

Minutes of the NC140 meetings held in Wenatchee Washington November 14-15, 2017.

2017 Chair and Host: Stefano Musacchi, Professor, WSU, Wenatchee, WA

Recording Secretary: Gennaro Fazio, USDA ARS, Geneva, NY

Tuesday November, 14

Welcome

The meeting started with the welcome and introduction by Stefano Musacchi who introduced the agenda, made several housekeeping announcements and introduced Dr. Jim McFerson (TFREC- WSU Center Director) who delivered welcoming remarks on behalf of the experiment station and pointed out the importance of research in fruit growing in Washington and how NC-140 fits in the overall support of the local industry. Next, Dr. Musacchi introduced Dr. Mike Willet (Manager Washington Tree Fruit Research Commission) who represents the research arm of the Washington tree fruit industry. Dr. Willet spoke about the strong investment that the commission has placed on rootstock research, especially apple and the positive impact it has had on the industry.

Next order of business was the approval of 2016 NC140 meeting minutes prepared by Mike Parker. Motion made by Stefano, seconded by Gennaro Fazio and approved unanimously by the committee.

Future Meeting Sites

The conversation about possible future meeting sites was started by Stefano Musacchi who provided a bit of history about why the current meetings were being held in Washington instead of the original planned location in North Carolina. The issue with California members regarding public bathrooms seems to be less important now according to Rachel Elkins so after some discussion a proposal surfaced to meet in NC 2018 and NY 2019. Peter Hirst motioned to have 2018 meetings in NC and 2019 in NY. Stefano Second and the motion approved with unanimity.

Dr. Ron Perry Stepping down as the regional representative for the NC-140 project

Ron Perry took the stage, addressed McFerson and Willet about how important the NC-140 rootstock research committee is to the industry, having recently received a major award. Dr. Perry recognized the students that were supported by the award funds – he recognized Dr. Marini and Dr. Hoover, their involvement in obtaining and administering the award as scholarship travel funds to attend the meetings. Dr. Perry has served as administrative advisor on behalf of the North Central Regional Association of Agricultural Experiment Stations for more than 12 years; NCCC22 2005-2011 and NC140 2012-2018. He indicated that he is stepping down. Dr. Richard Marini has agreed to serve in the Administrative Advisor role on behalf of the NCRA. The membership expressed their pleasure in having Dr. Marini serve in this capacity. Pending approval by the NCRA, Dr. Marini will begin in the AA capacity in 2018.

Website Report

Jon Clements delivered a brief update on website development. There have not been big changes since last year. Jon updated the contact information about official representatives. Jon could use some help about rootstock trials – trial coordinators should check if the trials they coordinate are entered correctly. 2009 Pear rootstock trial does not exist and should be deleted. Jon pointed out some statistics about

access and countries. Annual reports and project publications have been updated. Some access issues were fixed.

Rewrite Committee

Mike Parker delivered an update on rewrite committee. Ron Perry expressed appreciation for those who helped on the rewrite committee. The project has been reviewed and approved – good until September 30, 2022. Mike informed the membership about the process of acceptance of states into the project – state representatives need to make sure that their project is approved and then added to the list by the state administrators. At one point there were 31 states involved in the NC-140.

Introductions

Attendees introduced themselves and spoke a bit about their project.

Dr. Peter Hirst made a pitch for participation in the American Pomological Society. Dr. Hirst made a presentation of the Shepherd Award for 2016 for a paper published by authors Marini, Autio et al. Peter relayed a message from Michele Warmund (APS president) to sign up for and publish in APS Journal.

Rootstock Trial Coordinator Reports

2009 Peach Rootstock – Greg Reighard introduced the ISHS Congress and lamented that very few NC-140 members had submitted abstracts for the 2018 congress. Greg has submitted the paper that was presented at the ISHS meetings in Bologna – the final draft is in the 2009 Peach trial folder on the website. Greg is planning to add the 2016-2017 data and publish in the APS journal in 2018. Refer to manuscript for performance updates. Greg will not be coordinating Peach trials in the future as he is slated to retire. Greg showed some very interesting pictures of root systems of rootstocks that were in the trial, showing differences in fibrous root formation, soil exploration (shallow vs deep) in interspecific hybrids. Later Greg Reighard nominated new person to chair new peach trials: Ioannis Minas of Colorado State accepted the charge.

2009 Peach Physiology – Rich Marini (Final report) originally designed to see temperature effects on peach rootstocks. Negative relationship between growing degree days and fruit size spurred the continuation of this experiment (Terence Robinson) - looking at the relationship between crop density, season length and fruit size – five states participated, had some problems with frost. Management is recognized as a huge factor in the interpretation of results as Rich noted that when one trial manager retired and another one stepped in the data would look quite different. Rich pointed out that in some cases it was hard to make some sense of the data with two years' worth of data. Refer to his presentation for graphs and interpretation of data.

