

Minutes of the 2013 NCERA-101 Business Meeting

Sunday March 10, 2013

Participants: Dann Adair (Conviron), George Adamson (Ontario Scientific), April Agee (Pioneer), Ken Beebe (DOW), Mark Blonquist (Apogee Inst), A.J. Both (Rutgers Univ.), Keri Bouchard (Conviron), Melissa Brechner (Cornell Univ.), David Bubenheim (NASA Ames), Johann Buck (HortAmericas), Bruce Bugbee (Utah State Univ.), Cannon Cheng (Purdue Univ.), Kevin Cope (Utah State Univ.), Greg Crabb (Syngenta), Kristen Curlee (DOW), Chris Currey (Purdue Univ.), Matthieu de Carbonnel (Syngenta), Gerald Deitzer (Univ. Maryland), Mike Dixon (Univ. Guelph), Michael Dzakovich (Purdue Univ.), Rob Eddy (Purdue Univ.), Matthew Ezzo (EGC), Jason Fatten (Ball Horticultural), Ed Fischer (Monsanto), Dave Fleisher (USDA-ARS), Jim Forgy (RiceTec), Jonathan Frantz (Pioneer), Gary Gardner (Univ. Minn.), Josh Gerovac (Purdue Univ.), Gene Giacomelli (Univ. Arizona), Larry Giles, Richard Gladon (Iowa St. Univ.), Celena Gomez (Purdue Univ.), Daniel Halldorf (Heliospectra), Ed Harwood (Aerofarms), Heather Hava (Colorado State Univ.), Alec Hay (Utah St. Univ.), Ricardo Hernandez (Univ. Arizona), Staffan Hillberg (Heliospectra), Lynn Hummel (Univ. Wisconsin-Madison), Henry Imberti (Percival Scientific), Lori Jolly-Brown (Purdue Univ.), Robert Joly (Purdue Univ.), Ramesh Kanwar (Iowa State Univ.), Bjorn Karlsson (Univ. Wisconsin-Madison), Meriam Karlsson (Univ. Alaska-Fairbanks), Joel Kenyon (PP Systems), Mark Kroggel (Univ. Arizona), Chieri Kubota (Univ. Arizona), John Lea-Cox (Univ. Maryland), Mark Lefsrud (McGill Univ.), Joan Leonard (Ohio St. Univ.), Peter Ling (Ohio St. Univ.), Roberto Lopez (Purdue Univ.), Rod Madsen (Li-Cor), Gioia Massa (NASA KSC), Neil Mattson (Cornell Univ.), Cary Mitchell (Purdue Univ.), Bob Morrow (Orbitec), Jake Nelson (Utah State Univ.), Derrick Oosterhuis (Univ. of Arkansas), Andrew Perkett (DOW), Michael Petercsak (Pioneer), Reg Quiring (Conviron), Michael Robbie (Conviron), Mark Romer (McGill Univ.), A.O. Rule (EGC), Erik Runkle (Mich. State Univ.), Carole Saravitz (NCSU Phytotron), Eric Senders & Cary Senders (iGrow), Tim Shelford (Cornell Univ.), Flip Sheridan & Jeff Sheridan (Cycloptics), Gregg Short (GShort.com), Todd Smith (Duke Phytotron), Hans Spalholz (Univ. Arizona), Mike Stasiak (Univ. Guelph), Christopher Steele (Heliospectra), Gary Stutte (Limerick Inst. Tech.), Marc Theroux (Biochambers), Mark Thompson (DOW), Ted Tibbitts (Univ. Wisconsin), Victor Tishchenko (Univ. Georgia), Richard Tuck (Cycloptics), Marc van Iersel (Univ. Georgia), Sydney Wallace (Univ. Maryland), Nicole Waterland (West Virginia Univ.), Kevin Wells (Lumigrow), Margie Werderich (Ball Hort.), Ray Wheeler (NASA-KSC), Rachelle Wittingham (Philip Lighting), Robert Witherell (Wisconsin Seed Potato Lab), Yang Yang (DOW), Melanie Yelton (Lumigrow), Neil Yorio (Lighting Science Group), Shifu Zhen (Pioneer).

