**USDA NE 1335 Annual Meeting**

**Lincoln, NE**

**Hyatt Place 600 Q Street**

**June 29, 2017**

**Attendees**

A.J. Both, Rutgers University, both@aesop.rutgers.edu

Ryan Dickson, University of New Hampshire, Ryan.Dickson@unh.edu

Hye-Ji Kim, Purdue University, hyejikim@purdue.edu

Joyce Latimer, Virginia Tech, jlatime@vt.edu

Peter Ling, Ohio State University, ling.23@osu.edu

Neil Mattson, Cornell University, nsm47@cornell.edu

George Meyer, University of Nebraska-Lincoln, gmeyer1@unl.edu

Ellen Paparozzi, University of Nebraska-Lincoln, etp1@unl.edu

Rosa Raudales, University of Connecticut, rosa.raudales@uconn.edu

Adel Shirmohammadi, University of Maryland, ashirmo@umd.edu

**8:30 AM Welcome – Dr. Mike Boehm**, Vice Chancellor Institute of Agriculture and Natural Resources, University of Nebraska- Lincoln

The meeting began with introduction from Dr. Boehm, including a some history regarding agriculture in Nebraska.

Attendees introduced themselves.

**Approval of the 2016 minutes**, minutes were reviewed and approved (AJB Moved, GM second, motion carried)

**Updates on membership and suggestions for new membership**

Recent additions to our membership include:

Celina Gomez, University of Florida

Paul Davidson, University of Illinois

Ryan Dickson, University of New Hampshire

Hye-Ji Kim, Purdue University

We will have two new members joining:

Roberto Lopez, Michigan State University

Chieri Kubota, Ohio State

Other suggestions for members:

Holly Scoggins, Virginia Tech

AJB: suggests bringing in more members from industry

**Report from Adel Shirmohammadi**, technical advisor for our project

Noted we should consider applying for the Multistate regional group award of excellence (which values coherency of team, impact oriented, collaboration with other agencies, ex: USDA ARS, private growers/industry, international collaboration), if interested we could work along with Dr. Shirmohammadi to prepare the nomination materials

Meeting report due to NIMSS (within 90 days post meeting)

Current project will end September 30, 2018. The timeline for new project development was discussed. The process should begin this fall \*\*\*MODIFY FROM BELOW\*\*\*. New project development,

New project request, timeline involved (as needs to be reviewed prior to meeting of the directors of Agriculture Experiment Stations), then comments from that group relayed back to us for modification, then at their summer meeting they review the modifications

Grant opportunities to be aware of

NIFA agroecology and climate change challenges

EQIP from NRCS (to industry)

NIFA, climate change as viable topic for greenhouses

EP noted our annual reporting metrics should include undergraduates involved in research – and those that went on to graduate school (training future generations, including also classes)

**Station Reports**

**Rosa Raudales – UConn**

Monitoring water use in commercial greenhouses, biofilm accumulation in irrigation systems

Would like to see water benchmarks for large greenhouses nationally (those over 800,000 sf, ca. 20 acres)

Interestingly, biofilm in pipes led to less *Pythium* mortality in poinsettias

Other projects include (phytoremediation using plants, non-chemical control of *Pythium* in hydroponics, algae control in hydroponics)

**Neil Mattson - Cornell University**

Controlled Environment Agriculture Group

Class video: <https://www.youtube.com/watch?v=gxUSyoeOksg>

Topics included: Microgreens, LED lighting and economics, and cost/marketing of CEA vegetables

GLASE (Greenhouse Lighting and Systems Engineering) will be new NYSERDA funded project in collaboration with RPI and Rutgers

**A.J. Both, Rutgers University**

Distributed the Guidelines for Measuring and Reporting Environmental Parameters for

Collaborating in High Tunnel strawberry/raspberry research – ventilation in tunnels (different ventilation designs)

Indoor Ag teaching initiative – systems include vertical towers, NFT, and traditional benches (students gain expertise with different crops/systems, would also include marketing and entrepreneurial side, some produce sold to dining hall)

