Florida Citrus Industry Research Coordinating Council

Movement and Preservation of Citrus Budwood

The Situation: The Florida citrus industry is engaged in a battle to survive and the current enemy is citrus greening (also known as HLB). There are other infectious diseases that threaten the industry, some are already in Florida (canker, black spot, sweet orange scab) while others loom on the horizon (CVC, leprosis, sudden death, etc.). The industry has elected to combat these challenges by investing significant amounts of their dollars to fund research. Most feel the long term solution to destructive diseases lies in the development of resistant or tolerant varieties and/or rootstocks. Considerable effort is under way to produce these "industry saving" selections. The work is not limited to Florida; already a red grapefruit selections developed in Texas are being tested by Southern Gardens.

In addition there is a strong need to find superior cultivars for both the fresh and processed market. Greening is not the only challenge facing the Florida citrus industry. The fresh fruit grower must have improved selections that are mature over an extended period, are seedless, easy to peel, of high internal quality, attractive, optimum size and many other qualities. The grower of processed fruit is looking for fruit with high sugar content, excellent juice color, delivers superior yield, produces high quality fruit on young trees, etc. The search for a better orange or grapefruit or tangerine or tangelo or whatever is under way not only in Florida, but all over the world.

The Problem: Currently time is of the essence, greening is marching quickly through grove after grove. Soon there could be yield reductions that will shut down processors and even packers thus altering the industry forever. Scientists need to be able to bring promising plant material into Florida without cumbersome and time delaying regulations. The grower and researcher realize the need to protect the industry from diseases, insects, mites, etc. However, it appears the current situation with the goal to protect the industry has produced a somewhat cumbersome and time consuming process that is generating a bottleneck. This is having a negative impact on the research process. Plant material is being held for extended periods because of the system in place to protect the industry.

Also there is only one repository for citrus germplasm in the US. It is located in Riverside, California. The largest citrus producing area in the US, Florida, does not have a formal collection of cultivars. If anything happened to the Citrus Repository in California valuable genetic material would be lost forever. The USDA-ARS needs to re-establish a repository in Florida (there was one that was discontinued in the mid 80's) in order to assure continuation of

germplasm for the industry and researchers. There needs to be a facility in Florida to characterize and preserve citrus germplasm.

Rationale from Research Perspective: Attached is a detailed document prepared by plant improvement researchers with USDA and UF/IFAS. These scientists are frustrated with the current system as they feel it extends the time required to acquire plant material necessary for their work. They are also concerned that if a new biological threat was found in Florida they would not have access to a diverse germplasm base that may be able to help deal with the problem. They feel we need a repository in Florida.

Solution: The problem outlined above has been known for several years. In 2008 Dr. Luis Navarro, Director of the Center of Plant Protection and Biotechnology, Valencia Spain (generally accepted as the foremost authority on germplasm preservation and budwood movement) was secured to review the Florida citrus budwood regulatory process, and make recommendations to remove the bottlenecks and streamline the process without increasing the risk of introducing harmful pathogens. Today's technology needs to be incorporated into the regulatory process. Dr. Navarro worked closely with DPI and the research community. He provided several recommendations to enhance the Florida system. His complete report is available.

Dr. Navarro notes the recommended changes will lower the cost and greatly reduce the time required to allow budwood introduction. He noted a modern air conditioned greenhouse needs to be constructed along with the necessary labs and offices. The facility should be out of the citrus industry and independent from the foundation trees used to provide budwood to the nursery industry.

It is clear that some major changes need to be made with the regulatory procedure in order to expedite the time involved to get plant material to researchers and allow for evaluation of a much larger number of cultivars. In addition capacity needs to be increased to provide the volume of budwood necessary for proper evaluation of potential new selections. A more efficient and effective system is needed to allow for more timely research and a more comprehensive field evaluation process.

In addition a USDA-ARS Satellite Citrus Repository needs to be established in Florida. Such a facility existed as USDA and the US citrus industry realized the need to have a backup source of germplasm. Florida is the largest citrus growing area in the US and has no germplasm repository. A satellite facility to the USDA-ARS repository at Miami could be located at a joint Florida Department of Agriculture and USDA facility at the proposed LaCrosse site. Specific activities for this satellite repository need to be well defined so as to meet the research and regulatory needs. USDA-APHIS should be involved in the process. A system needs to be

established that allows the free movement of citrus budwood, under the authority of DPI and APHIS, to and from “approved” facilities worldwide.

Procedure: It appears there is an excellent opportunity for the Florida Department of Agriculture, USDA-ARS, USDA-APHIS and the US citrus industry to work out arrangement to streamline the budwood transfer process within the US. Funding from the state of Florida could be used to construct the facilities – air conditioned greenhouse(s), labs, offices and field facilities. USDA-ARS could lease part or all of the facility for a satellite repository. Staffing would include USDA and DPI personnel. A joint facility would be cost efficient and greatly expedite the time required to get bud wood into the hands of researchers and nurseryman.

Key Players: USDA-ARS, USDA-APHIS, Florida Department of Agriculture-DPI, Florida and California citrus nurseries.

Endorsements: In order to demonstrate this is an idea supported by the entire citrus industry, the following organizations need to endorse the concept and strongly urge all governmental agencies noted above to work together in order to establish an effective system to move citrus budwood within the US in a safe and timely manner. This is absolutely essential to the industry in order to have solutions to disease tolerance/resistance, cold hardiness, seedlessness, higher quality, etc. that rely on improved scion and rootstock cultivars.