Executive Officers:

Chair: Peter Ling (The Ohio State University), Vice Chair: Henry Imberti (Percival Scientific), Secretary: Meriam Karlsson (Univ. Alaska Fairbanks), Past Chair: Marc van Iersel (Univ. Georgia)

Marc van Iersel chaired the meeting since the current Chair, Peter Ling, was delayed traveling and had not yet arrived.

Marc van Iersel called the business meeting to order at 9:10 am and asked the members for announcements of upcoming scientific meetings and conferences relevant to the group.

- Dave Fleisher announced that the 42nd Biological Systems Simulation Conference will meet April 23-25, 2013, at Penn State University, College Station, PA
- John Lea-Cox announced the annual ASHS (American Society for Horticultural Sciences) meeting will be held July 22-25, 2013 in Palm Desert, California.
- Dann Adair announced that the annual AERGC (Association of Education and Research Greenhouse Curators) annual meeting will be at North Dakota State University, Fargo, North Dakota, on July 25-29, 2013.
- Gary Gardner announced that the International Conference on Plant Growth Substances is planned for June 18-22, 2013, in Shanghai, China.

Administrator advisory report (Ramesh Kanwar)

- Ramesh Kanwar welcomed the group to the meeting on the Purdue campus. Many conferences are meeting on this campus throughout the year.
- Ramesh came from India specifically to attend this meeting and will be returning to India following the meeting.
- Ramesh has been the Administrative Advisor for NCERA-101 for 13 years. The expected commitment for an administrative advisor to a specific group, is 8 years.
- NCERA-101 is a collegial and well-organized group with good accomplishments and excellent record of submitting reports on time.
- The annual report is due sixty days from today (May 9, 2013) and should highlight the impacts of the group, industry participation since this is one of the few groups with significant industry interactions, the website, and the preparation and participation of graduate students and future faculty members.
- The midterm report is due no later than December 15, 2013 and should highlight accomplishments with an up-dated one-page impact statement. Ramesh suggested considering adding a strategic plan to the midterm report.
- Since NCERA-101 has had and is planning future international meetings in Australia and the United Kingdom, the group may also consider other locations such as India or China for future meetings in the next 5 to 10 years. There are large concentrations in these countries of high tunnels or polyhouses as they are commonly called. Polyhouses are used for all types of food production. In India, polyhouses are often also used for pharmaceuticals such as natural production of the sugar substitute Splenda.

- China appears to be better organized to provide higher education than India. Many faculty positions (up to 30-40%) are not filled in India and there are limited or no faculty salary increases.
- An emerging trend in the United States, is for Professors to mentor students at a distance. This model is working in the area of economics education in the US and could also work for India to build human resources. A faculty member could teach for 2 to 3 weeks in India and then complete the assignment via distance teaching and mentoring. There are also opportunities for graduate students to spend 6 months teaching in India. Shorter visits are also possible. If anybody is interested in these opportunities, please talk to Ramesh about available funding and for more information.
- On the subject of expected impact of sequestering, NIFA and USDA have developed a plan for a five percent budget cut. This and next years' funding is not expected to be severely impacted. At Iowa State University, we are expecting to receive 40 to 50 fewer projects next year.
- Dave Fleisher added that the Administration seems uncertain on a direction until Congress is expected to decide on a budget at the end of March.
- Marc thanked Ramesh for the update and his longstanding service as the advisor to the NCERA-101 group.

NIFA representative report

Dan Schmoldt was not present to provide a report from NIFA. For several years, NIFA has not been represented at the annual NCERA-101 business meeting. Travel funds have become very restricted within USDA and most likely explain the lack of participation. Marc van Iersel will follow up with Dan Schmoldt on the reason for the absence.

2012 minutes report

Henry Imberti reported that last year's meeting minutes from Cambridge, UK, are posted on the website, and asked the group for suggestions, changes or additions. There were no comments from the group. Mark Romer moved to accept the minutes and Gioia Massa second the motion. The minutes were unanimously approved.

Membership report (Mark Romer)

This year marks the 38th annual meeting of the group which first met as the NCR-101 Committee on Growth Chamber Use at Purdue in 1976. The membership total remains strong at 155 members representing 108 institutions, 34 states and 9 countries (Appendix A). One of the reasons for the success of the NCERA-101 group has been the commitment of its core members. This year, the group will once again recognize the contributions of several long-serving members by awarding them the "20 Year Member Award" at the Awards Banquet on Sunday night (March 10, 2013). The 2013 recipients include Mark Romer (1992), Gary Stutte (1993), A.J. Both (1994), Henry Imberti (1994) and Chieri Kubota (1994).

