

## **CRDF Commercial Field Trial of Candidate HLB Tolerant Rootstocks**

### **Announcement of Opportunity for Grower Cooperators, November 2014**

This is a communication to encourage participation by interested growers in the selection of cooperator field trial sites for further evaluation of HLB-tolerant rootstocks. Details of the trials are provided here and CRDF encourages submission of a letter of interest by December 1, 2014 from those who might be interested in hosting a regional trial.

#### Background:

In the environment of HLB, citrus susceptibility to disease is an important component of developing solutions. As rootstocks from the breeding programs are being evaluated, CRDF has encouraged early release and other strategies to make these rootstocks available to growers. Past success in 2013-14 in rootstock release activities from USDA, ARS and UF, IFAS is encouraging, and CRDF will continue to work with both variety improvement programs and their plant release mechanisms to ensure that rootstock materials showing promise are made available for further grower evaluation either through open release or through Materials Transfer Agreement (MTA) strategies.

Further efforts by CRDF to support evaluation of candidate HLB-tolerant rootstocks has led to CRDF arranging for sufficient numbers of 5 HLB-tolerant candidate rootstock trees to plant commercial-scale replicated field trials with cooperative growers, comparing to 2 standard rootstock at each site. These trials will be located in 3 citrus regions of the state and will be hosted by commercial citrus growers to facilitate real-world evaluation under commercial production, harvesting and marketing conditions. Only grower-cooperators who fit these criteria will be considered for hosting the field trials. While CRDF is interested in overlaying appropriate design in these plantings, the plantings necessarily will need to conform to general grower practices, including being treated as a solid planting as far as cultural practices, harvesting and marketing are concerned. For this reason, one consistent scion will be used in all field trial sites.

#### Purpose of the commercial plantings:

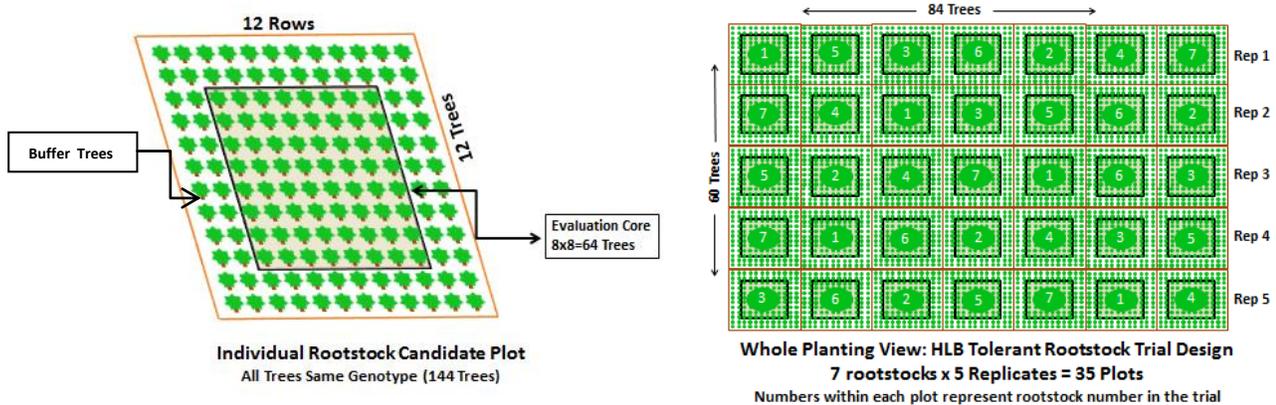
The early field trials are moving forward by CRDF to facilitate identification of best performing candidate rootstocks from Florida citrus breeding programs that appear to have HLB tolerance. The UF, IFAS and USDA, ARS breeding programs continue to produce and evaluate rootstocks which are being subjected to HLB pressure in early field trials. Information is accumulating that allows the breeders and growers to rank rootstocks in these first field trials that appear to be performing well early in their planting cycle (most are less than 7 years old). CRDF has the responsibility to encourage these programs to acquire data and observations and to analyze the performance so that the most promising candidate rootstocks are moved forward.

