**Minutes: Joint Meeting NC-1186 & S-1065 Working Groups**

Location: UC Cooperative Extension Monterey County, 1432 Abbott Street, Salinas, CA 93901

Date: June 21, 2018

Secretary: Paul Fisher (University of Florida)

Attendees:

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| Damon | Abdi | Michigan State University |
| James | Altland | USDA-ARS |
| Susan | Barton | University of Delaware |
| Bridget | Behe | Michigan State University |
| Bruk | Belayneh | University of Maryland |
| Anna | Birnbaum | Virginia Tech |
| Julie | Brindley | Virginia Tech |
| Jennifer | Brown | Oregon State University |
| Robin | Brumfield | Rutgers University |
| Douglas | Buhler | Michigan State University |
| Raul | Cabrera | Rutgers University |
| Bert | Cregg | Michigan State University |
| Winston | Dunwell | Uninversity of Kentucky |
| Tom | Fernandez | Michigan State University |
| Jeb | Fields | Louisiana State University |
| Paul | Fisher | University of Florida |
| Austin | Gimondo | Iowa State University |
| William | Graves | Iowa State University |
| Darren | Haver | UC Cooperative Extension Orange County |
| Grant | Johnson | UCCE, Orange County |
| Hayk | Khachatryan | University of Florida |
| John | Lea-Cox | University of Maryland |
| Anthony | Lebude | North Carolina State University |
| Leticia | Macias | UC Davis |
| John | Majsztrik | Clemson University |
| Joseph | Masabni | Texas A&M AgriLife Extension |
| Donald | Merhaut | UCR |
| Lloyd | Nackley | Oregon State |
| Genhua | Niu | Texas A&M AgriLife Research, Texas A&M University |
| Loren | Oki | UC Davis |
| James | Owen | Virginia Tech |
| Bruno | Pitton | University of California, Davis |
| Shital | Poudyal | Michigan State University |
| Rosa | Raudales | University of Connecticut |
| Ariana | Torres | Purdue University |
| Sarah | White | Clemson University |

**9:00 am to 1:30 pm: Station Reports:** Reports from each member in attendance on current status of their research and extension efforts related to their working group.

Darren Haver, Loren Oki, Bruno Pitton, Grant Johnson (University of California Davis): Nitrogen balance modeling for nurseries to develop nitrogen budgets (an upcoming regulatory requirement). Water and nutrient budget for a large CA grower. Slow-sand filtration to remove viruses and oomycetes, with successful results. Expanding into removal of paclobutrazol and other agrichemicals by slow sand filtration. Water use quantification and classification of different plant varieties for CA landscape use, in response to water restrictions and regulations.

Don Merhaut (University of California Riverside): Balancing water alkalinity and lime type and incorporation rate. Potential to expand research and recommendations for managing high alkalinity and high salinity water for production and landscape. Plant evaluations under California growing conditions. Nitrogen dynamics with controlled-release fertilizers.

Paul Fisher (University of Florida): Online extension courses, including two nutrient courses, a costing course (with Alan Hodges and Charlie Hall), and upcoming water quality and treatment course. Grad student Erin Yafuso doing CT scanning of water and oxygen balance in substrates, and visualizing air & water distribution relates to irrigation and substrates – plan to grow this collaboration with James Altland, Jeb Fields, and Jim Owen. Co-advising with Alan Hodges a student working on labor efficiency & return on investment for automation for transplanting cuttings. Two aspects of indoor growing with Celina Gomez: (a) vertical farming of transplants, including economic analysis, and (b) home growing of hydroponic vegetables. One of the most uncontrolled variables in home growing is water quality.

Winston Dunwell (University of Kentucky): Renovating facility and expanding graduate program on station. Effects of container materials on water efficiency. Nursery use of composted materials from animal production. Ambrosia beetle management and variety susceptibility.

John Lea-Cox, Bruk Belayneh (University of Maryland): Irrigation control using moisture sensors, and effects on not only water efficiency but also pathogen control (along with UC Davis). Paclobutrazol remediation studies at local grower operation, including effect of slow sand filtration. Urban farming, especially substrate development for roof-top gardening and potential effect on N and P runoff, in addition to broader storm water management options. Using Hyprop system for moisture release curves.

John Majstrik, Sarah White (Clemson University): Clean WateR3 research leadership, with a Clemson focus on ecological treatment technologies (floating and other constructed wetlands, carbon buffers, bioreactors) and P remediation with filtration. Model and decision-support development on water-related issues such as calculating chlorine dosage.