The group discussed the issue of adding and deleting members from the membership list and proposed the following guidelines:

Guidelines with regards to the admission of new members

- All new member requests should be forwarded for consideration to the membership secretary.
- Persons interested in joining the NCERA-101 must attend at least one meeting before being added to the official membership list. Official representatives of agricultural experiment stations at land grant universities are excluded from this requirement.
- Graduate students may join the group upon completion of their graduate degree.

Guidelines with regards to the deletion of members

- Members who do not attend meetings, who do not submit annual reports, or who do not contribute to the sponsorship of meetings, may be removed after 5 years at the discretion of the executive committee and the membership secretary.
 - There was some discussion on the timing of graduate student memberships, the size of the membership list, the opportunity to attend meetings without being an official member, and participation versus membership.
 - Erik Runkle made a motion to accept the guidelines as stated above. Bruce Bugbee seconded the motion.
 - Ramesh stated that industry members are part of the group and that information sharing is a main purpose. Participation is key to sharing information on technology and science. Experiment Station Directors select one authorized representative but may nominate two or three additional members.
 - The motion to accept the guidelines for adding and deleting members as stated above, passed unanimously.

Jonathan Frantz informed the group that graduate student posters will be judged during the break and throughout the day. The committee judging student posters consists of Jonathan Frantz, Nicole Waterland and Gioia Massa.

The meeting was discontinued for a break at 10:06 am.
The meeting was called back to order at 10:47 am.

Web-site report (Carole Saravitz)

- Marc thanked Carole for her service managing the NCERA-101 website.

- The NCERA-101 website is hosted by North Carolina State University.
- The site name is ControlledEnvironments.org (not case sensitive), with NCERA101.org and NCR101.org as pointers.
- The site has 2100 MB of space.
- NCSU is acknowledged as the host at the bottom of each page in small print.
- Carole encouraged everybody to look at their specific pages and information on the website to ensure it is correct.
- Carole asked for comments and suggestions for the website.
- Jonathan informed the group that he has scanned 21 issues of Phytotronics published in 1971 through 1980, and provided by Ted Tibbitts. These files are now available on the website under Publications.
- If you would like additional information posted or find errors on the website, please send emails to Mark Romer and Carole.

Improvements to student poster competition (Mark Romer)

- Currently there are no guidelines for the student poster competition at annual meetings.
- Arranging the student poster competition has been the responsibility of the hosting institution with variations in approach, organization, judging, and amount of awards.
- It is desirable to have clearly developed guidelines and procedures that are continuously available on the website to increase visibility and encourage more participation.
- Jonathan has volunteered to lead the effort of developing guidelines and procedures for the student poster competition. He will put together a committee to assist him with this task.

Greenhouse guidelines update (A.J. Both)

- The Guidelines for Measuring and Reporting Environmental Parameters for Plant Experiments in Growth Chambers were recently published (December 2012) as an ASABE (earlier ASAE) standard. Melissa Brechner was the lead in revising and getting the guidelines published. Copies are available from ASABE.
- The work on the growth chamber guidelines started in 2001 at the UK meeting. The ASAE standard were already available but since they were really specific and too detailed for most practical applications, there was a need for minimum guidelines for controlled environments.