2010 Apple Rootstock – Wes Autio. Two scions, 31 rootstocks. Wes cautioned to shut down anyone proposes to hold a new trial with that many rootstocks. The trial was riddled with rootstocks (Budagovsky) with unknown performance predictions which caused many problems with shading and spacing. These problems translated into complicating the statistical analysis. There were some inconsistencies with the comparison of TC derived Geneva rootstocks which in many cases were smaller

than the normally propagated ones – very different than previous studies. Some rootstocks in the Fuji trials produced trees that are smaller than the Honeycrisp trials. Fallahi expressed that we learned quite a bit from this trial and that some of the trees/locations are being used in the AppleRoot2Fruit. Crassweller noted that the trees were somewhat damaged by a freeze in the nursery. Lang expressed the need to split trials in two (dwarfing and semi-dwarfing). Fazio pointed out that while tree size for Pillnitz material was somewhat known, there was little or no knowledge of what the Budagovsky material was going to do – and that it was a big mistake to introduce those in the trial without good knowledge about tree size potential. This is important for future trials – we need to be more restrictive with entries if they are not accompanied with solid vigor class data. Autio pointed out that in previous years we did split trials into dwarfing classes. Refer to the report submitted by Autio for specifics. Autio was congratulatory to participants for having submitted all data by May 2017. Autio stressed the importance to follow the data submission format and to proofread the data before sending it in.

2010 Sweet Cherry Rootstock & Training Systems – Greg Lang. Trial was started with 13 different sites and was down to 5. Cherry trials have yielded some very good data in identifying good Gisela rootstocks and some of their interactions with the different training systems. The interaction meant that some rootstocks are best for some training systems and that some training systems cannot be evaluated in a short time because productivity curves change significantly once the orchard reaches maturity. Please refer to Greg's slides and trial report for more details. Greg Lang volunteered to coordinate apricot and cherry trials.

2013 Pear training/spacing/rootstock - Todd Einhorn. Stefano Musacchi and Todd Einhorn will coordinate future apple trials. Todd gave an update on the 2018 (now 2019) apple rootstock trial. Crimson Crisp was not available for propagation. Finalized trial with Buckeye Gala – more trees are available as some locations dropped out because of changes in scion. Stemilt/Gold Crown is preparing the trees – tree planting was delayed because the nursery size was small. Canada BC would like to be added to trial and Colorado would like one more site. No update on the pear trial.

Rena Moran volunteered to coordinate plum rootstock trials. It will take some time to come up with rootstocks and scion to test. Goals are to find cold tolerant rootstocks that do not sucker.

2014 Apple Rootstock – John Cline Absent

2014 Organic Apple rootstock – Wes Autio. The trial was described as having some issues with management under organic rules. Very difficult in some states to control weeds and other diseases, which in turn confounds data on rootstock performance. Please refer report on website for salient updates about this trial.

State Reports

Participants delivered highlights of state reports (24 states). The reports can be found on the www.nc140.org website.

Open meeting with nursery and industry

Stefano Musacchi led a discussion about nursery priorities in rootstocks research. Participants and speakers were Scott Harper (Clean Plant Center) Washington State University. Bill Howell (Northwest

Nursery Improve Institute) (NNII). Mike Willet (Washington Tree Fruit Research Commission). Several nursery industry representatives were present. The importance of conducting nursery research as well as field performance was stressed in this meeting as well as the importance to coordinate and divulge scientific information to the nurseries. Musacchi and Fazio will spearhead an effort to coordinate research that involves nurseries and different topics like virus resistance.

Meeting Adjourned for the day.

Wednesday November, 15.

Several students working on rootstock research projects in many states were invited to deliver short presentations about their research. This activity was appreciated by acclamation by the committee and efforts are being made to continue to make available some scholarship funds to allow students to participate in meetings. Presenters and their topics are listed below. Each student was awarded a stipend to cover travel expenses to the meeting. Each student delivered a ten minute summary of their activities in the morning of November 15. Table 1. Provides a list of the students and their project titles.

Table 1. List of invited students and their projects.

