

Minutes: Joint Meeting NE 1335 & NC 1186 Working Groups

Location: Cornell Cooperative Extension, Riverhead, NY

Date: June 23, 2016

Attendees:

Name	Email	Institution	Working group
A. J. Both	both@aesop.rutgers.edu	Rutgers University	NE1335
Anthony LeBude	avlebude@ncsu.edu	NC State University	NC1186
Gene Giacomelli	giacomel@ag.arizona.edu	University of Arizona	NE1335
George Grant	gagrants@ufl.edu	University of Florida	NC1186
Hye-Ji Kim	hjkim@purdue.edu	Purdue University	NC1186
Jake Shreckhise	jshreck@vt.edu	Virginia Tech	NC1186
James Altland	james.altland@ars.usda.gov	USDA-ARS	NC1186
Jeb Fields	jsfields@vt.edu	Virginia Tech	NC1186
Jim Owen	jsowen@vt.edu	Virginia Tech	NC1186
John Majsztrik	jmajsz@clermson.edu	Clemson University	NC1186
Jonathan Allred	jaa337@cornell.edu	Cornell University	NE1335
Kale Harbick	harbick@cornell.edu	Cornell University	NE1335
Loren Oki	lroki@ucdavis.edu	University of California	NC1186
Mandy Bayer	abayer10@umass.edu	University of Massachusetts Amherst	NC1186
Mark Bridgen	mpb27@cornell.edu	Cornell University	(Host)
Martin Gent	martin.gent@ct.gov	CT Ag Experiment Station, New Haven	NE1335
Paul Fisher	pfisher@ufl.edu	University of Florida	NC1186
Peter Ling	Ling.23@osu.edu	The Ohio State University	NE1335
Raul Cabrera	cabrera@aesop.rutgers.edu	Rutgers University	NC1186
Robin Brumfield	brumfield@aesop.rutgers.edu	Rutgers University	NE1335
Rosa Raudales	rosa.raudales@uconn.edu	University of Connecticut	Both
Sarah White	swhite4@clermson.edu	Clemson University	NC1186
Stephanie Burnett	sburnett@maine.edu	University of Maine	NE1335
Tom Fernandez	fernan15@msu.edu	Michigan State University	NC1186
Tom Manning	manning@njaes.rutgers.edu	Rutgers University	NE1335

9:00 am: Welcome by Mark Bridgen, Cornell University.

9:15am: Station Reports: Reports from each member in attendance on current status of their research and extension efforts related to their working group (3 minutes per person with PowerPoint) connected via Webex (Adel Shirmohammadi).

A.J. Both, Rutgers University: Dr. George Wulster, Floriculture Specialist from Rutgers University passed away this year. A.J. is developing a series of horticultural lighting labels to assist growers in the decision-making process.

Kale Harbick (representing Neil Mattson), Cornell University: The team conducted several experiments relating light efficiency. The team compared LED with HPS in greenhouses, plant

response to three light combinations using LEDs, energy costs of producing in greenhouse compared with plant factory, and compared two algorithms to compare daily light integral accumulation on lettuce.

Gene Giacomelli, University of Arizona: The Univ. of Arizona Controlled Environment Agriculture Center team has been conducting research on advanced sensing and climate control, economic analysis of supplemental lighting, and algae biofuels. Dr. Giacomelli also mentioned that the Lunar and South Pole project are ongoing.

Ellen Paporozzi and George Meyer, University of Nebraska: Sent video. They presented the research on greenhouse production and modeling of basil for growth and essential oils.

Mandy Bayer, University of Massachusetts: Her research program is related to sensor-controlled irrigation. Dr. Bayer will be conducting growth control of container-grown ornamentals by applying timed drought stress using sensor-controlled irrigation both in the greenhouse and outdoors.

Stephanie Burnett, University of Maine: Stephanie announced that the University of Maine is hiring a Landscape Design specialist. She presented her research comparing sub-mist compared to overhead mist in propagation.

Sarah White, Clemson University: Introduced Clean Water³ (<http://cleanwater3.org/>), project that resulted from the NC1186 working group interactions. The goal of the project is to encourage recycling and reuse of remediated runoff. Research is conducted on several aspects of contaminant (Pesticides, pathogens or nutrients) management. Her research program at Clemson, focuses on evaluating different plants that trap contaminants. Currently screening 7 plants in channels for removal of contaminants and that also have commercial value.

John Majsztrik, Clemson University: Research consists on consolidating data collected by the Clean Water³ group and develop decision support tools based on models to help growers make informed-decisions.