- The growth chamber guidelines were published and made available at the Brisbane meeting in 2004, and are posted on the NCERA-101 website.
- At the 2004 meeting in Brisbane, the decision was made to work on guidelines for tissue culture facilities. The Guidelines for Measuring and Reporting Environmental Parameters for Experiments in Plant Tissue Culture Facilities were published in 2008 at the international Cocoa Beach meeting and are available on the NCERA-101 website.
- A list of committee members working on the various guidelines is available on the UK Controlled Environment Users' Group website at <http://www.ceug.ac.uk/index.php?folder=guidelines&file=ICCEG>
- The work on the greenhouse guidelines started in 2008. In 2009 during a session at the GreenSYS meeting in Quebec City, topics were identified for the greenhouse guidelines. There was also a session working on the guidelines at the NCERA-101 meeting in Ames, Iowa, in 2011.
- A draft of the greenhouse guidelines was distributed in Cambridge 2012. The current draft of the Guidelines for Measuring and Reporting Environmental Parameters for Experiments in Greenhouses, is provided in the registration packet for this meeting.
- There are still a few unresolved issues, but the committee is getting close to finalizing the greenhouse guidelines.
- Some of the issues that still need to be finalized:
 - Should the calibration procedure be reported in a paper or write-up of the experiment, or is it sufficient to have the procedure on file and available when somebody asks for it?
 - Should both precision and accuracy be included or just accuracy? Some think accuracy is sufficient. For instance for quantum sensors, the precision is good. Do we need to challenge instrument companies to be able to reduce the accuracy number of $\pm 10\%$?
 - For temperature, the instrument precision is $\pm 0.1^\circ\text{C}$ and the reading accuracy is $\pm 0.2^\circ\text{C}$. Thermocouples for instance, are difficult to fit into these guidelines of precision and accuracy. Maybe we should recommend that thermocouples should not be used.
 - Another issue of discussion is continuous measurements of pH and EC versus time step measurements. Continuously measured pH and EC may be preferred but is it sufficient to report time step (daily, hourly) values?
 - Is the temperature of the irrigation water important, or is it more important to know the root temperature/environment?

- Use of irradiation and radiation? Maybe we should decide to use only one of these terms?
- Comments from the participants:
 - Mike Dixon: pH/EC measurements need to be normalized to the capacity of the system. In smaller systems (200 liter), continuous monitoring is absolutely required. Larger systems (100,000 gallons) do not change quickly and continuous measurements are not necessary.
 - John Lea-Cox: Both spatial and temporal resolution is important, should we try to make users aware of the need for resolution to get precision and accuracy?
 - A.J.: How do you translate resolution into guidelines? The guidelines cannot be vague.
 - Gregg Short: Does it matter to the design of a greenhouse experiment if there is a 0.1°C change?
 - A.J.: We want to specify instruments and make users aware of what type of instruments is needed to get enough precision for providing reliable research measurements and data.
 - Mark Lefsrud: Thermocouples should not be used and we should not recommend them. There are better sensors that should be used instead of thermocouples.
 - Bruce: Thermocouples are a time-honored measurement technique. They will continue to be around, they work, not the most accurate, but are adequate for some applications.
 - Gary Gardner: The growth chamber guidelines use “fluence” while the draft greenhouse guidelines use “irradiance”. We should use the same term in all guidelines, since this could be confusing for the users.
 - Ray Wheeler: These guidelines are trying to define monitoring specifications. Control capabilities do not have to meet these guidelines. The photobiology community has used “fluence” for years. Can we get some clarification on “fluence” versus “irradiance”?
 - Gerry Deitzer: You only need to specify two measurements in the SI system: W/m^2 that measures photon energy and $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ that measures number of photons. The other units are derived from W/m^2 or $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$.
Fluence indicates a flux of photons.

- Marc thanked A.J. and encouraged the group to provide feedback to A.J. via email. Since the committee is close to finalizing the greenhouse guidelines, this is the time to provide your suggestions and feedback.

Instrument/financial report (Bruce Bugbee)

- There were no rentals of instrument packages during the past year.
- The financial report is provided in Appendix B.
- There are 4 instrument packages available for rental by members and a signup sheet was passed around for members to indicate their interest in renting one or several packages. You can also contact Bruce or Alec Hay (Alec.Hay@usu.edu) directly. Information about the instrument packages and how to rent them, is posted on the NCERA-101 website.
 - The photosynthetic radiation calibration package consists of four calibrated LI-COR quantum sensors (400-700 nm). The sensor to be tested is placed in the middle of the four calibrated PAR sensors for in situ evaluation. The package also includes a UV sensor (250-400 nm) and a R/FR sensor.
 - The humidity/temperature calibration package has three HMP45 humidity sensors.
 - The spectroradiometer package consists of a StellarNet UV/VIS spectroradiometer (300-850 nm).
 - The net radiometer package has a Kipp & Zonen CNR1 net radiometer. This package was used a lot when HID lamps were used in experiments. It may become interesting again with the LEDs, to get information on thermal radiation.
- Rental fees with shipping included:

○ One instrument package	\$300
○ Two instrument packages at the same time	\$450
○ Three packages at the same time	\$600
○ All four packages at the same time	\$750
- Comments from the participants:
 - Melissa asked how often LICOR PAR sensors should be calibrated and why do they lose their calibration?
 - Bruce answered that it depends on the environment they are used in. If the humidity is high, they need to be calibrated more often. Rod Madsen added that LICOR recommends calibration every two years, but it depends on the environment. If moisture gets into the sensors, they may need to be calibrated more often.

