

## **Minutes - Juglans CGC Meeting**

**Thursday, October 5, 2017**

**NCGR Office, Straloch Road, Davis, CA**

### **Attendees:**

Malli Aradhya, Jackson Audley, Rick Bostock, Pat Brown, Greg Browne, Tom Burchell, Mark Coggeshall, Bob Driver, Joe Grant, LJ Grauke, Dan Kluepfel, Chuck Langley, Chuck Leslie, Gale McGranahan, Dan Parfitt, Katherine Pope, Dan Potter, John Preece, Dave Ramos, Steve Seybold; By Phone: Gary Kinard, Kim Hummer, Joseph Postman, Andreas Westphal

### **Introductions**

Pat Brown, newly hired walnut breeder at UC Davis was introduced

LJ Grauke – Carya curator from Texas attended for the first time

### **Approval of previous minutes**

### **Gary Kinard – NGRL report**

The National Germplasm Resources Lab recently hired a new botanist (Melanie Schori) who will be working with John Wiersema on taxonomy for GRIN

Discussed the importance of GRIN taxonomy work

Reviewed the state of plant exploration and plant exchange work, impediments to germplasm exchange, funding for these activities, and application deadline (July)

Additional material of interest for several crops was collected from the old Plant Introduction Station at Chico, CA

GRIN Global has been in use now for 2 years and staff is continuing to work on it

International systems are now using the GRIN structure and customizing it

LJ Grauke raised a concern about errors in the Carya information

### **National Program Report – (Peter Bretting PowerPoint) –by John Preece**

Locations of gene banks

~ 600,000 accessions

Information on demand and distribution of germplasm

Budget – declining funding of Germplasm System

Priorities – Maintenance of collections - #1

Malli Aradhya commented that this presentation points out problems but no solutions

## **Davis Repository Report – by John Preece**

### Budget

Needs to cut \$30,000 from his discretionary budget

Needs to maintain a supplies budget so cut two student half-time workers

Current staff retained on discretionary funds: Angie (nursery), Patty (Lab), Sergio (Wolfskill)

Lack of funds is impacting management – for example will see if industry will help with pruning the grapes

### Land Shortage

The NCGR- Davis had 7,000 total accessions of all species 5 years ago, now 8,800, so an increase of 25% in 5 years

Bob Materi is the new Area Director replacing Andy Hammond – John has had discussions with him regarding need for additional land and issues with water at LTRAS site that has been under consideration. That site potentially could provide 65 acres but no reliable water supply and new well would cost ~\$250,000. Materi indicated funding for water could be considered.

John said he will go back to the university again immediately with support for a pump etc. and discuss additional land options

John has 15 rows opening now that were formerly the old peach block and he is planning to use this to repropagate existing walnuts into a new block. Under consideration for material to include:

- Trees being lost to crown gall in current blocks
- Accessions from Georgia and Azerbaijan now planted on very close nursery block spacing
- Grauke *J. microcarpa* collection

There was discussion of the value of keeping the *J. californica*, considering the losses and susceptibility to stress and thousand cankers. The general opinion was there is value in keeping for diversity but probably with fewer accessions than originally in existing blocks.

Gale asked about the fate of *J. australis* she imported from Argentina. Most of these have been lost but survivors are improving following removal of adjacent large Paradox. There was discussion of the value of these for rootstock

development, for example for Phytophthora resistance, and that *J. regia* x *J. australis* hybrids can be large beautiful trees.

Ramos asked about possible land at Parlier. John said that do that would incur prohibitive land charges.

Kim Hummer stated that she has some land that could be available but discussion of distance from main growing area and suitability of the site for walnuts suggested that was not a feasible option.

Ramos pointed out that Plant Sciences has a new Chair and that presented a new opportunity to reopen conversations with the Department

Gale suggested forming a Land Committee to discuss options with the various UCD people and suggested Ramos as Chair

There was discussion of keeping collections on USDA vs. university land and the university use of collections and differences in objectives between university breeding collections and USDA germplasm collections.

A Land Committee was formed to advise and assist John in pursuing land options with the UCD Plant Sciences Department and the School of Ag regarding more space:

- Members: Dave Ramos, Rick Bostock, Pat Brown, and John Preece

### **Thousand Cankers Disease**

Steve Seybold reported on his and his graduate student, Stacy Hishinuma's, work on the impact of thousand cankers disease and expressed his appreciation for the use of the NCGR walnut collections, which made her thesis work possible. She also used the collection to study host selection behavior of the walnut twig beetle, which vectors the pathogenic fungus.

Rick Bostock reported briefly on his work with the thousand cankers state-wide survey which is now completed

### **LJ Grauke**

We were honored to have LJ Grauke travel from Texas to attend the meeting in person.

