Grower Research REPORT
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An Overview of Replanting Citrus in the Presence of Huanglongbing (HLB)

CRDF has highlighted the goals for their research and delivery programs over recent months in print and at grower meetings, stressing the need to focus on two near-term objectives. The first, which is on everyone's mind at present, is how to preserve the health of the existing inventory of citrus trees that are the current life-blood of the industry. Secondly, at the same time, we all know that replacing trees as they age and become less productive is at the core of long-term stability and health of the industry. With the dramatic impact of HLB on Florida citrus, it is difficult for many to contemplate replanting, while at the same time we view replanting as a necessary step toward future success. CRDF encourages that you take into consideration all of the available tools and options as replanting is contemplated. CRDF is currently focused on a plan to develop and communicate strategies to incorporate all of the available tools into new plantings.

Site Selection

Site selection for placement of new citrus plantings is an important first step, and for many growers, few options are available. Within the context of existing citrus grove property, a grower should assess the risks associated with all sites at their disposal to replant, and consider the factors that will most contribute to success with the planting under today's conditions. Choosing the best site has always been an important part of new plantings, and it is even more so today with additional factors to consider.

HLB Inoculum: Despite widespread infection of Florida citrus with HLB, not all grove properties are equally infected and *CLas* inoculum is not equally distributed. Choosing a new planting location where inoculum is lower or can be lowered prior to planting should always be considered.

Participation in Citrus Health Management Areas (CHMAs): There is continuing evidence that the combined effects of growers working in cooperation to plan and apply ACP treatments are significant. Furthermore, it suggests that other tools used through a CHMA with wide participation should lead to enhanced results. Topics where additional coordination might be useful include several discussed in this issue, including HLB inoculum, block and grove border management and managing HLB infection, insects and other diseases in new plantings.

Soil conditions: As with many other aspects of new plantings, soil quality and conditions are important to consider as new plantings are planned. The presence of HLB in Florida makes this even more important, because infected trees have compromised root systems and are thus more susceptible to root stress. Presence of high levels of dissolved salts, drainage issues, and suboptimal soil and irrigation water pH all contribute to challenges of maintaining tree health when HLB is present. These factors should be assessed and resolved when preparing for new plantings.

Other disease issues: Related to the soil conditions above, the presence of soil disease organisms, nematodes and root weevils complicate establishment of healthy new plantings. Management of these challenges should be considered in site location and post-planting management, as they are playing a more important role in health of HLB affected citrus trees. Above-ground diseases and pests apply similar challenges to establishment of new plantings and their continued health, and management should include these considerations as well.

Planting

Tree Size and Quality: Young trees in an HLB environment suffer from greater susceptibility to infection as a result of atypical flushing patterns which attract Psyllid populations. This is particularly impactful when other citrus trees are not flushing, thereby concentrating ACP on young trees. For this and other reasons, it is important to plant high quality citrus trees that will establish quickly and grow through the immature phenology as soon as possible. Planting trees that have been grown for additional time in containers under screen to prevent ACP access is one approach, while another is pushing newly planted trees aggressively to grow through this vulnerable stage as quickly as possible. Selecting high quality trees for planting is as important as ever.

Candidate tolerant rootstocks: Both UF, IFAS and USDA, ARS citrus breeding programs in Florida have been screening wide collections of rootstock candidates for susceptibility to HLB in field trials across the state. This is possible due to the long-standing breeding and selection programs that have created wide-ranging rootstock populations with diverse parentage. Emerging from this HLB challenge is a number of rootstock candidates that show early promise in tolerating infection by HLB. The duration of evidence is short compared to traditional rootstock evaluation timetables, but due to the situation

UPCOMING MEETINGS

May 2014			
16	Commercial Product Delivery Committee	CREC, Lake Alfred	9:30 a.m.
20	Governance Committee	CREC, Lake Alfred	10:00 a.m.
22	Finance and Audit Committee	CREC, Lake Alfred	10:00 a.m.
27	Board of Directors Meeting	CREC, Lake Alfred	9:30 a.m.
27	Industry Research Coordinating Committee	CREC, Lake Alfred	1:00 p.m.

in Florida with HLB, both breeding programs are making some of their selections available for commercial plantings. Plantings of one or more of these rootstocks should be contemplated as new citrus plantings are going out to further evaluate the adaptability across Florida growing conditions as well as their ability to perform in the presence of HLB as well or better than current standard rootstocks.