- There are three reasons for calibration changes of PAR sensors: long term gradual degradation of the silica, faster blue wavelength degradation than longer wavelength degradation, or the filters used for the straight line response between 400 to 700 nm may change at different rates.
- Questions: How do you calibrate a light-bar (line quantum sensor)? Do the sensors on a light-bar change at the same rate?
- Bruce: To calibrate a light-bar, put them in the sun or other area with spatial uniform light. You may test an individual sensor by putting black electrical tape over the other sensors (to get a zero reading for the covered sensors). Still need to multiply by the number of sensors on the light-bar to get the correct value for the sensor being tested.

Surplus funds (Bruce Bugbee)

- Some options for investing surplus funds.
 - New instrumentation for the instrument packages
 - Handheld spectroradiometer (Qubit Systems, \$5,000). The limitation of this instrument is the relatively low spectral resolution of 9 nm while it is about 1 nm for the spectroradiometer in the current instrument package. The advantage of the Qubit spectroradiometer is that it is portable and easy to use.
 - Handheld anemometer (Thermal Systems, \$2,000) for measuring air movement. This variable is often not measured and can vary significantly.
 - Undergraduate and graduate student travel and awards
 - Web-based summarized CE knowledge
Advancing the state of knowledge in controlled environments, posters, summarized information from this group, an electronic database, nuggets of wisdom, conference proceedings, an electronic on-line journal, publication of the developed guidelines.
 - Keep some funds for future meetings as it is often uncertain how donations and costs of annual meetings may work out.
- Bruce made a motion to establish a committee that will gather information from the membership and make recommendations for the best use of the money. Mark Romer seconded the motion and it passed unanimously.
- The selected committee consists of Bruce Bugbee (Chair), Jonathan Frantz, Gary Gardner and Marc van Iersel.

The meeting was discontinued for lunch at 11:56 am.

Marc van Iersel called the meeting back to order at 1:40 pm.

NCERA-101 NIMSS midterm review (van Iersel)

- The midterm review report is due no later than December 15, 2013, and should highlight accomplishments with an up-dated one-page impact statement.

- Marc van Iersel and Mark Romer re-emphasized the importance of members submitting station reports. All members, not just authorized experiment station members, are encouraged to submit station reports. These reports are important for the development of the annual report and for the exchange of information. The submission of station reports from industry representatives is especially valued to show the close interactions and sharing of information among academic, research and industry members.

Future meetings

- 2014 meeting
 - The planned location for the 2014 meeting is Fairbanks, Alaska.

 - Meriam outlined a proposed program that will start on Saturday April 12 and go through April 15, 2014. There will be tours of the University of Alaska Fairbanks facilities on Monday afternoon, and an all day field trip April 15, to Chena Hot Springs Resort, located 60 road miles outside Fairbanks.

 - Jonathan Frantz made a motion to accept the offer from University of Alaska Fairbanks to host the meeting in 2014. Bruce seconded the motion and it passed unanimously.

- 2015 meeting
 - There is a proposal to have a joint meeting in 2015, with the AERGC (Association of Education and Research Greenhouse Curators) group.

 - Dann Adair, Chair of AERCG, stated that AERGC and NCERA have similar interests with annual meetings of similar size and length. Both groups freely share information and can be expected to benefit from the interactions and exchange of information.

 - AERGC meets in the summer, usually in July, since the AERGC members are too busy during the academic year. AERGC would have a difficult time deviate from a summer meeting.

 - George Adamson pointed out that each group needs to have business meetings. Speakers could be selected from each group and there could be concurrent sessions. Several sponsors support the meetings of both groups.

