11 cybrids produced an intermediate number (25-50), and 5 cybrids formed a lower number of lesions than VO (<25). In contrast to the callus-like lesions for RG, less susceptible cybrid lesions were more necrotic as observed for VO. Thus, canker resistance appeared to be quantitatively inherited from VO based on an intermediate lesion phenotype in the selected cybrids. This was confirmed by Xcc population growth in Cy 3 (7.8 log cfu) and Cy 10 (8.1 log cfu), that was similar to VO (8.0 log cfu) and nearly one log unit lower than RG (8.7 log cfu) at 15 days post inoculation. Responses of genes related to host pathogen interaction in VO and Cy, differed from RG. The pathogenicity related proteins PR4, chitinase (CHI) and beta-glucanase (BG) were up regulated at 4 and 24 hpi in both cybrids. Higher expression of heat shock proteins (Hsp20) in the cybrids suggested a differential interaction of genes from the nucleus with mitochondria and chloroplast genes from the cytoplasm donor. Expression of genes related to programmed cell death and development of hypersensitive reaction to plant pathogens, like alternative oxidase (AOX), aconitase-iron regulated protein (IRP1) and ascorbate peroxidase (APX2) were up regulated at 4 hpi in the cybrids, as evidence for enhanced antioxidant activity. The response of cybrids to Xcc may be expressed at different levels depending on whether mitochondrial and/or chloroplast genomes are transferred in the cybridization process. Cybrids 3 and 10 produced a quantitative resistance reaction to Xcc resembling that in VO. Xcc population development in the cybrids was similar to VO and almost one log unit lower than in RG. More necrotic lesions in these cybrids and VO and lower Xcc populations in lesions suggests cell death occurred which reduced Xcc proliferation. Responses of genes related to host pathogen interaction, in VO and cybrids contrasted with those in RG. At the present time, several citrus cybrids are under evaluation in field trials in areas of endemic citrus canker.

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Contract Number 78062

Project Duration (years) 3 *Year of Project* 3

Total Funds (current year) $95,604.00

SUBMIT REPORT

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.