Tom Fernandez, Bert Cregg, Brigid Behe, Damon Abdi, Shital Poudyal (Michigan State University): Integration of new technologies (RFID, drones) with nursery monitoring and management, and correlation with plant nitrogen status. Mitigation of runoff of pesticides and nutrients from nursery beds, including bio-reactors and filtration buffers and impacts of applying runoff on crop plants. Nitrogen stabilizers for tree production using newly available products and measurement of nitrogen uptake, efficiency, and leaching using lysimeters. Phosphorus needs for tree production based on fertilizer dose response with multiple species. Consumer perceptions of reclaimed and recycled water, showing that wording is very important.

Genhua Liu (Texas A&M): Low quality (high salinity) irrigation water and drought tolerance of nursery and landscape plants. Diversification into edibles and hydroponics for greenhouse producers, especially with high salinity water, means we need to identify salinity thresholds in these systems.

Magdalena Paucerz, James Altland (USDA-ARS): Effects of chemical compounds such as polyphenols in leachate from pine bark substrates, and effect on plant growth and weed seed germination. Effects of surfactants on soil physical properties of soilless substrates. pH buffering of pine bark substrates. Microbial community identification in soilless substrates – a largely neglected area because of its complexity. Iron oxides in soilless substrates to improve anion exchange capacity.

Raul Cabrera (Rutgers University): Continued work on alternative irrigation sources for nursery & landscape use, including reclaimed and gray water. Chemical components and growth effects of homeowner products (such as detergents/surfactants, stabilizers/softeners, sodium, chloride, and borax) that end up in gray water. Cost benefit analysis of water treatment and recycling systems, in collaboration with Robin Brumfield. Silicon effects on ornamental grasses, especially the potential for limitations in soilless substrates.

Bill Graves, Austin Gimondo (Iowa State University): Wastewater-grown algae as a fertilizer for container production – effective and promising results, but more research needed on factors such as K concentration would vary between batches. Ethnobotanical research on bark use of leatherwood shrubs.

Lloyd Nackley (Oregon State Univ): Working on a variety of high-tech applications for nursery production, including targeted spray application, sensor-based irrigation, drones with cameras to optimize irrigation applications. Bee-friendly aspects of native and non-native plants.

Jeb Fields (Louisiana State University): Designing a simulated nursery research complex. Initially focusing on resource efficiency, abiotic stress (including water/air balance and substrate/irrigation options), and predictive models for substrate hydrology.

Jim Owen (Virginia Tech): Raised nursery bed runoff research, including interaction of phosphorus with irrigation practices. It has been useful to compare runoff results with the MSU system. Bioreactors to remove phosphate from runoff – challenging to increase scale. Also showed potential to reduce standard phosphorus fertilization practices in important nursery crops such as hydrangea, and interaction of factors affecting P release.

Rosa Raudales (University of Connecticut): Studying microbiomes that develop inside hydroponic systems and their effect on plant growth and plant disease. Biofungicide type organisms added to hydroponic systems can potentially have a growth suppressing effect in the absence of a plant pathogen. Biofilm management in irrigation lines, including not only preventing biofilm formation but also establishing beneficial biofilms that may suppress plant pathogens. Quantifying irrigation emitter-clogging factors such as particles and bacterial loads.

Anthony Lebude (North Carolina State University): Outreach work with nursery growers to encourage and evaluate adoption of best management practices. Effects of irrigating with high pH and low alkalinity pond water on plant performance.

Hayk Khachatryan (University of Florida) discussed his USDA SCRI grant project, which focuses on three broad areas 1. An economic feasibility analysis (inputs / insecticides), 2. Growers’ adoption of alternative pest management/production methods / factors affecting production decisions, and 3. Consumer demand analysis for several annual and perennial ornamental crops. As part of the SCRI grant, Hayk’s group is studying the use of neonicotinoid labels and their impact on consumer preferences in an experimental laboratory. The other project, National Horticulture Foundation (previously National Foliage Foundation) grant, is a 2-year project investigating shopper behavior at independent garden centers in Florida. The grant included a pilot section for which data was collected at the TPIE tradeshow to understand tradeshow attendees’ visual attention to booth design elements. Hayk’s residential landscaping project (funded through UF’s Center for Landscape Conservation and Ecology) investigates consumer preferences and WTP for different turfgrass/non-turfgrass landscape ratios, smart sensor-based irrigation systems, pollinator friendly attributes, etc.

