

Minutes of the 2011 NCERA-101 Business Meeting

(Sunday, May 1st, 2011)

NCERA-101 Members and Conference attendees:

George Adamson (Ontario Scientific), April Agee (Pioneer Hi-Bred), Lou Albright (Cornell), Tony Beckmann (HortAmericas), A.J. Both (Rutgers Univ.), Keri Bouchard (Conviron), Melissa Brechner (Univ. Cornell), Johann Buck (HortAmericas), Bruce Bugbee (Utah State Univ.), Joni Campidilli (Percival Scientific), Christian Clough (C2 Development), Daedre Craig (Michigan State Univ.), Christopher Curry (Purdue Univ.), David de Villiers (Cornell), Jason Fatten (Ball Horticulture), Shaun Faulkner (Univ. Maryland), Jonathan Frantz (USDA-ARS), Gary Gardner (Univ. Minn.), Lawrence Giles (Carnegie Inst. for Science), Richard Gladon (Iowa St. Univ.), Stephen Griggs (EGC), Ed Harwood (Aero Farm Systems), Alec Hay (Utah State Univ.), Ricardo Hernandez (Arizona State Univ.), Lynn Hummel (Univ. Wisconsin-Madison), Seth Humphries (Apogee Instruments), Henry Imberti (Percival Scientific), Ramesh Kanwar (Iowa State Univ.), Meriam Karlsson (Univ. Alaska), Daniel Kiekhaefer (Percival Scientific), Mark Kroggel (Univ. Arizona), Chieri Kubota (Univ. Arizona), John Lea-Cox (Univ. Maryland), Mark Lefsrud (McGill Univ.), Peter Ling (Ohio State Univ.), Mark Loewen (Conviron), Roberto Lopez (Purdue Univ.), Gioia Massa (NASA Kennedy), Cary Mitchell (Purdue Univ.), Bob Morrow (ORBITEC), Joey Norikane (Fraunhofer CMB), Rob Pauls (Biochambers), Roger Peters (Biochambers), Lucie Poulet (Purdue Univ.), Reg Quiring (Conviron), Matthew Randall (C2 Development), Sharon Reid (Conviron), Mark Romer (McGill Univ.), Erik Runkle (Mich. State Univ.), John Sager (EGC), Carole Saravitz (NCSU Phytotron), Tim Shelford (Cornell Univ.), Blake Sheridan (Cycloptics), Philip Sheridan (Cycloptics), Jesse Smith (Percival Scientific), Todd Smith (Duke Univ. Phytotron), Arnold Stankus (EGC), Gary Stutte (NASA-Kennedy), Ted Tibbitts (Univ. Wisconsin-Madison), Richard Tuck (Cycloptics), Marc van Iersel (Univ. Georgia), Celina Gomez Vargas (Purdue Univ.), Daniel Warnock (Monsanto), Ed Wiebe (Biochambers), Ray Wheeler (NASA-Kennedy), Ann Widrig (Ball Horticulture), John Wierzchowski (EGC), Dave Wilson (Stanford University), Wayne Zimmerman (Conviron),

Executive Officers :

Chair: Jonathan Frantz (USDA ARS Maine), Vice-Chair: Marc van Iersel (Univ. Georgia),
Secretary: Peter Ling (The Ohio State University)

Chair Jonathan Frantz called the meeting to order at 8:09 am and asked the meeting attendees introduce themselves.

Announcements:

- Erik Runkle announced an ISHS Lighting conference, International Symposium on Light in Horticulture 2012, will be held at Wageningen, The Netherlands, 10/15-18/2012.
- Dick Gladon announced local arrangements for meals, airport transportation, post-conference tour, and graduate student posters.

Administrator advisory report (Ramesh Kanwar)

Ramesh welcomed more than 60 attendees to Ames, Iowa and thanked Dick Gladon for making all the local arrangements. He also provided a status update of Iowa State University (ISU). The university has approved a 0.5% salary increase, as opposed to 0% last year. ISU faculty can now increase their own salary up to 20% by paying themselves using 15% of indirect cost from funded projects. Fund raising for a new Ag and Biological Engineering building, budgeted for \$74.5M, is on target and has strong support of state legislators.