Student name	Advisor name	Department and University Affiliation	Presentation Titles
Ali Farqani	Gennaro Fazio	Cornell university, School of Integrative Plant Science, Horticulture Section	Growth and fruiting performance of Honeycrisp apple grafted on 8 rootstocks in response to soil pH
Sarah Kostick	Kate Evans	Department of Horticulture, Washington State University	The objective of this project is to identify potential Pyrus genotypes that could be further assessed as potential rootstock cultivars in replicated trials.
Nadia Valverdi	Lee Kalcsits	Horticulture, Washington State University	Response of Different Rootstocks for Apple Trees to Abiotic Stress: Using four different rootstocks (Bud-9, G-41, M-9-T337 and G-890),
Sheriden Hansen	Dr. Brent Black	Plants, Soils and Climate; Utah State University	Renewal pruning and hedging of tart cherry trees on Gisela 3, Gisela 5, and Mahaleb rootstocks.
Emily Lavelly	Richard Marini	Plant Science at Penn State University	Studies being conducted on apple replant disease and associated with replant pathogens and other soil-borne fungi such as mycorrhizal fungi.
James Larson	Greg Lang	Michigan State University- Horticulture	Whole canopy renewal of sweet cherry is being studied in sweet cherry on dwarfing rootstocks and within different high density training systems.
Bruno Casamali	Dario Chavez	The University of Georgia	Determining the optimum irrigation and fertilization rates for young peach trees in Southeastern US. We intend to determine the optimal equilibrium between vegetative and reproductive plant development, maximizing orchard production and grower profit.
Rebecca Wiepz	James Schupp	Plant Science, Penn State University	Studies are being conducted to determine the best Mycorrhizal inoculants on apple and impact on growth and development in the field and in controlled studies.
William Wheeler	Bruce Bugbee	Department of Plants, Soils and Climate - Utah State University	Determining the physiological response to imposed drought stress of varieties on different cherry rootstocks
Brendon Anthony	Stefano Musacchi	Horticulture - Washington State University	Studies are being conducted to determine the best leaf area and crop load management approaches for Cosmic Crisp new apple variety released by Washington State University.
Stefan Roeder	Stefano Musacchi	Washington State University - Department of Horticulture - Graduate Student	Studies are being conducted to determine new potential pollinizer phenotypes for apple orchards.
Peter C. Herzelle	Terence Robinson and Greg Peck	Professor and Assistant Professor, Horticulture Section, School of Integrative Plant Science, Cornell University	Bloom thinning treatments in New York utilizing the Pollen Tube Growth Model.

Other administrative discussion and meeting wrap up.

The traditional discussion about number of 'within plot' tree replication and plot number ensued by comments by Dr. Crassweller. There needs to be a balance between having multiple trees per plot and number of plots to serve different purposes: statistical analysis which requires a minimal number of trees, and developing a unit of production in modern fruiting wall training systems which requires multiple trees per plot. Rich Marini: blocking is not useful. A compromise was reached – completely randomized design and several 3-7 trees plots. The expectation is that the entries in the trial have a uniform dwarfing classification.

Emily Hoover mentioned that it is important to have students participate in these meetings. Peter Hirst proposed a mechanism to fund students by increasing registration fees. Brent Black proposed that advising faculty could match scholarship funds. There is disparity in the method of payment of registration fees by different participating experiment stations. Most experiment stations fund only one representative per state, which causes complexities in having everybody participate. There are also complexities in the ability to administer the 'would be' scholarship funds. Sponsorship was discussed by Musacchi. Fazio asked Hirst about the using APS and ASHS as medium for administering the scholarship funds because state institutions have many difficulties in justifying spending items – most members were in agreement, making student membership a prerequisite to receiving the funds. Fazio proposed the combination of finding sponsors and increasing registration fees. Hirst proposed different scholarship amounts "as needed" by students. Hirst motioned to increase registration by \$75 per person. More discussion ensued. Emily Hoover mentioned that \$9K were used to sponsor students in 2017. Lang amended proposal to be increased to \$100. Hoover proposed to have differential registration fees for students – mentioned how difficult to disburse funds. Parker mentioned that next year is not a problem because registration will be administered by nonprofit North Carolina Apple Growers Association. So next year is no problem to fund some students with registration fees. Hoover proposed a small subcommittee chaired by the new administrative advisor Marini to explore ways to fund student travel to NC-14- meetings – Musacchi volunteered Hoover to be part of the committee. Fazio mentioned that this could provide continuity to the system. Hirst is on the ASHS finance committee and mentioned that the ASHS charges very minimal fees. Motion by Peter Hirst was amended to increase registration fees by \$100. Amendment was seconded by Fallahi and approved unanimously. Motion to establish a limited time sub-committee to explore avenues to continuity of funding graduate students by Musacchi. Motion seconded by Hoover and approved unanimously. Subcommittee will be Marini, Hoover and Hirst.

Respectively submitted;

Gennaro Fazio, Recording Secretary

Apple Rootstock Breeder and Geneticist

Plant Genetic Resources Unit USDA ARS

Adjunct Associate Professor

School of Integrative Plant Science – Horticulture Section

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Meetings Adjourned at 5 pm on Nov 15, 2017

Tour of WSU Sunrise Orchard (SRO) featuring NC-140 trials 2014 Apple Rootstock – Honeycrisp, Cosmic Crisp rootstocks and Training system trial, Cosmic Crisp top graft trial (Single, double and Triple axis) then visit Legacy Orchard - McDougal & Sons, Inc (amazing!) and visit to cherry rootstock trial (dwarfing rootstocks from MSU) - Washington Tree Fruit Research Commission