Robin Brumfield (Rutgers) is wrapping up the second year of an EU grant where they are training women farmers. She has collaborators in Germany, Malta, Turkey and Spain. She is also working on taking Annie’s Project to urban agriculture in areas of production and economics. Annie’s project is empowering women farmers by the creation of business plans in Turkey, Greece, Guyana, and Nicaragua. Robin obtained a grant from NRCS for a water project, in which they are looking for growers to be their ‘test’ subjects that they can collect water use data from. The NRCS project aims to develop an economic model for smaller grower to recycle water. Robin received a Small Farms grant to analyze the potential of 10 ultra-niche products. This project is helping develop online enterprise budgets for these crops. Robin also received the 2nd biggest gift given to Rutgers to decrease youth unemployment.

Ariana Torres (Purdue University) is working on four main industry issues. First, value-added technologies that can help the economic sustainability of specialty crops. She has collaborated with Bridget Behe and Susan Barton on a paper that has been submitted to AgEcon journal that looks to the correlation between using social media (and other online marketing strategies) and the adoption of e-commerce in the green industry. She is collecting data on the use of value-added technologies for produce sold primarily at farmers markets. She got a USDA-NIFA grant to work with ag and biological engineers and food scientists to understand the drivers and barriers to add value to specialty crops sold in local markets. Another USAID-Hort Innovation lab grant is measuring the supply chain of dried apricots in Tajikistan, where she will also conduct entrepreneurship training to women groups. With funding from Specialty Crops Block Grant, she is collaborating with turfgrass scientists to work on the information asymmetries found in the turfgrass industry. She will hire a graduate student to understand the preferences of homeowners, HOA, and landscape contractors toward sustainable turfgrass for residential purposes. With funding from USDA-SARE, she (and a graduate student) is evaluating the purchase agreement and preferences of buyers of organic grains in the Midwest. Second, the lack of indicators that address the financial feasibility of new crops and technologies. She (and a visiting scholar) is developing an online financial calculator that uses enterprise budgets to understand breakeven prices/quantities, cost-benefit analysis, and ROI. This project is currently funded by 3 grants from USDA-SARE, 1 from SCBG, 1 grant submitted by a grad student grant for organic grains. How marketing decisions influence farm diversification through the reduction of risk exposure. Third, the lack of pricing information for farmers selling in local markets. She has started the 2nd year of collecting farmer’s market prices in 10 locations in Indiana and 1 produce auction. A graduate student and a visiting scholar are working on data analysis to understand how prices from farmers markets, produce auctions, and retailers correlate. She has obtained an internal grant to fund the 2018 phase and has trained farmers, market managers and extension educators on the use of pricing information to assist price determination. Fourth, she has started looking at consumers perceptions of new crops. With funding from USDA-SARE, she is collaborating with Bridget Behe to develop a survey that will evaluate consumers’ preferences and willingness to pay for new varieties of melons (one of the main specialty crops in Indiana). She and a graduate student are modeling if millennials perceive organic and local foods as substitutes or complements.

Jennifer Brown (Jennifer Dennis-Oregon State University ) attended the meeting as a former member of the group. She gave us an update on her current position at Oregon State University. She also announced she will join UC Riverside this summer.

Bridget Behe (Michigan State University) is working on a SCRI water project with Melina Knuth. She has also finished a study built on Jennifer Dennis’ plant guarantee work and has assessed the structural break points. She has started working with Ph.D. communications students looking at hedonic versus utilitarian attributes of plants; preliminary analysis shows that the price point for plants is higher for hedonic v. utilitarian settings and that priming strongly influences price points. Bridget and Marco Palma submitted their SCRI proposal on the marketing and economics for biocontrols submitted by Ohio State. Bridget, Sue, and Ariana Torres published a paper looking at business practices of landscape businesses HortTechnology. The SCRI Water 3 project, in collaboration with Charlie and Dwayne, had yield 4 papers looking at perceptions on water source and water use by consumers. One paper is published, another one in press, and 2 in preparation. Their work gathered data on consumer perceptions on the word recycle vs reclaimed, and perceived risk of direct (personal and impersonal) and indirect use. The word “recycle” has a positive term with significant policy issues with perceptions of and willingness to work with recycled water. Findings from this project will be submitted for the Journal of Environmental Psychology. Bridget and Tom Fernandez got a grant to investigate the impact of RFID tags on consumer perceptions regarding perceived risk, intention to use, convenience to use – disconnect between using and not knowing and privacy. She is expecting to present her work in Italy. Her EyeTracking project got a FSMA grant looking at the display complexity between human coding and tobi filter. The software extracts patterns between eye movement and purchasing or not plants as part of their goal to understand decision-making search behavior of how humans pick a plant. This eye-tracking project is currently analyzing the gaze pattern (eye-tracking) in the lab, and will combine her FSMA grant that focuses on retail purchasing behavior. They have been able to find the eye pattern when looking at plants in retail setups. Lastly, Bridget has launched her new podcast series called Marketing Munchies, available in Connect-2-Consumer.com. Each podcast interviews a researcher to provide a preview of a project related to marketing in the green industry.