GLASE (Greenhouse Lighting and Systems Engineering) – using Integrating Light Sphere as part of light quantification efforts

Silicon as a potential beneficial nutrient for hydroponics (including in response to biotic or abiotic stresses)

Farm energy workshop – train the trainer 3-day program, introduction to farm energy analysis, a workshop for users of energy audits (held at request of NRCS)

Completed: product label for plant growth lamps (paper accepted for HortTechnology), chapters for lighting book (Light Management in Controlled Environments, now published)

**Peter Ling – Ohio State University**

Horticultural Engineering Technology – modules available on YouTube, currently 12,000 views

Personnel: Chieri Kubota moving to OSU, Dr. Uttara Samarakoon joined last fall (hydroponic vegetables, primarily teaching, and coordinating a 2-year program), 3 upcoming openings related to remote sensing, monitoring, and control

Development of 2-year Greenhouse Engineering Technology Program

Greenhouse automation (1 course), Greenhouse computer control (2nd course)

Research projects include:

High tunnel heat recover system for winter wastewater mitigation (heating bioreactor)

Intelligent spray for greenhouse applications (spray pattern and volume given canopy density – to reduce pesticide use)

Hydroponic vegetable production in high temperature environments

Undergrad research projects (taking advantage of senior design capstone projects), NASA sponsorship – food production in space applications (ex. Reuse of substrates used in space applications)

**Ryan Dickson – University of New Hampshire**

Background, PhD from University of Florida – plant nutrition and pH management

Research with wood fiber substrates as potential sustainable replacements for peat/perlite, compressible forms for cheaper shipping – how it influences plant performance, fertilization, watering, and blends with other substrate amendments

Fertilizer strategies to promote consumer performance (providing residual fertilizer)

Height control for edible crops (ex: plant brushing, and temperature cool morning drop)

Leaf purpling disorder in Echinacea

Modelling CO2, temperature, and light responses in the greenhouse

 USDA PhotoSim 2.0 model grower tool predicts plant response to CO2, temperature, and light – now working on validating in the greenhouse (energy savings with CO2, Effects on crop schedule and performance)

**Joyce Latimer – Virginia Tech**

Best Management Practices for greenhouse and nursery (environmental reasons – part of Chesapeake Bay Watershed), cost was #1 identified barrier to adopting BMPs. Survey will be published in HortTechnology.

PGR research ongoing

Use of virtual grower, validating in commercial greenhouses

Hydroponics of continuing interest, extension programming

Holly Scoggins/Joyce developed greenhouse management and production class

 Applied for grant for demonstration of different hydroponic systems, both for classroom use and for providing information to growers

**Hye-Ji Kim – Purdue University**

Evaluating water use and yield of greenhouse tomato as affected by LED and HPS supplemental lighting during winter months (intracanopy LED lighting)

Effect of plant species on N and P removal and recovery in an aquaponic system (aquaponics (tilapia) vs. hydroponics for cherry tomato, basil, lettuce)

**Ellen Paparozzi and George Meyer – University of Nebraska**

Winter growing (a nice complement to outdoor field growing)

CapMat Irrigation/Fertigation bench system

Trying to make automated *and* inexpensive system (can set up a greenhouse for $30,000)

Initial work was with strawberries, now working with winter basil production

 Beyond use in fresh and processed (pesto) can extract essential oil from it

Five experiments between 2014-2017

Growth patterns, crop scheduling (making it fit in a 3-4 month period)

Trying to obtain shorter production timelines and higher dry weight per pot

Data collection: Decagon (GS3) soil sensors (moisture, temperature, and EC), Li-Cor quantum sensors

Approximate reasoning and potential modeling approaches. Ex: Fuzzy Logic (mathematical deductive reasoning, neural networks), model basil plant biomass, height

**Project renewal discussion**

Our 5 year project ends September 30, 2018. This year we need to work on the 5 year renewal project.