Ramesh also made the following comments specific to NCERA-101 committee:

- Ramesh suggested we self-nominate NCERA-101 committee for a multi-state committee award. He will help to put a nominating committee together to prepare a 1-2 page nomination package within 2-3 months.
- Regarding to the review of the committee renewal proposal, we received a highly commended review with a minor concern that more references documenting multi-state collaborating effort is desirable. The committee will need to submit a revised report by June 1, 2011.
- The meeting report should be submitted within 60 days of the meeting.
- Possible sources of travel grants for our next international meeting include USDA, NSF, NASA, and DOD.

Mark Romer commented on Ramesh's encouragement of meeting internationally. Jonathan Frantz expressed his gratitude of Ramesh's long term (13 years to date and continuing) service to the committee. Jonathan also acknowledged the proposal renewal submission team members, and Erik Runkle and Dave Fleisher who put together the last proposal which made it a lot easier for this submission.

Several participants voiced their appreciation of the proposal renewal team (Ray Wheeler), and Jonathan's leadership (Marc van Iersel).

Approval of 2010 meeting minutes (Marc van Iersel). Marc reported that the meeting minutes was distributed by email, revised to address several comments, and solicited revision suggestions from the meeting attendees. Hearing none, Mark Romer motioned to accept the meeting minutes as is, seconded by Bruce Bugbee, and unanimously approved.

Membership report (Mark Romer)

- Currently we have 150 members representing 109 institutions from 8 countries.
- Google discussion group: the discussion group was originally limited to signed-up members, while only half of the membership participated. The decision was made to add all official members to the group for better communication.
- A membership report provided by Mark Romer is attached as Appendix A.

Website report (Carole Saravitz)

- The website host was moved from University of Montana to NC State
 - Website name: www.controlledenvironments.org with pointers NCERA101.org and NCR101.org
- John Lea-Cox – commented on not being able to find some information posted on the previous website. Carole responded saying she will look into it.
- Bruce Bugbee asked how much time and effort Carole has spent on the webpage management. Carole said she has no concern of the effort she put in and is eager to work with any suggestions. A suggestion was made to provide links to individual members' websites. Comments were made on the excellent transition to the new website with a good name.
- Mark Romer– reminded each member that he or she does have available space for additional, specific information.

ASHS Working Group report (Bob Morrow)

- Met yesterday (4/30/2011) with 16 attendees
- ASHS maintains a website for each working group including controlled environment working group.
- ASHS has instituted an annual student paper award for protected environment area. Papers presented at controlled environment sessions will be considered.
- The working group will co-sponsor a workshop on challenges and opportunities of medical cannabis for professional horticulturist at the 2011 ASHS Annual Conference.

- 2012 ASHS workshop ideas include greenhouse cooling and high tunnel. Other ideas are welcome.

Phytotronics Newsletter report (Jonathan Frantz)

Per Ted Tibbitts' suggestion, Jonathan scanned and converted 1300 pages of hard copy Phytotronics Newsletter to PDF files. The files will be forwarded to Carole for web posting. He also commented on finding interesting information on early PGR, closed-gas exchange work, and some documentation of the 1st meeting of this group. Further, Jonathan noted the conversion process was not able to convert everything due to symbols. Ted Tibbitts stated that proof reading help is welcome.

Instrumentation package report (Bruce Bugbee)

NCERA-101 Instrument Package Account has a current balance of \$14,237. Incomes were from company contributions, not instrument package usage. There was no usage of the instrument package last year.