LJ described his work with *Carya* and state of the NCGR *Carya* collection in Texas

That facility has plenty of land and 300 grafted pecan cultivars

He has provenance collections – seedlings on their own roots

Xylella fastidiosa is the biggest problem for the repository due to restrictions on distribution but is not of much interest to the industry

The pecan industry is growing rapidly in South Africa

Jennifer Randall collected isolates in the repository collection

New 5 year plan for Carya

Addresses Xylella

Will look for genetic resistance

If no remediation to treat for this, cannot ship. Alternative is to repropagate material in a screen house but there is no budget for this so why do it if the industry doesn't care – this would be mostly benefit international folks

Eliminate redundancy in the collection and keep a core collection

Pecans got an SCRI grant

Genomic development

Use to understand geographic distribution

Use of SSRs from Keith Woeste and added some

Tree plastid markers and more modern markers

Hudson-Alpha did the work on the reference genome

Use of Carya for truffle production

### **Dan Kluepfel – Walnut SCRI update**

*J. microcarpa* hybrids for rootstocks

Physical and genetic maps for *J. regia* and *J. microcarpa* developed

Screened hybrids for pathogen resistance

DJUG 31.01 x Serr and DJUG 31.09 x Serr

300 progeny from each micropropagated, >50,000 clonal trees produced these are being screened for pathogen resistance – crown gall, nematodes, and Phytophthora

QTL for crown gall identified

Seed from Seybold collection of *J. microcarpa* in New Mexico is being screened for crown gall resistance

We need to decide how to preserve this collection

Malli is doing microsatellite work to characterize diversity

Currently planning to plant in a 2 acre plot at the Plant Pathology Department's Armstrong Field Station

Wes Hackett developed a new germination procedure for *microcarpa* which is notoriously difficult to germinate

### **Chuck Langley and Pat Brown,**

Chuck Langley briefly discussed resequencing work in progress that has been funded, in part, with Plant Germplasm evaluation funding.

### **Dan Potter**

Dan commented briefly on his work looking at the frequency and distribution of pure *J. hindsii* in northern California vs. hybrids. This work will be published soon but he is finding pure *J. hindsii* is common.

### **John Preece - management issues related to the walnut collection.**

Hedging - John spent nearly \$3,500 to hedge the youngest close-planted trees from Georgia and Azerbaijan in the D Block on both sides of the trees and to hedge the C block and outer rows of the A&B Blocks on only the north side of each row. This was all he could pay for due to budget and spending limits.

Irrigation nozzles in the A&B Blocks will be moved to hanging in the air rather than on the ground to avoid rodent damage because the staff did not want to bury the lines. There was skepticism and discussion of the merits of this plan which is a method used by one local grower, concern about wetting the trunks and promoting Phytophthora, etc. John said he had already bought the nozzles for doing this.

There was discussion of why the pruning was done late summer instead of early summer. Driver and Ramos both thought this should be done by early July at the latest to get the best effect on regrowth. John replied that budget uncertainty and spending limits on contracting amounts dictated the timing and it was better to do this fall than not to do at all. There was agreement on this point.

Kat Pope asked if a control program for *Botryosphaeria* was in place, given the serious problems local growers are having with this and spraying 2-3 times a year. John responded that this is not being done but there was discussion about the importance of this, given that nut yield is not the objective of the NCGR collection. Driver asked about timing of spray applications and Rick Bostock said the question should be directed to

Themis Michailides. As a general conclusion, it was suggested that Bot is perhaps not the major concern among several serious threats to the collection, but can cause significant branch loss and tree decline, and should be considered.

### **Rick Bostock**

State SCRI-CDFR grant is supporting Jackson Audley (Seybold student) and Jason (Bostock student) looking at differences in *Juglans* species attractiveness to the twig beetle, looking at volatiles etc. *J. microcarpa* is not attractive, *J. californica* is most attractive – why the differences? This work is an offshoot of the Hishinuma Ph.D. thesis work performed in the collection.

### **Jackson Audley**

Working on behavioral repellants of walnut twig beetle flight in hopes of developing a tool to protect trees from attack by the beetles.

Testing 5 compounds as potential repellants – two enantiomers of limonene, one enantiomer of verbenone, and two other compounds (*trans*-conophthorin and chalcogran) produced by feeding twig beetles that are potential anti-aggregation pheromones. Bob Driver pointed out that limonene is widely used as a surfactant for orchard sprays.

### **Vulnerability Statement**

John Preece has substantially updated and revised the Vulnerability Statement and given that draft to Chuck Leslie

Chuck will revise further with committee input

Committee members were asked to look at the current version and offer revisions, particularly in their areas of expertise

### **Membership**

Pat Brown, the newly hired nut crops breeder in the UC Davis Plant Sciences Department was added as a new member.

Chuck Leslie was retained as Chair

### **Adjourned the morning indoor session**

### **Traveled to Wolfskill for lunch**

### **Afternoon on-site collection management discussions in the orchards at Wolfskill**

A&B Blocks

Discussion of extensive loss of *J. californica* trees over time and reasons.