- Gioia mentioned that the 2016 meeting will be an international meeting and could be at a different time than a traditional spring meeting. She suggested second week or late June as a possibility for a joint meeting.
- A show of hands indicated a majority interest in considering and discussion a joint meeting with the AERGC group.
- Discussion followed on location for a joint meeting. One option is Ohio State University (OSU) to be hosted by Joan Leonard and Peter Ling. AERGC met there in 1992 and NCERA at OARDC Wooster, in 2006.
- AERGC would take the lead in organizing the meeting with input from NCERA-101, since they are better set up administratively to run meetings.
- NCERA has a long-standing offer from Michigan State University for hosting the annual meeting.
- Another option is British Columbia where there is support from Alec Mackenzie of Argus Control Systems in White Rock, BC, and Brian Spencer of Applied Bio-nomics. British Columbia has a large concentration of greenhouses with interesting technology, operations and pest control approaches that would be of interest to both groups.
- A decision about the 2015 meeting needs to be made in a year (March 2014).
- A motion was made by George Adamson to consider a joint meeting with AERGC in 2015 with Columbus, Ohio, as the potential meeting location. Jonathan seconded the motion and it passed unanimously.
- 2016 meeting
 - Mark Romer informed the group that the 2016 meeting is planned for Australia.
 - Tony Agostino and the CSIRO have agreed to host the meeting in 2016. The meeting will be at Black Mountain Laboratories in Canberra in March during spring break time in the US.
 - Dennis Greer who works in wine and food sciences at Charles Sturt University (CSU), Wagga Wagga, will co-sponsor the meeting.
 - At the meeting last year in UK, it was decided to split the organization of the meeting among the three controlled environment groups (Australia, UK, US). Each group would organize one day of the scientific program. Tony Agostino also requested that NCERA-101 put together an organizing committee for the 2016 meeting. The following members volunteered to serve on this committee: Mark Romer, A.J. Both, John Lea-Cox, Dave Bubenheim, Mark Lefsrud and Dave Fleisher.

- A.J. suggested having a second committee to work on the logistics and seeking funding for travel. For the meeting in Brisbane, funding was received from USDA.
- Ramesh suggested pursuing NSF as a group collaborating with the Australian group, for funding. We would need to have about a year lead-time to submit a proposal. The success rate is high, especially if you plan on publishing the presented information afterwards. This would however, require a substantial additional commitment and effort from the group.
- Marc: There are also funding opportunities from USDA. We can probably use a similar proposal as to NSF.
- Ray Wheeler, Marc van Iersel and Chieri Kubota volunteered to serve on the committee seeking funding. Additional members may be added, as we get closer to the 2016 meeting. To be able to apply for grants, a large portion of the program needs to have been determined at time of proposal submission.
- The Australian organizers would like suggestions for conference themes. Mark Romer will work on this via email.

Election of new secretary

Marc van Iersel presented the Executive Committee's recommendation of Carole Saravitz as the incoming secretary candidate and solicited other nominations from the floor. With no other nominations put forth, Carole was unanimously elected as the secretary.

New business

- Cary Mitchell informed the group that the members of the SCRI LED-project working on applications, best practices and protocols for using LEDs in commercial greenhouses, regularly get inquiries from entrepreneurs, growers, hobbyists and the general public on how to use lighting equipment and especially LEDs, for growing plants.
 - A.J. stated that since we have been developing guidelines in other areas, maybe as a group we could come up with some procedures and guidelines for how to use LEDs in greenhouses. There are many issues for growers to consider when deciding on using or not using LEDs.
 - Melissa pointed out that there is a need for guidelines not just for end users but also for manufacturers of LEDs.
 - Kevin Wells: Speaking from a manufacturer's standpoint, you can develop a concept of two standards. One standard is for the efficacy of the fixtures and the other standard is for the longevity and quality of the product. There are standardized tests within the lighting industry. These tests can be set up with one set of guidelines for manufacturers and one set of guidelines for how to use the product.