Planting Density and Design: Significant attention has been paid to accelerating new plantings to productive age both among citrus researchers and among growers. The combination of higher tree densities and precision application of irrigation and fertilization is being tested in research plots and grower plantings, and evidence is mounting that groves can be harvested earlier in their life under these conditions. Tradeoffs are the earlier production and cash flow against higher establishment costs. The opportunity for incorporating one or more of the variables associated with advanced citrus production should be evaluated as new plantings are planned.

Young Tree Care

Asian Citrus Psyllid Control – Within and Around a New Planting: By far the most important factor in preventing HLB infection of new citrus plantings is treatment of psyllid populations within the new planting and in adjacent infected groves. Through efforts of the industry and registrants, additional pesticidal materials are available to extend suppression of ACP populations beyond the first 1-2 years to trees that are 3-5 years old. Research showing that some of the soil applied materials prevent transmission even before psyllids are killed by the active ingredient points to the opportunity to keep ACP populations low. For a number of reasons, including stewardship of the suppression tools, ACP treatments should not focus on one mode of action. Following current grower recommendations and participation in CHMAs will extend protection from HLB transmission. In addition, groves surrounding new plantings should be aggressively managed for ACP to further reduce the risk of HLB being moved into new plantings.

Block and Grove Borders: Various approaches to respond to the awareness that ACP populations aggregate at grove edges are available, and these should be considered for new plantings. Establishing border areas around the perimeter of new plantings and treating them for ACP control more aggressively has proven effective in Brazilian citrus plantings. More regular treatment of these areas reduces aggregated ACP populations along the edges from moving into the center of the block. Similary, treating perimeters of established citrus blocks in the vicinity of new plantings will reduce the movement of edge populations of ACP from those groves into new plantings.

Nutrition and Irrigation: Cultural practices were mentioned above in relation to advanced citrus production and higher density plantings, but the principles are the same regardless of planting density. Appropriate attention to avoid macro- and micro-nutrient deficiencies will allow the tree to respond to seasonal and environmental cues that trigger root and foliage flushes. Fostering this growth will achieve the goal of early production and strengthen the tree's ability to respond to *CLas* infection and HLB disease. While there are no simple guidelines to apply to every grove, the water and nutritional requirements can be managed through monitoring and adjusting inputs. Avoiding either water or nutritional stress may delay onset of HLB symptoms.

Managing HLB infection in a New Planting: HLB, once established within a new planting, can spread locally through "secondary spread". While this is managed to a certain extent through ACP treatments in the new plantings, this is balanced by the ease of local spread once ACP survivors move from tree to tree within a new planting. For this reason, a plan for scouting and monitoring the level of HLB infection in a new planting should be considered. As opposed to existing, heavily infected plantings, scouting and either treatment or removal/replanting of new infected trees should be contemplated, as this is the only method available right now to slow the accumulation of disease in a new planting. CRDF projects supporting testing of thermal therapy and antimicrobial treatments should provide additional opportunities to weigh against tree removal in new plantings.

Inoculum Source Management Around a New Planting: As with the ACP discussion, the extent and proximity of citrus plantings near a new planting provide opportunity for movement of ACP and *CLas* into the new plantings, particularly if the surrounding blocks are not being treated for ACP. CRDF is working with numerous partners to identify methods for limiting or removing inoculum sources to reduce *CLas* transmission into new plantings. It is difficult to contemplate long-term success in new plantings if we continue to accumulate untreated, infected citrus acreage.

Putting it all together

The discussion here does not announce significant new ideas or identify one method that alone will lead to success in new plantings. However, the point is to integrate as many tools as possible in planning, executing and managing new citrus plantings. Achieving success with new plantings and helping to balance the loss of productivity of existing citrus groves will depend on limiting the risks of early *CLas* infection. These tools, and others being developed with grower support through CRDF, will incrementally extend the ability of growers to replant citrus with an expectation of sustained productivity over an economic life.

LINK	TITLE	RESEARCHER
	International Citrus Genome Consortium (ICGC). Providing tools to address HLB and other challenges	Gmitter
	Strategies to minimize growth flushes of mature citrus trees with pruning practices and PGRs	Spann