(Seybold: In her thesis, Stacy Hishinuma reported that as of Aug. 2016, only 67 live *J. californica* remained of an estimated original 210 accessions planted in the collection. These were mostly in poor condition. Between 2010 and 2014, 43% (71 of 163) died with symptoms of TCD.)

Discussions of John's proposal to remove the few remaining trees in the center section and use the space for Prunus. Driver and others argues that shading, proximity to remaining trees, replant situation, etc. would suggest poor results from this

There was additional talk of the issues with raising the irrigation lines off the ground, the small area actually covered by the current sprinkler system, and use of splitters to keep water off the trunks if a wider distribution system was used. These would not work with suspended aerial sprinkler heads.

There was a question about use of pressure bomb to manage irrigation and if this was being done.

(Seybold: In her Ph.D. thesis, Hishinuma reported that pilot measurements by B.D. Lampinen of about 20 *J. californica* and 20 *J. major* in the collection were taken on June 5 and June 9, 2014 (one and five days after irrigation). The mean SWP's at these times were -10.1 and -11.5 bars for *J. californica* and -7.1 and -7.9 bars for *J. major*, respectively. This suggested that there was more moisture stress on *J. californica* than on *J. major* at this time and that perhaps the *J. californica* trees were under watered.)

There was extensive discussion about the recent hedging - who had been contracted (John had delegated to Howard and was not sure -later clarified it was Eric Nielsen), why it had not been roofed to reduce height as had been suggested (equipment that could do this was not used), and there was a continuing discussion from the morning session regarding the optimum time to do hedging in order to reduce height and keep light in the lower canopy. The discussion continued in the C Block

## C Block

This block was planted on spacing that is clearly too close for walnuts and this has long been a problem with this block

The entire block was recently hedged on only the north side of all trees and not topped. The consensus was that this is very inadequate - the trees are so tall that this does not provide more light in the lower canopy and will only promote more branching into the rows on the prune side, further reducing light down low. The consensus was that these trees need to be topped at half height and over time

brought down to about 10 12 ft in height and then hedged and topped annually as has been done and recommended consistently in the past. This will require financial resources that, it is recognized, are not currently available and there was discussion of possible avenues to correct that.

We looked at the few *J. australis* that remain. Many large Paradox trees that grew from escaped rootstocks and shaded adjacent trees, including these, were removed two years ago, and that is helping. A considerable number of these still need removal.

Suckering of rootstocks in this block is badly needed, many trees still need identification tags, and trees are being lost to crown gall

#### Former Prunus Block immediately south of the C Block

The Prunus collection that was here has been repropagated and trees here removed except the stumps.

John's plan is to locate a new walnut block here – repropagating items in poor health in the current blocks due to crown gall and weak trees in the A&B Blocks along with material most likely to be of interest, some *J. microcarpa* accessions, for example, and some new material from the seedling introductions in the D Block

There was extensive discussion of preferred spacing, arrangement of species, what material should be included, how ground should be prepared, how material would be propagated and a potential timeline for accomplishing this. Discussion of material to include and spacing will be continued among John, Malli, Chuck Leslie, and Pat Brown.

#### D Block

This block contains young seedlings trees of recent introductions, primarily from China, Azerbaijan, and Georgia.

Trees are planted on very close spacing (~1 meter) due to absence of space for walnut introduction at the repository.

Trees in this block were recently hedged on both side at 8ft height and it was generally agreed that this was the best way to maintain these trees but that it needed to happen every year and to be done no later than the 4<sup>th</sup> of July each year.

Many trees died very young in the older part of this block – John says due to soil problems.



It was suggested that John should designate a person on his staff to have responsibility for management of the walnut collection, as he has done with most of the other crops. This responsibility has not been clear for walnuts although they are a major part of the collection and actively used in support of a major commodity. There was discussion of possible candidates and John will consider options.

There was further extensive discussion of the critical need for additional space and financial resources for collection maintenance and also closer direction to the field staff and curator regarding orchard management

**The meeting adjourned in late afternoon.**

**Conclusions:**

Davis NCGR has serious budget and land issues that need to be addressed

Management of the walnut collections has serious issues that need correction, closer management attention, and additional financial and land resources

Insufficient land and money is severely inhibiting badly needed repropagation of deteriorating walnut material currently in the collection

Insufficient land is preventing acquisition of additional walnut germplasm of interest

**Action items:**

A land committee was formed to assist John in exploring options with UC Davis for additional land

John was encouraged to appoint a staff member with responsibility for management of the walnut collection, as he has done for other crops

Several committee members (Bob Driver, Chuck Leslie, Dave Ramos) asked to be engaged more closely with pruning and hedging decisions and volunteered to participate on-site

John will hedge and top the collection annually in consultation with the CGC

Pat Brown, Chuck Leslie, and Malli will work with John to develop a planting plan (spacing and genotypes) for the proposed new walnut planting on the old Prunus block site

Chuck Leslie will work further on the Vulnerability Statement and submit a revised version to Beltsville