Susan Barton (University of Delaware) is working with a group of researchers on consumer perceptions towards native plants. They are looking at how testimonials affect consumers following through the planting of native plants in their yard. The team is also looking at homeowner’s fertilization practices on native plants. Susan has a long standing project with the Delaware Department of Transportation, in which they are getting enhancement sites on Google Earth as an online resource to manage public sites properly. Another of her project looks at different grasses and their effect on pollinators. The project has 4 treatments of herbaceous and 3 types of grasses to understand what will be the best pollinator meadow.

Bill Graves’ (Iowa State University) research appointment has decreased after taking an administrative appointment in Iowa. Will has 3 grad students. Doctoral student Zach Hudson is studying the anatomy and physical properties of bark of members of the Thymelaeaceae. He’s also investigating potential uses of high-quality specialty paper he has made from the bark of Dirca spp., which are members of the Thymelaeaceae. Doctoral student Anna Talcott is resolving conflicting reports of human responses to floral fragrance of hoptrees (Ptelea trifoliata and Ptelea crenulata). She also is studying cold hardiness of these species, as well as preferences of swallowtail butterflies for Ptelea vs. other members of the citrus family. Master student, Austin Gimondo, gave a presentation about his masters’ thesis on wastewater-grown algae fertilizer for horticulture production in turfgrass and container crops. Using complexes of green algae as fertilizer at standard rates of nitrogen, incorporated into the media. Quantified plant growth and shoot nutrient concentrations. Compare performance of extruded algae-based pellets to synthetic and controlled-released fertilizer. Pellets performed similarly or better than commercial fertilizer.

**2:00 pm:** Business Meeting NC1186 (S1065 had a separate meeting)

**Attendees:** Damon Abdi, James Altland, Bruk Belayneh, Doug Buhler, Raul Cabrera, Bert Cregg, Win Dunwell, Tom Fernandez, Jeb Fields, Paul Fisher, Austin Gimondo, Darren Haver, Grant Johnson, Hayk Khachatryan, John Lea-Cox, Anthony Lebude, John Majsztrik, Donald Merhaut, Lloyd Nackley, Genhua Niu, Loren Oki, James Owen, Bruno Pitton, Shital Poudyal, Rosa Raudales, Sarah White

**Nomination and election of incoming secretary: Lloyd Nackley (Oregon State University)** was nominated for secretary and unanimously all voted in favor.

**Meeting dates and locations:**

**2019:** Possible end of May Massachusetts or southern New Jersey

**2020:** Possible Oregon

2017 minutes approved.

Suggestion to invite R&D/technical industry members to participate and sponsor. John Lea-Cox to lead a subcommittee to suggestion how this could work, based around the associated grower meeting, and report back to the group.

Ideas on potential university collaborators were brainstormed and individual faculty will follow up.

Doug Buhler: Fall of 2019 the proposal for the next round of the project will need to be submitted to NIMSS. The project is going very well, with congratulations on the national award and having an active research group.

James Altland and Rosa Raudales: Make sure you follow the provided station report format so that it is easy to submit as a combined document, and also the next group proposal.

Paul Fisher: Broad objectives for proposal renewal decided by project team along with objective lead researchers.

Other business:

* Win Dunwell: Encouraging everyone, including graduate students, to participate in IPPS conferences and especially the upcoming Eastern region IPPS on September 23-26 in Newark, Delaware
* ISHS irrigation management symposium and ISHS substrate meeting in Italy in June 2018
* Participate in UCNFA (University of California Nursery and Floriculture Alliance) and like with social media

**3:30 pm:** Meeting adjourned