A.S. noted the timeline

First 1-page form (intention to renew project) – should do ASAP

Then proposal for March meeting of station directors (NERA) so they can review and provide feedback

Feedback needs to be incorporated by summer for station directors to review again

Topics for new proposal:

Life cycle assessment of CEA systems (traditional, high tech, low tech)

Natural resource use

 water quantity/quality

 fertilizer/GAPS

 energy

 sensors and controls

Soilless culture, hydroponics/aquaponics

 Systems, substrates, nutrition, aquaponics/hydroponics

 Sensors and controls

New crop development (and perhaps benchmarking/comparing to lettuce parameters/yields) – commercializing new crops, including ethnic veggies

Undergraduate/graduate education, internships, extension, online courses (we have more jobs than students)

Investigate the feasibility of an online training course

Within this general framework, we will ask team members what outputs would be expected from the research; and thoughts on their specific research coming up over next 5 years – then these could fit under the broader topics

A.S.: We will need to include justification for renewal; for example under the current 1335 project, progress has been made but gaps still exist – as well as new technologies, new crops. Making connection to climate change could also make sense too

A.J.: life cycle assessments of greenhouse industry production is lacking

A.J.: Groupings should be relatively broad (show everyone has their place)

A.S.: Impact is very important to include in proposal (how will industry be benefitted, also training of grads/undergrads is also impact)

A.J. making sure we show true collaboration –

Examples Greenhouse Engineering Technology, article series, collecting/monitoring data (such as greenhouse water use), natural gas use

Colleagues could serve as external member of grad students committee

More with data collection, aggregation, and mining

**Collaborations**

Grants

 SCRI, NSF INFEWS

Grant program: Research & Extension for undergraduate training (Rosa will send link)

<https://nifa.usda.gov/sites/default/files/rfa/FY%202016%20AFRI%20ELI.pdf>

Could also do an industry stakeholder survey

Joyce/Rosa to explore this

Urban agriculture article series/book

Ask Stephanie to better define the audience (commercial and homeowner) and focus

Stephanie will arrange a conference call to discuss

Hydroponic book

 Like the light book, practical for both students and industry

 Rosa will take the lead in exploring this

Webinar series

 What would the specific theme be? General consensus this would be a good idea.

**Project renewal lead**

Neil will take the lead and ask for assistance from section writers (perhaps Stephanie, Rosa, Ryan, Murat)

**Election**

New Secretary for 2017-2018 cycle will be Ryan Dickson (RR moved, JL second, motion carried)

As per our tradition the previous secretary (Neil Mattson) will assume the role of chair for the 2017-2018 cycle

**Location for next year**

2018 meeting to coincide with Cultivate in Columbus, OH – before Cultivate with OSU colleagues hosting

**General member announcements**

A.J. Noted that we should add our teaching efforts (as well as student training outcomes) to our annual reports

NCERA-101 (an information exchange committee) controlled environment technology and use – also includes a large industry membership

2018 annual meeting we will at Duke University in April

**Friday, June 30, 2017**

An excellent day of networking and tours was held as noted below. Many thanks to our hosts Ellen Paparozzi and George Meyer.

8:00-8:10 a.m. Van departs from hotel

8:30-9:00 a.m. Greenhouse Innovation Center – Nebraska’s Innovation Campus - Phenotyping facilities- 2021 Transformation Dr, Lincoln, NE 68508

9:00- 9:30 AM UNL Maker Space – Innovation Campus

9:45 AM LI-COR BioSciences, 4647 Superior St, Lincoln, NE 68504

11:45 AM Lauritzen Gardens, Omaha’s Botanical Center – 100 Bancroft St, Omaha,

 NE 68108

 Lunch at the café (included in registration) then

 12:30 PM guided tour of the new conservatory

 1:45 PM depart Lauritzen Gardens

2: 00 PM Henry Doorly Zoo and Aquarium, 3701 S 10th St, Omaha, NE 68107

 *Private tours of Lied Jungle and the Desert Dome.*

 Admission included in registration

5 PM Back at hotel. *Safe Travels!*

Minutes respectfully submitted by Neil Mattson, secretary