Bruce solicited suggestions of new instruments. The following instruments were mentioned by the name in parentheses for possible new instruments: an instrument with an accuracy down to 200 nm (Gary Gardner), an UV-C meter (Ray Wheeler), chlorophyll meter (John Lea-Cox), red/far red ratio meter (Gary Gardner), hand-held spectroradiometer (A.J. Both), leaf area index meter (John Lea-Cox), line quantum sensor (John Lea-Cox), porometer (Peter Ling), CO₂ analyzer (Peter Ling), infrared thermometer (Peter Ling), anemometer (Peter Ling). Ted Tibbitts suggested to compile an instrument need list through web or Google discussion group. He also suggested circulating a signup sheet with price information among the conference attendees. Reg Quiring commented on the challenges of air flow measurement. Mark Romer commented there is room for new guideline on how to measure air flow, and how to use measured air flow information. Marc van Iersel suggested Bruce Bugbee to compile and forward a recommended new instrumentation list for the executive committee to make purchasing decisions.

Greenhouse Guideline report (A.J. Both)

A.J. first announced that Bob Langhans can't make it to the meeting, receiving Rutgers Distinguished Alumni Award. He also announced availability of "*Guidelines for measuring and reporting environmental parameters for experiments in plant tissue culture facilities*" brochure. A.J. then proceeded commenting on the Greenhouse Guideline development. Five sections, temperature, radiation, water, gases, and nutrients, were discussed at 2009 Greensys meeting. The four of the five sections are in

draft form, additional help is needed for the fifth, nutrient, section. He suggested the group to provide feedbacks through sub-groups in breakout sessions today. Each sub-group will select a reporter and recorder to provide feedbacks back to A.J. He also acknowledged major contributions of the guideline development from Mark Lefsrud (particularly on temperature section) and Jonathan Jr. Franklin (worked on water section). Questions were raised on the format of the final product (Gioia Massa) and how it may be used (Mark Lefsrud). A.J. responded saying the members are encouraged to take leadership to have the guidelines published. Marc van Iersel commented that the minimal guidelines have been accepted by ASHS but are not enforced. Mark Lefsrud suggested the guideline can be enforced through manuscript reviewing process when our members are serving as the reviewers. Ted Tibbitts encouraged members of this committee to publish the guideline through their professional societies. Time was set aside for after the business meeting to meet in five groups to discuss editing the four draft version sections and begin to develop the final section.

ASHRAE handbook chapter update (Lou Albright)

Lou provided some background information of ASHRAE (American Society of Heat Refrigeration and Air Conditioning Engineering) handbook and solicited help to revise chapters concerning plant production. He commented that the greenhouse related information in the handbook is very out-of-date, some are 30-40 yrs old and many units are wrong. For those who may be interested in participating, there is already a foundational document started by A.J. The document can be used either as a skeleton or foundation to develop a new chapter. Last year, two people showed interests in this effort, the group is looking for approximately 6 people for this effort. Please send Lou an email if interested in participating.

ASHRAE handbooks are published annually. Last edition was approved last fall. Opportunity exists to revise this chapter for the next version.

Future meetings (Jonathan Frantz)

- 2013 meeting: Cary Mitchel volunteered to host the meeting at Purdue University sometime between 3/1 and 3/15. Potential tour includes Dow Agro Sciences who has an extra-large climate control plant growth facility. Dick Gladon motioned to accept the offer, Henry Imberti seconded the motion. The motion carried with acclamation by the attendees.
- 2014 meeting: Meriam Karlsson will explore the possibility of hosting the meeting at Fairbanks, Alaska.

- 2015 meeting: Carole Saravitz is willing to host the meeting at NC State in 2015.
- 2012 international meeting: Mark Romer presented some preliminary information of the meeting including cost estimates, post conference tour, and general programs. He also surveyed interests in attending the meeting, companion program, exhibit, and post-conference tour. The conference will be held 9/9-12/2012 at Downing College, Cambridge University located 60 miles from center of London. More information is available at NCERA-101 website.