This proposal needs to be reviewed by the organizations below. Their comments are necessary to provide the broad look and to be sure the "citrus industry" is supportive of the proposal. It seems a Task Force should be formed to review ideas and make recommendations to the Budwood Technical Advisory Committee, which in turn will pass along their suggestions to the Commissioner of Agriculture.

Florida Citrus Mutual

Indian River Citrus League

Highlands Citrus Growers Association

Peace River Valley CGA

Gulf Citrus Growers

Florida Nursery Growers and Landscape Assoc. (Fla. Citrus Nurseryman's Assoc.)

New Citrus Varieties Development Corp.

Citrus R&D Foundation

FCIRCC

FDOC

Florida Citrus Packers

Florida Citrus Processors

Florida Citrus Production Managers Assoc.

Basic rationale from Research Perspective:

Establishment of a USDA citrus germplasm repository location in Florida will benefit the US citrus industry in several ways:

1. It will facilitate the more rapid introduction of newly created or introduced cultivars into Florida and other citrus producing states. Active genetic improvement programs in Florida, California, Texas, and several other countries produce new cultivars that may have great potential in the other citrus production areas. Movement of citrus germplasm into the US from other countries, and among citrus producing states is vital for continued sustainability of the US citrus industry. Yield and fruit quality parameters for nearly all citrus cultivars can differ significantly between subtropical and Mediterranean environments. Characterization of citrus material in Florida is essential to gauge potential for new cultivars and parental material for use in a subtropical climate and would be enhanced by early availability of promising material. Phytosanitary regulations are essential for safeguarding against introduction or movement of citrus pathogens; however the present infrastructure is inadequate to satisfy needs for citrus importation and greatly slows entry of citrus germplasm into Florida. Citrus germplasm should be viewed as very low risk when introduced into Florida from certified pathogen free sources within the US, such as the NCGR for Citrus or CCPP in California. Therefore, materials from these sources should be able to move quickly through a streamlined introduction process. Likewise, certified pathogen-free materials from FDACS-DPI should be able to enter California and become quickly available for commercial or research use. Citrus germplasm from foreign sources represents a higher risk for disease introduction and should be managed appropriately. Currently, none of these activities has received sufficient attention, and the slow introduction of new citrus germplasm has inhibited citrus breeding programs in Florida and California, as well as programs to evaluate new cultivars of potential value directly to the industry. More rapid introduction of new citrus cultivars into Florida will result in earlier evaluation and the availability of good new cultivars for direct industry use. Ability to move material freely throughout the country will enhance possible nationwide utilization of improved citrus cultivars from USDA-USHRL, UF, UCR, and other public/private programs nationally or internationally. Such facilitated exchange of material with other states will enhance the profitability and competitiveness of US citrus production, by hastening the utilization of improved germplasm resources.
2. It will accelerate the pace of genetic improvement programs in Florida and throughout the US. At present, many potentially useful germplasm accessions are only found in Florida or California, but not both. In combination with severe restrictions on interstate movement of plant material, this limits the opportunities for researchers to conduct experiments and make crosses with unique material. Better access to the full breadth of the existing citrus germplasm pool will allow for exploration of potential for resistance and tolerance to emerging biotic or abiotic threats. New biological threats are unlikely to simultaneously enter the East and West coasts, so having ready access to broad germplasm collections in FL and CA facilitates more rapid research response to future problems which may be faced throughout US citrus industries.
3. It will provide a backup to the USDA germplasm repository for Citrus in Riverside, CA. Having a backup collection of germplasm provides insurance against loss from catastrophic events, and is a routine goal in germplasm preservation. Currently there is no backup of the nation's collection of citrus germplasm and having two widely separated collections would provide excellent security for this plant material.

4. Improving the process of introducing novel cultivars and making them available in Florida will reduce the motivation for individuals to illegally introduce citrus from other parts of the world. Citrus growers, commercialization interests, and common citizens will be less likely to introduce materials illegally if there is a viable safe pathway for germplasm introduction and movement. Illegal importations are very likely to have contributed to many of the new pests and diseases against which the US citrus industries are now struggling.
5. Perhaps the greatest rationale for developing a DPI/ARS satellite repository is the synergy and strength that comes from leveraging state and federal resources and skills. This repository will contribute to both national and state concerns and opportunities. Combined resources and commitment will enhance all aspects of repository function, strengthening the DPI CGIP program and the National Germplasm System conservation of citrus resources. In addition, by formalizing the relationship between Florida CGIP and the National Germplasm System (which has already occurred between the California citrus budwood program and the National Germplams System), it should markedly streamline interactions and facilitate movement of clean material for maximum benefit of all US citrus industries and researchers.
6. The clean-up and preservation of valuable domestic citrus germplasm. The citrus breeding programs in Florida and California have created and assembled a very large collection of intraspecific, interspecific and intergeneric hybrids – a wealth of genetically diverse citrus germplasm. Many unique hybrids with unusual genetics now exist in these programs; and though many of these hybrids have absolutely no direct cultivar potential, they may have potential for specific studies in citrus genetics and breeding, pathology, physiology, etc. There are numerous examples of such domestic germplasm that could contribute to future rootstock and scion improvement. It is also likely that with the rampant HLB in Florida, that new potentially HLB or canker tolerant hybrids are going to be identified – these need to be cleaned up and preserved. Thus, the synergy created by combining CGIP with a new Repository in Florida will provide an outstanding opportunity to collect, clean-up and preserve this valuable germplasm in a central location where it can be made available to the broader citrus research community. What a resource this would be!

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May 2011