**Minutes: Joint Meeting NC-1186 Working Groups**

Location: University of Massachusetts, Amherst, MA

Date: July 9, 2019

Attendees:

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| Damon | Abdi | Michigan State University |
| Amanda | Bayer | U Mass (host) |
| Raul | Cabrera | Rutgers University |
| Winston | Dunwell | University of Kentucky |
| Tom | Fernandez | Michigan State University |
| Jeb | Fields | Louisiana State University |
| Paul | Fisher | University of Florida |
| John | Lea-Cox | University of Maryland |
| Anthony | Lebude | North Carolina State University |
| John | Majsztrik | Clemson University |
| Lloyd | Nackley | Oregon State |
| Loren | Oki | UC Davis |
| James | Owen | Virginia Tech |
| Rosa | Raudales | University of Connecticut |
| Sarah | White | Clemson University |

**9:00 am to 1:30 pm: Station Reports:** Reports from each member in attendance on the current status of their research and extension efforts related to their working group (3 minutes per person with PowerPoint).

Jeb Fields (Louisiana State University):

Substrate hydrology modeling. Measuring and modeling water movement, distribution, and loss from container substrate systems. Using water movement models to identify new strategies for resource efficiency in nursery production. Substrate engineering – building substrates in containers for more water and fertilizer efficiency and quicker crop production. Measuring release from new controlled-release fertilizer technologies. Investigating alternative materials including sugarcane bagasse. Hyperspectral imaging – using hyperspectral imaging to identify plant stress and agrichemicals on surface and in surface water through handheld and drone measures. Citrus production in containers – identifying strategies for growing citrus fruit in containers. Researching substrate evolution and duration in container citrus production. Starting project on identifying labor efficiency in nursery production.

Paul Fisher (University of Florida):

Particle and granular activated carbon filtration – new topics pond management, filter operation and design best management practices, granular activated carbon installations. Physical properties and CT scanning of water and air to visualize the effect of substrate and irrigation practices. New topics irrigation and substrate training and webinars. Biofilm quick test being developed to culture biofilm from irrigation water samples. Indoor growing on home hydroponics and vertical farming of transplants may be suitable topics for urban component of next grant project. CleanWater3.org will continue to be available as a way to distribute research outputs.

John Lea-Cox (University of Maryland):

Managing urban stormwater and modeling water balance using vegetation and green roofs for capture and remediation, with case studies. Substrate moisture and climate sensors, wireless networks, and online software for irrigation control and crop management. Using microclimate stations for a wide range of crops internationally including disease modeling.

John Majzstrik-(Clemson):

Temperature impacts on the efficacy of slow sand filters (SSF). Loren Oki makes comment about P being temperature-dependent. Majztrik describes setting up an irrigation playground for growersP relations with FeOxide and CRF. FeOxide is a waste product of mining and really good at adsorping P. Building 6 20 x 20 irrigation pads. To look at infiltration vs overland flow Ready to release tools for growers: SSF sizing tool. Irrigation volume calculator. Pond volume calculator to know how much volume you need. Chlorine contact time. Co-efficient of uniformity.

Jim Owen (Virginia Tech):

new leaching fraction pub. SWIM model. Non-nursery work, seed grant NSF biochemist for the plant to make them hyperaccumulating P. AP1. gene in plants to turn into biochar and strubite. Stratified Bioretention wet bottom dry top constantly leaching, preferential flow remove. Just add fertilizer in top half of the container, add something to the bottom like FeSO4 on the bottom. Make top fine, coarse on the bottom. Most his growers already fill with two conveyors. N fate, ammonium, nitrate, urea, considerable leaching from urea fertilizer. Gas component, Fourier transformed red Gas-off. Containers 2 yrs pH decline after 9 months. Pelletized vs crushed lime. CRF dropping ph to 3. Acidity to alkalinity rating for CRF like they have for liquid fertilizer. Repeat what Brian Whipker did for pine bark. Pour throughs with tip method. Most of the acidity comes from plant microbial reaction. Urea becomes and acidifier. Tom comments 100 400 alkalinities.

Raul Cabrera (Rutgers University):

Landscape irrigation and drought, greywater for landscape irrigation. What is long term effects of water-rich in detergents? Toxicity relating to Na, Cl, and B. We buy 90% of cut roses from Colombia and Ecuador, 5,000 lbs of N per ac per yr. ROSES!! Beta testing for farmers to do tool from NRCS to water recycling. Growers still do not know much water they use. Big growers UV and save 40,000 gallons. Just keep frogs out of system. If we don’t test we don’t have a problem. Big growers use liquid feed on top of a CRF. Cal-9. 100 lbs P per acre year limit in Maryland. Water solubles and P. If you’re using 100 ppm N. Paul Fisher says that the best case study was UCD with Altman. Bioinformatics pathogens. Industrial hemp. Grow operations have a huge problem for humidity. Testing for pesticides, heavy metal, Phillip Morris is waiting for legal ramifications to grow away.

