



Hurricane Irma Impact to Field Trials for CRDF Projects



Oct. 16th 2017



Irma damaged property and crops across FL



- Wind and water impacts significant in many locations
- Estimates of 50% citrus crop loss (dependent on location and other variables)
- Tree damage and loss in some locations
- Monetary losses of greater than \$750M



CRDF prepared for and determined impact of Irma on projects

Pre-Irma

- Team in field collecting priority data (including fruit drop, disease index) in the week before the storm hit
- Anticipated yield data would be the most compromised data type post storm
- Some types of data (disease index, PCR) may be collected depending on storm damage at a given location

Post- Irma

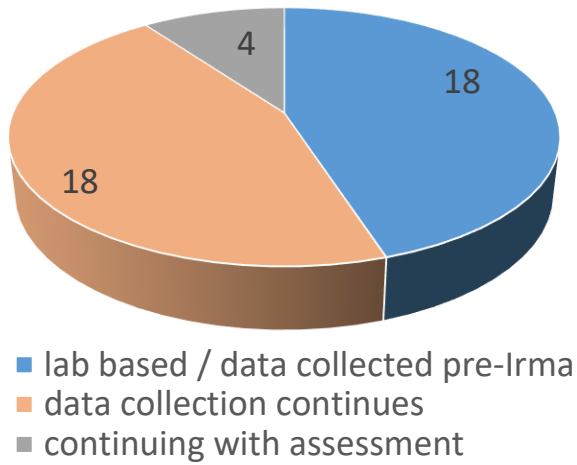
- Follow up with site visits and connection to PIs and growers to get quick assessment of field trial status
 - How much damage at a site?
 - Are individuals in the test or control groups damaged?
 - What types of data can still be collected?
- Experimental design, analysis will be critical to interpreting results



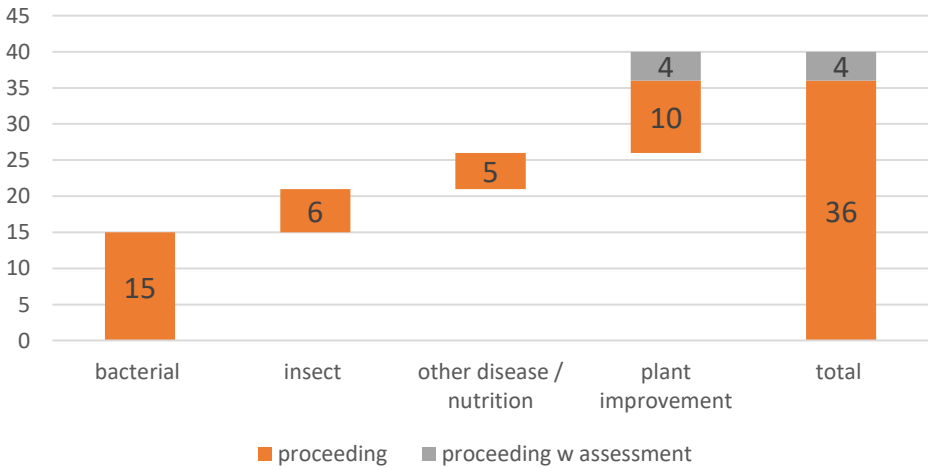
No projects need to completely stop due to Irma

- Currently, 40 projects active
- 18 were largely unaffected due to the type or timing of activities
- Of the remaining 22, data can still be collected for 18
- 4 projects have incomplete information, or are proceeding with continued assessment
- Grower bactericide trials – some locations impacted- data collection to continue

post-Irma impact on active projects



impacts by program area





Summary – impacts to CRDF projects

- To the best of our knowledge, there are no projects that need to stop now due to damage from Irma
- For the majority of projects, trials will continue, and at least some data can be gathered
- Rootstock/plant improvement trials may be compromised depending on location; assessments continue
- Grower bactericide trials will continue for most locations with disease index and PCR data; yield data may be compromised for some locations

Citrus Research and Development Foundation, Inc.



Thank you!



Projects continuing

P #	Entity	Title	Comments
16-016C	Southern Gardens	Use of RNAi delivered by the Citrus Tristeza Virus Ciral Vector to control the ACP	Wind burn and leaf loss. Trial will continue.
16-010C	Univ of Florida	Enhancement of Postbloom fruit drop control measures.	We had taken our fruit data already and minimal flooding occurred in the blocks so few trees were lost. There was wind damage but it will not affect our sampling.
15-039C	USDA	Secure site for testing transgenic and conventional citrus for HLB and psyllid resistance	No significant impacts reported on this site.
15-026	USDA	Implementing Transgenic Tools to Produce Commercial Scion Cultivars Resistant to HLB & Canker	minimal impact
15-016C	USDA	High-Throughput Inoculation of Transgenic Citrus for HLB Resistance	The hurricane had minimal effect, one of Hall's portable greenhouses had a roof lifted. However, none of the 15-016c materials were affected and none of the houses
15-005	Univ of Florida	Asexual inoculum production of Guignardia citricarpa, causal agent of citrus black spot	Taken our fruit data already and minimal flooding occurred in the blocks so few trees lost. There was wind damage of course but it will not affect our sampling.
15-023	Univ of Florida	Citrus nutrition studies for improved survival of HLB-affected trees	The greenhouse was unaffected, Polk Co. sites should be fine since we are not relying on fruit yield. The flatwoods sites on the East Coast and SW FL had some flooding which may have transient effects for the next sampling, but PI's think that it will not result in harm to the project. Post hurricane measurements will need to be analyzed understanding that fruit loss and leaf loss may affect leaf nutrient values, leaf size parameters and LAI.
15-045C	Univ of Florida	Continued Funding for the Mature Citrus Facility to Produce Disease Tolerant, Transgenic Citrus	Minor damage to air conditioning unit in GH but that has been repaired.
15-049C	Florida Ag Research	Evaluation of minimal-risk and biopesticide products as a protectant and therapy for HLB	HLB + site: V1-3% green fruit drop. 3-23 blown over. 3-22, 5-43, 5-40, 2-41, 2-42, 4-46, 6-14, 6-15 = leaning. HLB - site: similar fruit drop. Lost 8-10 and 9-41, the trees split. Trial continues