Hye-Ji Kim, Purdue University: Research program focuses on managing N and P levels in aquaponics systems. They are evaluating vegetable crops to remove nitrate from the solution. Another project evaluated parboiled hulls substrates affected growth and water use in zinnias and petunias. Experiment 2: Inert media with vermiculite and perlite which does not have P and tested different rates of P from 1- 30 mg/L on lantana. Optimum growth observed at 20mg/L P, under this rate plants were overall significantly smaller.

James Altland, USDA ARS: Conducted research on rice hulls for weed control. Rice hulls retained very little water and dehydrated very quickly. The layer of rice hulls provided a physical barrier between the seeds and growing media and the low water content at the top might also prevented weed seeds to germinate. A thick layer (0.5 inch, 500 g/m²) reduced weed germination on established containers. Ongoing research to determine optimum temperature of hot water and steam to control weeds left on old containers.

Jim Owen, Virginia Tech: Research program focuses on mineral nutrient fate, soilless substrate and agrochemical remediation. Filter socks to clean P and sediments. Currently, building experimental nursery and will evaluate water quality of runoff. Results from previous experiments: Evaluated CRF placement in the container, when placed on the top layer less leachate was captured. Developed Gro Zone Tracker which is designed to track water and soil quality on a map and will be launch at Cultivate '16. Jeb Fields (Ph.D. Candidate) research on how the amount of P affects the final concentration of P levels in the substrate. Jake Shreckhise (Ph.D. Candidate) evaluating how hydraulic properties of substrates affect water retention.

Anthony LeBude, North Carolina State University: Conducted water quality survey of water sources in North Carolina. Most samples had high pH and alkalinity. He discussed Wilkinson and Davies research that showed how pH of the solution can affect transpiration rates. As a follow up study, he will evaluate how water quality affects plant physiology at the farm level.

Martin Gent, Connecticut Agricultural Experiment Station: Effect of standard or partial saturation (75% of the full saturation) in sub irrigation combined with silicon application on incidence of *Pythium* root rot of poinsettias. Plants inoculated with *Pythium* sp. under standard saturation did not recover had higher diseases rating and lower dry weight.

Raul Cabrera, Rutgers University: Evaluating short and long term effects of graywater (“soapy”) irrigation on ornamental plants in the landscape. Ongoing project, recently established project and will be collecting chemical and physical properties of soil. Also involved with the Colombian national association of cut flowers to increasing nutrient efficiency (currently the efficiency is 50%) and reduce runoff. Will submit a grant to evaluate plasma as an alternative water treatments option.

Rosa Raudales, University of Connecticut: Research program focuses on understanding how water quality affects biofilm buildup on the inside of irrigation pipes, and how biofilm affects plant health. Presented water quality data from survey conducted to growers who indicated having biofilm clogging problems. Also presented preliminary results on how biofilm affect plant disease incidence in poinsettias.

Paul Fisher and George Grant, University of Florida: Remediation of paclobutrazol using granular activated carbon. Tested how different contact times and granular activated carbon materials affect removal efficacy of 50 ppb paclobutrazol. Based on a bioassay studies, increased contact time of removed the biological active residual concentration of paclobutrazol and no difference was observed between bituminous coal and coconut coir.

Loren Oki, UC Davis: Virus (TMV) removal with slow sand filtration after week 6 (sustained for 6 more weeks). Ongoing research is part of the Clean Water³ project: Nursery runoff characterization will measure flow rate, residual chlorine, etc. Measuring salinity tolerance using microcalorimetry.

Peter Ling, The Ohio State University: New education program (2-year) on Greenhouse Engineering Technology at ATI. Plant health monitoring and passive watering: NASA project including sensors to monitor water use and prevent water leakage. Energy harvesting greenhouse: Recycle extra energy from daytime and use it at night.

Tom Fernandez, Michigan State University: Clean Water³ project: Currently, establishing an experimental nursery. First experiments are looking at the movement of P and pesticides and tracing residual concentrations. Runoff system will be caught at the pond and then treat with a bioreactor. Then they will irrigate with recaptured, remediated and fresh water. Project will include customer willingness to pay (Bridget Behe). RFID technology that reads all the tags of plants on the cart without unloading. Readers get 98% efficiency of readings. Drawback is that water impedes the signal, max distance 16 feet. Potential use to map where plants are located, and use it a precision agriculture in container agriculture.