Lorence Oki, also representing (UC-ANR collaborators) Darren Haver, Don Merhaut

N management for central valley growers. No nursery grower in the state knows how to fill out form. Nothing about demineralization, assumption N goes into groundwater, Oki lab does not agree and is testing N2 b/c N2O is an intermediate. JLC says that N15 large amounts of loss, CRF 2000-3000 lbs per acre. CRF. Agronomic is 150 lbs per acre. Jim Owen says N per month is what’s important. Davis and SCREC doing landscape plant irrigation trials. CIT Ca Irrig Technology Fresno SU and CalPoly. Groud cover WUE, effects of alkalinity and water acidification on soil media pH as influenced by dolomite rates in media.

Anthony Lebude (North Carolina State University):

Finished work with Jim Owen substrate saturation on Coir and Clay, large tree preferential flow 30-gallon phantom container coir and clay should be treated like lime add a mass and coir should be. High pH low alkalinity study does it affect plant growth. No growth rate same after a year. High pH 9.3 and low alk < 50 ppm carbonate. pH dynamics in a pond 7 up to 12 in afternoon because Can be a problem if using a for pesticide. pH affects for sanitation. Paul for pH budget thinks of meq of alk. Alkalinity budget meq of acid. The fluctuation of pH in pond water. Even if we are acidifying. Also working with James Altland, Joe ONeil on transport of weed seeds in irrigation.

Tom Fernandez Damon Abdi (Michigan State University)

Nutrient and pesticide remediation with a bioreactor. Costs and retention time (flow rate), bifenthrin and oxyfluorfen, Nitrate and Phosphate longer retention time, shorter can reduce pesticides. Microbial populations can shift in response to pesticides. Triggered a discussion about irrigated lands act in CA and KY in city. In rural area 10 ppm N. The rapid is likely the carbon filter for pesticides. Bifenthrin for water which is sticky and sticks to sediment. Paclobutrazol chronic growth reduction.

Damon raised bed work. Reduce water use through efficient irrigation methods and limit pesticide movement. 16 plots with surface and subsurface collection. Impermeable sub base and 0.3 meters of sand overlay graded to funnel surface runoff and soil infiltrated water to respective 378 L collection tanks. A control of 19 mm applied daily was compared with individual container spray stakes and applying 2 L daily and up to 3 L based on substrated content. Pesticides were uniformly applied to all beds with water tanks over a 16-day span for pesticide analysis.

Substrate moisture sensors reduced 60 80 % respectively. Jim Owen says meter loggers are unreliable and that GS3 and EC5 lose signal at the end of the season. John Lea-Cox says better growth from overhead because of evaporative cooling, which speaks to the impact of VPD

Winston Dunwell (University of Kentucky):

States that pine bark is a problem. Field grown in KY and now they are moving towards polywoven plastic bags, 15-25 bags. Everybody has abandoned pot and pot, leaving plants in the system too long. Sarah White says Clemson growers have also abandoned because of heat loss, JLC says Terry Hines JO two spray stakes when they reach 5-gallon size. Win published compost in SNA. Blueberries in containers b/c of phytophthora. The longer these things are in the pot

Renovating facility and expanding the 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. Ambrosia beetle, Jason Oliver, in Orchard's extra funds. Positions and admin available UKAg.

Rosa Raudales (University of Connecticut):

Water quantity in CT greenhouse USDA Floriculture and Nursery Research Initiative Dwayne Ingram. Water withdrawal. Work with Ingram for water footprint. Anybody that uses water in MI has to report quantity. Water quality for disease pressure. Pythium. Interaction biofilm and pipe type. PVC and PE and flow rates. 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.

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.

Amanda Bayer (UMass) – Fertilizer rate and irrigation volume effect. Hydrogel polymers. Soil Moist Terrasobr incorporated into the substrate. Nutircote 18 – 6 – 8. Native vs non-native establishment, and bare root planting (a la Linda Chalker-Scott) salt tolerance of landscape plants. Biostimulant instead of hydrogels for wetting agent.

Tom Fernandez for Bert Cregg (Michigan State University).

Runoff of oxyfluorfen visible injury of hosta and hydrangea. Slope restoration near Detroit. Improving transplant success of container-grown trees. Ed. Gilman that shaving root ball and Linda bare rooting. Shave vs Bare-root study.

**2:00 pm:** Business Meeting NC1186

**Nomination and the election of incoming secretary: Jeb Fields (Louisiana State University)**

 was nominated for secretary and unanimously all voted in favor.

The previous secretary **Lloyd Nackley (Oregon State University)**  transitions to Chair-elect and will host the 2020 meeting in Oregon

**Nackley** will host the 2020 meeting in August to coincide with Far West Nursery convention.

2:30 – Break into small groups and brainstorm new project planning. Paul Fisher (UF/IFAS) coordinates group activities when small groups return. Ideas for planning include retaining the NC1186 name, brining in people from disciplines outside plant production. For instance regulators, water quality/pollution, and engineers who are interested in water management. 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.

**3:30 pm:** Meeting adjourned

**July 10th:** additional discussion for 2020 meeting. It was suggested to have a graduate student presentation session outside of the business meeting and station report time.

Ideas for other university and industry collaborations were discussed.

Possible meeting location for 2021, have meeting with Irrigatio Association meeting in San Antonio, TX