- A.J.: Longevity is a rather complicated measurement. How can we use the concept of longevity independently and come up with a tool for people to look at and use?
- Kevin: There are specific testing standards within the commercial lighting industry. The LM-79 standard and the in situ management test are testing the actual fixtures. The LM-80 standard is testing the LEDs themselves. These are rigorous and long-term testing procedures to guarantee the LEDs will last. The second part of the test is related to how the LEDs are used in fixtures. You can report the results or you can project the results. The projected results can be pretty accurate and are based on how the fixtures manage the cooling, and the types of voltages and currents applied to the LEDs.
- A.J.: How do we use the information from the manufacturers? All information is written for visible light and lighting applications for humans. There is very limited information for LEDs in greenhouse applications. The visible light information is, in many cases, not applicable to greenhouse and plant production.
- Kevin: I agree, it is a problem. I welcome other LED manufacturers to work on how to best solve that problem.
- There are also issues about the best spectrum (George), LEDs as supplemental lighting versus sole source in controlled environment applications (Melissa), the impact on phytochemical levels in plants grown under LEDs (Dave F.), the spectral output, light intensity, uniformity and distribution under LEDs versus traditional lighting sources (Erik). We need unbiased information that we can pass along to controlled environment and greenhouse end users (Erik).
- Cary Mitchell: The SCRI LED group would like to extend an invitation to NCERA-101 in developing procedures for the use of LEDs. A.J. is in the process of setting up a test lab for LEDs, to generate objective information and procedures for evaluating LEDs for greenhouse applications.
- John Lea-Cox in his role as Research Vice President for ASHS, has had the opportunity to talk to several members of Congress and want to make the group aware of some current events.
 - If the issues with snap (supplemental nutrition assistance program) can be worked out, a farm bill is expected to pass this summer. The funding connected to the farm bill will then become available such as funding for SCRI (specialty crops research initiative), OREI (organic agriculture research and extension initiative), AFRI (agriculture and food research initiative), and NCPN (national clean plant network).
 - The crops covered in the SCRI funding are mostly horticulture crops. Although horticulture crops constitute about 50% of the agriculture farm gate value, research on these crops only receive 10% of available funding.

- There is no money for SCRI funding in 2013. If the farm bill is passed this summer, SCRI will receive 25 million in 2014, 25 millions in 2015, 35 millions in 2016, 65 millions in 2017, and 50 millions in 2018.
- Since no projects were awarded in 2013, SCRI funding is expected to be very competitive with a current backlog of very good SCRI proposals.
- Although 25 million to SCRI in 2014 (if the farm bill is passed) may sound like a large amount of funding, It is very limited in comparison to other research funding and for crops that constitute 50% of the agriculture farm gate value.
- There is a large need for education of congress members and staffers to bring attention to funding issues related to SCRI, AFRI and other agricultural programs.
- Gary Gardner: It may be useful to send out talking points for contacting our congressional electives to promote additional agricultural research dollars.
- ASHS has developed some background information and talking points, and is working with other societies to raise awareness. More information on these issues and events is available from John.
- It is important to have good statements of impacts as researchers, but industry and company support has much more influence. The benefits to industries using research results need to be communicated to Congress.
- Joel Kenyon: This group may be interested in the work by Geoffrey West of the Santa Fe Institute and David Krakauer of the Wisconsin Center for Discovery. These research institutes are studying future trends including determining the future of academic research, the dynamics of large cities and trends of urbanization with 75% of the population living in urban areas by 2050. They are making arguments that could benefit this group for increased controlled environment research, food production and security.
- Marc van Iersel: A special issue of the Resource magazine (Volume 20 (2) March/April 2013) was just published by ASABE. Several members of this group contributed to the issue with articles on controlled environment agriculture and how to feed an increasing global population. If you are interested, you can get a copy of the publication in pdf-format from Marc.

Marc van Iersel thanked Peter Ling for his service and passed the gavel to Henry Imberti as the incoming Chair. Henry thanked Marc for his leadership and contributions chairing the business meeting during two consecutive years, and asked for a round of applause.

Henry asked if there were any additional business or announcements.

Jonathan Frantz announced that the judging of posters for the graduate student competition will be completed during the break.

Post-business meeting note:

The winners of the student poster competition were in first place Ricardo Hernández, University of Arizona; in second place Christopher Currey, Purdue University; and in third place Jake Nelson, Utah State University.

Henry asked for a motion to adjourn the meeting. Bruce motioned to adjourn at 2:45 pm. Jonathan seconded the motion and the meeting was adjourned.

Prepared by Meriam Karlsson, Secretary, March 10, 2013.