It is now time for CRDF to implement Phase I grower field trials of most promising candidate HLB tolerant rootstocks emerging from early field trials. Trees for Phase I grower plantings at three sites have been propagated and will be available in spring, 2015. CRDF project managers have characterized the details for grower-cooperator participation in these field trials, including the standardized horticultural practices following planting and appropriate initial information-gathering from the trials commencing when the trials are planted. Grower cooperators for the 3 locations of Phase I trials are

now being sought. CRDF-funded trial administration and data support will provide liaison with the grower cooperators beginning at pre-plant and continuing after the trials are planted.

Details of the field trial Plantings to be considered by potential trial hosts:

- The recommended block design is a 12 x 12 planting (144 trees in each block) for each rootstock per replicate. This “square” orientation is preferred over long rectangular blocks (e.g., 9 x 16 or 8 x 18) to optimize the buffering effects.
- Two buffer rows and two row-end buffer trees in each plot (shown in figure below, left) that allows a non-edge block of 8 x 8 trees, or 64 trees per replicate per rootstock to evaluate for HLB and other performance parameters across the trial
- With this block size, there will be 144 trees per replicate per rootstock
- With 5 replicates of each rootstock, 720 trees of each rootstock will be planted per site and a total tree population of 5,040 for the 7 rootstocks in each location in the state.
- The number of acres planted will vary with the tree and row spacing chosen. Under conventional spacing, this is approximately 1 acre per plot and thus 35 total acres per location in the state.



Candidate HLB-tolerant rootstocks: The rootstock trial will be planted at the sites as follows:

Indian River Site:

- Orange 4 (UFR-2)
- Orange 15 (UFR-3)
- Orange 19 (UFR-4)
- 46 x 31-02-13 (UFR-16)
- US 942 (USDA, ARS)
- US – 812 Standard at all sites
- Sour orange: Indian River

Ridge Site:

- Orange 4 (UFR-2)
- Orange 15 (UFR-3)
- Orange 19 (UFR-4)
- 46 x 31-02-13 (UFR-16)
- US 942 (USDA, ARS)
- US – 812 Standard at all sites
- Carrizo citrange: Ridge only

Southwest Flatwoods Site:

- Orange 4 (UFR-2)
- Orange 15 (UFR-3)
- Orange 19 (UFR-4)
- 46 x 31-02-13 (UFR-16)
- US 942 (USDA, ARS)
- US – 812 Standard at all sites
- Swingle – Southwest flatwoods

All rootstocks for planting in these three trials were budded with ‘1-14-19 Valencia’ for scion uniformity. This facilitates a straight comparison of performance, including yield and fruit quality, as well as facilitating production, harvest and fruit marketing across all rootstocks.

Expectations for planting and cultural practices in the field trials:

Planting plans should maximize the ability to compare buffered blocks of solid planted rootstocks for each rootstock, mirroring the generic design shown above as much as possible. To be useful, the replication of rootstocks must be incorporated into the planting plan as indicated in the design above.

Within-row spacing of trees on the different rootstocks should take into consideration the growth habits of scions on each of the rootstocks. The rootstock breeders can provide recommendations on specific rootstocks that may benefit from tighter or more open spacing, but have indicated that all rootstocks that are included in these field plantings should perform well at 10 foot within-row spacing. This assessment is focused on 10-12 years of economic life of the planting. Complete records on the planting plan, dates of planting, and other relevant details such as soil type, organic matter, irrigation water salinity, pH and bicarbonates, should be collected at planting.