12:40 pm: Break for lunch

1:50 pm: Collaborative efforts led by John Majsztrik

The group divided in three groups and then reported to the rest of the group:

1. Remediation of water sources: The group discussed the importance of characterizing water around the country and proposed doing a water source mapping to predict how growers would have to manage water in those regions. Potential idea for developing a grant (John Majsztrik offered to lead the effort). It was suggested to collect data by: (1) sampling, (2) data from commercial analytical labs, and (3) USDA geological groundwater survey.
2. Organic fertilizers and predictability of nutrient release: The group discussed how one of the limitations of organic production is the unknown predictability and lack of control on when nutrients are released. They discussed that it might be a good start to understand N balance. Previous research by Univ. of Maryland, found big gaps in N balance. Proposed future steps were to develop nitrogen curves for organic fertilizer, control nitrification, and interaction with microbes. A second topic, was to develop a decision tree to standardize management of composts (Hye-Ji Kim).
3. Controlled Environment and Conservation: The group discussed the importance on conducting research that compares plant factories with semi-close greenhouses in terms of ET modelling, recapturing wastewater and blending, semi-close energy and water systems and include economics of the different options.

4:00 pm: BUSINESS MEETING: NE 1335

Attendees: Gene, A.J. Both, Martin Gent, Tom Manning, Rosa Raudales, Stephanie Burnett (Preside meeting), Robin Brumfield, and Peter Ling

Approval of 2015 minutes: A.J. Both made a motion to accept 2015 minutes, P. Ling second, all accept.

Suggestions for new members: U. of Illinois Paul Davidson (engineer water and soil), Celina Gomez (Purdue graduate, Univ. of Florida), Ryan Dickson (New Hampshire). Stephanie will invite them to join (explain how it works). Send letter to Experimental Station director to invite your new faculty. Send a message to other groups with new hires in CEA: Purdue, Michigan, OSU, New Hamp. Florida, Colorado, Iowa (Chris Currey), NCSU (Ricardo), Roberto Lopez (MSU) Involve industry partner help identify gaps in knowledge.

Administration report: Adel Shirmohammadi from the University of Maryland is the new NIFA Advisor. He could not make it to the meeting.

Meeting dates and locations: June 2017, unless it is in Ohio.

Adel Shirmohammadi from Maryland. Contact faculty (John Lea-Cox) in Univ. of Maryland about potential meeting there next year.

If Maryland does not agree to host, Connecticut (R. Raudales) will host 2017.

OSU (P. Ling) offered to host. Potentially at the same time as Cultivate.

Invite growers to help identify gaps in knowledge. Encourage industry, growers and students to join the meeting next year.

Nomination and election of incoming secretary:

A.J. Both nominated Neil Mattson for secretary. A.J. Both will serve as a backup if Neil does not accept.

Member announcements:

- Cultivate'16 will take place in two weeks (July 9-12)

- NCERA-101 meeting will be in Australia on Sept 3. The group submitted a grant to support travel grants. Anybody interested in attending, must submit abstract and travel grant before the end of the month (June 30).
- A.J. Both: NCERA-101 (and two international sister organizations) developed a booklet titled “Guidelines for measuring and reporting environmental parameters for experiments in the greenhouses”. The information contained in this booklet is also discussed in the open-source publication: Both, A.J., L. Benjamin, J. Franklin, G. Holroyd, L.D. Incoll, M.G. Lefsrud, and G. Pitkin. 2015. Guidelines for measuring and reporting environmental parameters for experiments in greenhouses. *Plant Methods* 11(43). 18 pp.
- P. Ling: Online courses for greenhouse engineering is completed. Search: Horticulture Engineering Technology channel in YouTube (https://www.youtube.com/channel/UCsD2oKzVv1B_GtummyKKE8LA)
- Consider doing an international trip in 2018: Potential locations: Mexico, Canada, Italy (AgroSpace Meeting, around Memorial Day weekend for 2018), Turkey (R. Brumfield has projects).
- Work on a joint project:
 - Involve with the NC1186 working group on the water mapping project.
 - Write a review paper.
 - Collaborative research.
 - Trade journal series
 - Write a series of articles and combine them under a book: exchange information about best practices. How do you teach a specific audience, for example teachers, growers, bankers, etc.
 - Potential topics: Hydroponics, aquaponics, urban agriculture.
 - Peter Ling currently working on alarms for high-tunnels that get high temperature.
 - Make a statement for urban agriculture: rooftop greenhouse, community gardens, vertical farming. Educational programs around the country.
 - Stephanie will contact the group to coordinate writing a group article.
- Hye-Ji Kim joined the meeting and expressed interest in joining.

4:50 pm: Meeting adjourn.

Notes taken by secretary: Rosa Raudales- University of Connecticut