Appendix A

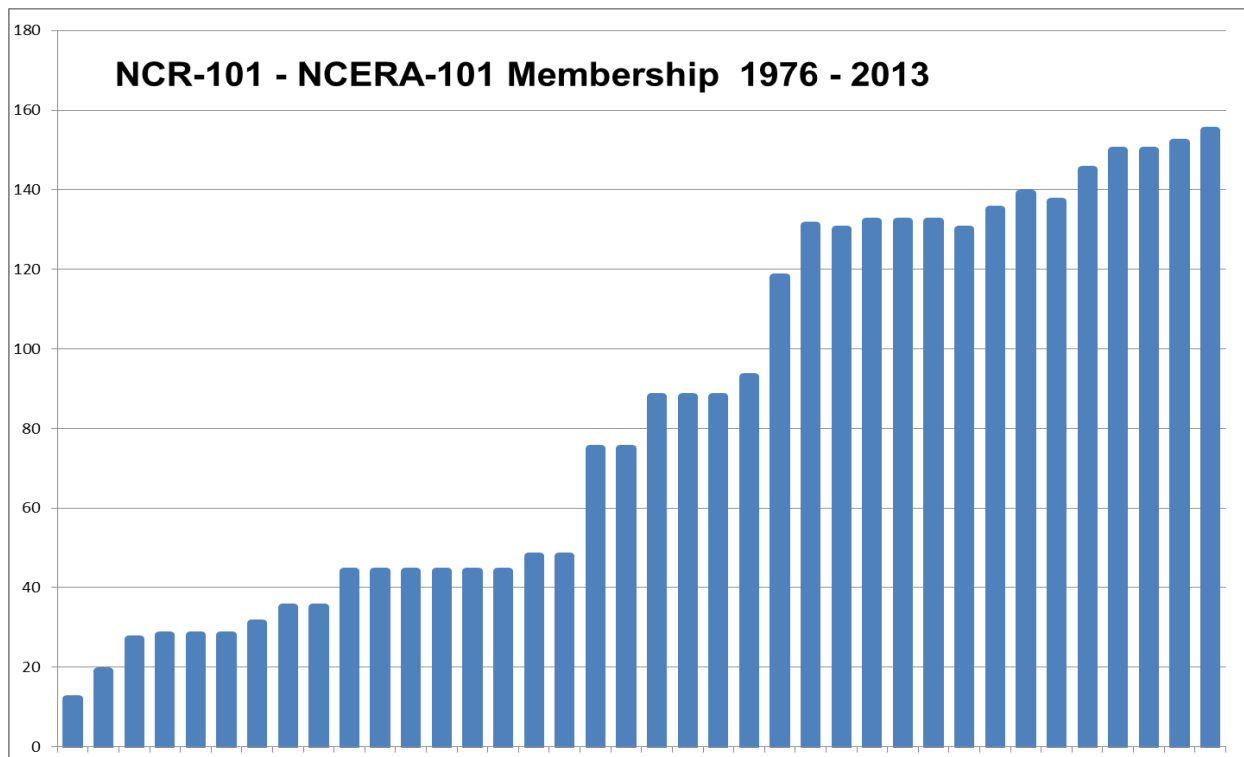
NCERA-101 Membership Summary March 2013 Mark Romer, *List Curator*

<u>Membership Number</u>	June 2012	152
	March 2013	155
<ul style="list-style-type: none"> • Additions4 • Deletions.....1 • Net Gain(Loss)3 		

<u>Membership Composition</u>	<u>Institutions</u>	<u>Members</u>
• Phytotrons & Controlled Environment Facilities	12.....	18
• University Departments, Agr. Exp. Stations.....	55.....	76
• Government Organizations & Contractors	12.....	14
• Industry Representatives	29.....	46
• Independent		1
 Total Number of Institutions / Members	 108.....	 155
Total Number of Countries	9	
Total Number of US States	34	

New Institutions in 2013 :

- USA - Brigham Young University – Dept. of Plant and Wildlife Sciences
- USA - West Virginia University – Dept. of Plant and Soil Sciences
- SWEDEN – Heliospectra



Appendix B

NCERA-101 Instrument Account Budget Report

2010 balance	\$ 11,732.94
Credit card rebates	\$ 160.00
Iowa surplus	<u>\$ 7,261.48</u>
2013 balance	\$ 19,154.52