Cultural practices: Once planted, the following general practices are encouraged to support the planting and provide for a reasonable evaluation of the rootstocks:

- Aggressive psyllid management according to current CHMA recommendations or equivalent for young trees and early mature trees. Active participation in a CHMA or cooperative treatment area is encouraged as relevant
- Irrigation, nutrition and grove floor management consistent with current practices to promote root health and growth in the presence of HLB
- Freeze protection should be a component of the planting plan

From the planting date forward, all practices should be implemented uniformly across the planting to avoid creating variation due to factors other than rootstock. Imposing treatments or practices on only portions of the rootstock planting will negatively impact the evaluation of the rootstocks and limit the value of the planting. For the purposes of evaluating these rootstocks for their tolerance to HLB, infected trees should not be removed when detected. Following disease development in trees on tolerant rootstocks is an important element of the trial. However, it is understood that rootstock performance across all replicates may decline to the extent that a specific rootstock may need to be removed from the trial at some point. In this case, it would be desirable to remove/replant all replicates of that rootstock with another candidate tolerant rootstock.

Record-keeping on the field trial planting should include dates, materials, rates and application methods for all practices. This will be used for evaluating rootstock performance within location and cultural practices parameters. This information will not be shared publically. Measures of performance also are an important part of these field trials. Grower-cooperators are encouraged to collect observations and direct data across the trials over time, with the intent to evaluate the relative performance of the HLB-tolerant rootstocks in comparison to the standard rootstocks. In addition, CRDF is assembling an evaluation protocol and will provide support to collect data and analyze how trees in the rootstock plots are growing in the presence of HLB pressure. Among the measures that should be evaluated from planting onward are the following:

- Leaf and soil nutritional analyses to document annual nutritional status

- Annual tree growth measures (trunk diameter, canopy volume, etc.)
- Annual disease measurements, including scouting for initial presence of HLB infection, disease index ratings, PCR tests, and ACP population trends
- Horticultural performance measures, such as herbicide sensitivity, cold response, and other general observations which add to the limited information available on these new rootstocks
- Fruit development, volume, size and quality characteristics once trees are fruiting. Measures of early fruit production will provide new information on rootstock performance. CRDF will coordinate sample analysis for fruit quality.
- To be most useful, plot-wise harvest for fruit yield comparison as well as fruit quality is recommended. This can be accomplished through measured harvest of sentinel trees within the evaluation core of each plot, but ideally, would include yield of the 64-tree core in each plot.

Grower cooperators and CRDF will coordinate on data collection on these field trials and will share information gained from the trials. CRDF will summarize and share publically general features of the trial, but details of disclosure of specific information from the sites will be discussed and agreed upon with the cooperator before being made public. Once the field trial planting is established, CRDF would coordinate with the grower host for a periodic (no more than annual) field day to demonstrate the status of the trials and progress to date in evaluating HLB disease and overall tree performance. This would be organized to minimize disruption to the cooperator operations and to be respectful of business operations. Details on the level of public access to the trial should be established and documented in the CRDF/Grower agreement covering provision of trees for the trials.

#### Considerations for grower cooperators:

The grower cooperator is the primary investor in this trial, well beyond the investment by CRDF and the industry in providing the trees and encouraging the planting. CRDF will encourage discretion in seeking access to field trials for observation, data collection, and field days associated with the trials. There is a need to balance the purpose of demonstrating the performance of the HLB-tolerant rootstocks under commercial production with property and business considerations. Property ownership change is always an issue in longer-term field trials. To the extent possible, cooperators are encouraged to manage for continuity of the trial in the event of property ownership or management change.

#### Selection of grower cooperators to host the trials:

CRDF encourages submission of a letter of interest by December 1, 2014 from those who might be interested in hosting a regional trial. Candidate hosts from each region (Indian River, Ridge and Southwest Flatwoods) must be willing and able to commit about 35 acres of suitable land by March 1, 2015 and to planting and maintaining 5,040 trees using uniformly good commercial practices. Candidate hosts will be evaluated and recommendations will be provided to the CRDF Board for final decisions. Please address your letter of interest to Citrus Research and Development Foundation, Inc., 700 Experiment Station Rd., Lake Alfred, FL 33850 or email to [cpd@citrusrdf.org](mailto:cpd@citrusrdf.org). Including an overview of your current grove operations and experience with hosting field trials in the letter of interest would be beneficial. Please contact our office (863 956-5894) if you would like to discuss details of this opportunity prior to submitting a letter of interest.