Project continuing

P #	Entity	Title	Comments
17-005C	University of Florida	Effects of heat treatments on antimicrobial uptake and translocation in citrus trees.	No damage to trees or any problems with this project due to hurricane.
17-006C	University of Florida	Monitoring of citrus groves for non-target antibiotic resistance prior to & after application of streptomycin and oxytetracycline.	Trials are still intact
16-011C	FL Res Ctr Ag Sustainability	Increasing the yield and decreasing the bearing age of citrus trees in new plantings by using metalized reflective mulch while determining ACP populations.	No trees toppled, only few trees in experiment with structural damage. Fruit drop about 10%, variable with windbreaks. Water less than 72 hours. About 50% leaf loss. Team assessing fruit on subset of all treatments (on-tree counts), and trying to ascribe on-ground fruit to plots. Will complete full-tree fruit count for on-tree fruit at harvest, and will monitor subsequent fruit drop loss. Suggest assessing root densities in bare vs MRM plots at terminus of trial.
943C	Univ of Florida	Support for scale-up of Thermal Therapy Treatment: Evaluation before and after thermotherapy heat treatments to combat HLB	Thermo/Bactericide Valencia trial- Water drained off 9/18, ~35 % fruit drop. We can collect yield and fruit drop this year.
15-037C	Univ of Central Florida	T-SOL™ antimicrobial for the management of citrus canker and HLB	Trees are stressed by flooding. They are evaluating health in the trees the first week in October. Project ends in Dec. most data collected pre-Irma
16-019C	Univ of Florida	RSA - Small plant assay for testing the efficacy of antimicrobial materials against HLB.	Had to replace some reagents, so PCR delayed. Minimal impact to milestones/timing
940C	Univ of Florida	Propagation of Rootstock Tree Production in Greenhouses by Seed, Stem Cuttings & Tissue Culture to Accelerate Budded Tree Production for Outplanting	Project complete, PI had insignificant damage to GH panels, the house was sprayed as per FDACS guidance. FDACS agents have inspected the greenhouse and he has been "re-certified".
424	Penn State University	Functional disruption of the NodT outer membrane protein of Candidatus Liberibacter asiaticus for rootstock-mediated resistance to citrus greening using a phloem-directed, single-chain antibody	Reports indicate that plants kept in Ft. Pierce have minimal impact
15-020	Univ of Florida	Create citrus varieties resistant to Huanglongbing (HLB) through transgenic and nontransgenic approaches.	minimal impact



Projects continuing – under assessment

P #	Entity	Title	Comments
15-010	U of Florida	Development & Commercialization of Improved New Disease Resistant Scions & Rootstocks - the Key For a Sustainable and Profitable Florida Citrus Industry	Incomplete information, full extent of impact unknown
15-013	U of Florida	Understanding & Manipulating the Interaction of Rootstocks & Constant Nutrition to Enhance Establishment, Longevity and Profitability of Citrus Plantings in HLB-Endemic Areas.	There was fruit drop in the trial but it may be possible get some yield data this year. The trial will continue.
15-025	USDA	HLB Resistance & Tolerance in Citrus Scion Breeding	There was fruit drop in crossing blocks but the PI had previously marked the fruit and was able to recover most crosses in Lake county. Fruit drop was significant at some trials in Lake and Polk counties and most likely yield data will not be meaningful this year but many trials will continue.
15-002	USDA	Development of Supersour and Other Promising Rootstocks for Florida.	Most USDA rootstock field plantings suffered some damage, including tree blow over and limb breakage. When possible, we are working to stand up trees that were blown over and trim larger damaged limbs. There was some crop loss with replicated trials, and in some trials the crop loss was major. This includes trials with SuperSour rootstock selections. For some trials, this may largely compromise any meaningful yield or fruit quality data for the current season's crop. There was significant loss of fruit from seed source trees of rootstock selections, both those commercially released, and those unreleased and currently being evaluated for possible release. This will reduce the amount of seed from released USDA rootstocks (US-802, US-897, US-942) provided to commercial nurseries for commercial use, and will reduce the seed for propagating new trials of unreleased selections (including the SuperSours). In some trials, the trees were completely underwater for 3-5 days and there is likelihood of long-term damage to the roots. The level of damage will be more apparent over time.

Description	Comments
Test the combination of thermotherapy & bactericide applications in the field.	No issues with continuing this trial. Yield and fruit drop can be collected this season.
Grower bactericide trials	<p>Summary: Data can be collected from the majority of trials. The data may show differences between treated and untreated trees, or differences in storm impact between treated and untreated.</p> <p>Fourteen trials, mostly in the SW, may not be continued due to tree stress (6 Hamlin, 3 Midsweet, 5 Valencia). Data can be collected on grapefruit sites this season. We can collect fruit drop and yield data from around 40 trials - need to account for a few trials.</p>