Erik Runkle reported scientific program development of the conference and solicited suggestions regarding to session focus, title, and speakers. Following discussion of a draft scientific program provided by the UK group, Eric summarized the group's suggestions in a document, Appendix B, to share with the UK meeting organizers on the scientific committee.

Peter Ling reported the committee will seek funding to aid travel expenses of North American attendees who have needs. Possible funding sources include USDA CSREES and USDA AFRI. He also solicited volunteers to explore funding opportunities. Gary Gardner, Marc van Iersel, Chieri Kubota, John Lee-Cox, and Peter Ling volunteered. John Lea-Cox and d Marc van Iersel will contact Dan Schmoltdt at USDA NIFA for possible support.

New Business

- **New officer election** (Jonathan Frantz)

Jonathan presented Nominating Committee's recommendation of Henry Imberti as an incoming secretary candidate and solicited other nominations from the floor. With no other nomination, Mark Romer motioned to accept the nomination, Bruce Bugbee seconded, and was accepted unanimously.

- **Other items**

The group discussed topics related the ASHS Graduate Student protected environment paper award. Question was raised for NCREA-101 to sponsor a paper award for both ASHS and ASABE student members to reinvigorate controlled environment interest. Mark Romer asked if corporate sponsorship can be solicited to fund the award. Marc van Iersel responded saying other ASHS working group has precedence of corporate sponsorship to fund their awards. Gioia Massa suggested the committee may use our own financial surplus to fund the award. Mark Romer said we already spending

thousands of dollars supporting graduate students for attending NCERA-101 meetings. Jonathan Frantz is in favor of seeking corporate sponsorship first.

Jonathan passed the gavel to Marc van Iersel at 2:12 pm. Marc thanked Jonathan for his service, especially his incredible amount of work in the past year.

Bruce Bugbee motioned to adjourn the meeting at 2:14 pm, Henry Imberti seconded, and approved by the attendees.

Respectfully submitted,

Peter Ling

Appendix A: NCERA-101 Membership Summary April 2011

Mark Romer, *List Curator*

Membership Number March 2010150

March 2011150

- Additions7
- Deletions7
- Net Gain(Loss)0

<u>Membership Composition</u>	<u>Institutions</u>	<u>Members</u>
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- | | | |
|--|---------|----|
| • Phytotrons & Controlled Environment Facilities | 12..... | 17 |
| • University Departments, Agr. Exp. Stations..... | 56..... | 77 |
| • Government Organizations & Contractors | 16..... | 17 |
| • Industry Representatives | 25..... | 38 |
| • Independent | | 1 |

Total Number of Institutions109

Total Number of Members150

New Institutions

Canada

- National Research Council Canada - IRAP

USA

- Aerofarms
- Ball Horticultural Company
- Lighting Science Group Corporation
- Mississippi Agricultural Experiment Station, Truck Crops Branch Exp. Station
- North Dakota State University - Dept. of Agricultural and Biosystems Engineering
- University of Maine - USDA-ARS- New England Plant, Soil, and Water Laboratory
- White Technology LLC

Appendix B: A summary of NCERA-101 suggestions for the 2011 joined UK CEUG/NCERA-101/ACEWG on Controlled Environments meeting

Topic 1: Light in controlled environments - cabinets, rooms and greenhouses

1.1. The science of LEDs.

- Mike Bourget, Orbitec
- Hiroyuki Watanabe, Faculty of Agriculture, Tamagawa Univ., Japan
- Nadarajah Narendran, Lighting Research Center (Troy, NY)

1.3. LEDs from a plant scientist's point of view.

- Jeremy Harbinson or Wim van Ieperen, Wageningen Univ.
- Cary Mitchell, Purdue Univ.

1.5. Commercial application of supplementary lighting for optimum yield and quality.

- A.J. Both, Rutgers Univ.
- Erik Runkle, Michigan State Univ.

Other suggested topics:

- Innovative and novel lighting in controlled environments, including T5s, LEDs, and retrofitting chambers.
- Future challenges with LED technologies, from an engineering perspective (temperature, life span, intensity drift, optics, diffusers, etc.)
- See Topic 7.

Topic 2: Sustainability of CEs with respect to energy

2.2. Innovative structures and methods enabling closed structures, including greenhouses, to run at high ambient temperatures in hot climates.

- Guillermo Zaragoza, Expt Station of Cajamar, Spain

2.3. Sustainability - other sources of energy - ground source heating, wind power, solar energy.

- Add biomass/biogas (methane).
- Does this topic fit? It is not unique to CEs. Perhaps present as a case study?
- Murat Kacira, Univ. of Arizona

2.4. Environmental impacts - noise, extraneous light at night (light pollution), carbon footprint, active cooling, sustainability of construction materials and end of life disposal, etc.

- Curt Rom – life cycle assessments, Univ. of Arkansas

Other suggested topic:

- Carbon sequestration and gasification, unique to CEs/greenhouses

Topic 3: Sensing and monitoring in CEs

3.1. New methods of sensing via plant physiological properties and physical environmental properties and their use in control systems to improve the efficiency of use of resources.

- Marc van Iersel, Univ. of Georgia. Suggested focus on water and nutrient management, plant physiological implications, and modeling.

Topic 4: CEs for conservation and climate change

- 4.1. CEs in ecosystem research with vertebrates.
 - Russell Lowers, Kennedy Space Center
- 4.2. CEs for conservation of crop resources.
 - Someone from the Global Seed Vault in Norway?
- 4.3. CEs for climate change research.
 - Steve DeLong of Biosphere 2 (Arizona)

Topic 5: CE technology and practice

- 5.1. Modern developments in remote access and control with wireless sensor systems.
 - George Kantor, Carnegie Mellon
- 5.2. The science of growing media.
 - Mike Evans, Univ. of Arkansas
- 5.3 Design and upscale of photobioreactors for algae production
 - Qiang Hu, Arizona State Univ.

Topic 6: Reporting guidelines

- 6.1. Greenhouse guidelines.
 - A.J. Both, Rutgers Univ.
- 6.2. CEs for investigating circadian rhythms.
 - It was suggested that this topic be excluded.
- 6.3. CEs for containment (?).
 - Dann Adair of Conviron, but only if there has been significant advances in the past decade, since he spoke on this topic at the 2001 meeting.
- 6.4. Advances in refrigeration since 2008.
 - Henry Imberti, Percival Scientific
 - Suggested that the topic focus on what is happening to refrigerants – what is Europe doing?
- 6.5. Concluding address, to summarize and close the meeting.
 - Lynton Incoll, Univ. of Leeds (this was unanimous)
 - If Lynton was unwilling, then Bruce Bugbee of Utah State Univ. was suggested

The following was suggested by Bruce Bugbee, but apparently before he had reviewed the suggested outline of topics. It was subsequently suggested that Topic 1 be expanded to include elements of this topic.

Topic 7. New instrumentation and novel measurement and control techniques in CEs

- New developments in sensing technology and applications in CEs
- Novel methods to interface sensors with data acquisition systems (wireless transmission)
- Novel techniques to summarize data in real time and control based on data
- A summary of the underlying causes of aging and long term drift in sensors
- The difference between precision and accuracy, and why precise, but less accurate sensors are sometimes preferable
- Optimizing the overall cost of a measurement system

Other comments and suggestions about the scientific program:

- Consider keeping 1 or 2 time slots open in each category, and then fill those with people who submitted abstracts for poster presentations (ask them to present an oral, not poster presentation). There was strong support for this idea.
- I conducted a straw poll about the interest of the 6 topics, with each participant able to vote twice. Here are the results:
 - Topic 1: Almost everyone raised their hand (around 55 people)
 - Topic 2: 5 people
 - Topic 3: 40 people
 - Topic 4: none
 - Topic 5: 5 people
 - Topic 6: none

So, there was clear consensus that Topics 1 and 3 were of most interest to the NCERA-101 group.