

Meeting Minutes
NCERA-101 (formerly NCR-101): Controlled Environment Technology and Use
Ohio State University/OARDC, Wooster, Ohio
April 8-11, 2006

Participants

Dann Adair (Conviron), Jeffrey Akers (Rutgers Univ.), Lou Albright (Cornell Univ.), Angela Beaman (Iowa State Univ.), Wade and Betsy Berry (UCLA), Matthew Blanchard (Michigan State Univ.), Mark Blonguist (Apogee Instruments), A.J. Both (Rutgers Univ.), Greg Brenneman (Ohio State Univ./OARDC), Lee Buckingham (USDA-ARS), Bruce Bugbee (Utah State Univ.), Peggy Christman (Ohio State Univ./OARDC), David DeVilliers (Cornell Univ.), Bruno Faucher (Envirosult), David Fleisher (USDA-ARS), Jonathan Frantz (USDA-ARS) and Susan Frantz, Molly Fusselman (Iowa State Univ.), Richard Gladon (Iowa State Univ.), Robert Hansen (Ohio State Univ./OARDC), Alec Hay (Utah State Univ.), Royal Heins (Michigan State Univ.), Henry Imberti (Percival Scientific Inc.), Michelle Jones (Ohio State Univ./OARDC), Ramesh Kanwar (Iowa State Univ.), Meriam Karlsson (Univ. of Alaska), Bruce Kettner (BioChambers Inc.), Mike Klingman (Ohio State Univ./OARDC), Charles Krause (USDA-ARS), Donald Krizek (USDA,ARS,ANRI,SASL) and Betty Krizek, Chieri Kubota (Univ. of Arizona), Kristina Lewis (Ohio State Univ.), Peter Ling (Ohio State Univ./OARDC), Jim Locke (USDA-ARS), Logan Logendra (Rutgers Univ.), Roberto Lopez (Michigan State Univ.), Gioia Massa (Purdue Univ.), Cary Mitchell (Purdue Univ.), Robert Morrow (Orbital Technologies), Desmond Mortley (Tuskegee Univ.), Angie Mu (Environmental Growth Chambers), Genhua Niu (Texas A&M Univ., El Paso), Joey Norikane (Univ. of Kentucky), Medani Omer (USDA-ARS), Reg Quiring (Conviron), Roel Rabara (Ohio State Univ.), Eugene Reiss (Rutgers Univ.), Joe Romagnano (Utah State Univ.), Mark Romer (McGill Univ. Phytotron), A.O. Rule (Environmental Growth Chambers), Erik Runkle (Michigan State Univ.), John Sager (NASA, Kennedy Space Center), Carole Saravitz (North Carolina State Univ.), Daniel Schmoldt (USDA-CSREES), Ted Short (Ohio State Univ./OARDC), Doug Sturtz (USDA-ARS), Gary Stutte (Dynamac Corp.), Noriko Takahashi (Univ. of Tokyo), Marc Theroux (BioChambers Inc.), Ted Tibbitts (Univ. of Wisconsin), Alex Turkewitsch (Greenhouse Engineering) and Eva Turkewitsch, Mirwan Ushada (Osaka Prefecture Univ.), Mark van Iersel (Univ. of Georgia), Peter Vanderveer (Univ. of Wisconsin Biotron), Nicole Waterland (Ohio State Univ./OARDC), Jeff Werner (Univ. of Alaska), Ray Wheeler (NASA, Kennedy Space Center), Ann Widrig (USDA-ARS), Congling Wu (Ohio State Univ./OARDC), Neil Yorio (Dynamac Corp.), Youbin Zheng (Univ. of Guelph).

Executive Committee

Dave Fleisher, Chair
Desmond Mortley, Vice Chair
Erik Runkle, Secretary
Chieri Kubota, Past Chair

The business meeting began on April 8 at 8:05am. Welcoming remarks were made by Dr. Steve Slack, Director of OARDC. Dave Fleisher thanked the host and informed us that 74 attendees were participating in the meeting. The sponsors of the event were also acknowledged. The participants all introduced themselves.

Administrative Advisor Report

Ramesh Kanwar (Iowa State Univ.) continues to serve as administrative advisor to this committee. The NCR-101 project was approved for a 5-year extension. A letter indicating receipt of the renewal project was distributed to at least one person from each participating Experiment Station. An overview of the project renewal process was discussed. All three reviewers gave an “excellent” rating for each of the six categories and the group was commended.

The committee name has changed from NCR-101 to NCERA-101 (North Central Extension and Research Activity). There is a need for increased accountability for this group’s activities. Meeting minutes should be posted on the website within 60 days after the annual meeting. Without the minutes, the next meeting can not be authorized. Guidelines of minutes were discussed and copies of the guidelines (available on the NIMSS website) are to be followed. Thoughtful impact statements are highly desirable and were stressed. Impact statements should include quantifiable impacts if possible. Components of the minutes will be compiled from the individual station reports. These minutes become the annual report.

The 2007 budget was briefly discussed. A handout was distributed that discussed changes to the federal funding agencies (NASA, NRI, etc.). Numerous international competitive research funding opportunities are available. For example, there is a granting program with project teams between two countries, such as between India and the United States, and between Israel and the United States.

Dr. Kanwar made suggestions for reporting noteworthy events at universities at future meetings. This Working Group should also consider developing an endowment to support this meeting, especially to fund travel for graduate students and technicians to these meetings. An endowment could ensure that the meeting continues in the future. The funding currently available at the Experiment Stations is to support travel of Experiment Station Reps to attend NCERA-101 annual meetings.

Mark Romer (McGill Univ.) motioned that a more complete version of the minutes should be distributed to members, and a condensed format should be submitted as the official version. A third, even more condensed version should be developed to include highlights for people (e.g., Directors) that want a quick summary. Motion seconded by Don Krizek (USDA-ARS), and all approved. Ray Wheeler (Kennedy Space Center, KSC) thanked Dave Fleisher (USDA-ARS) for developing and submitting the renewal proposal.

CSREES Report

Dan Schmoldt (USDA-CSREES) summarized the 2006 and proposed 2007 budgets and how possible changes may affect this group. The 2006 budget included a 2% increase to CSREES. There were minor increases in the National Research Initiative, and the majority (60%) of the budgetary increases was congressionally earmarked for specific projects (not competitive). In contrast, most federal agencies had reduced budgets in 2006. The President’s 2007 budget request currently includes a 0.5% increase above his 2006 budget request, with increase in NRI funding to \$247.5 million (an increase of \$66 million). Much of that NRI increase will arise from it absorbing the 406 Integrated Programs portfolio.

While Formula Funds provide base funding to support many Experiment Station activities, this funding strategy is not popular with the current federal government. In real dollars, Formula Funds have decreased over the past several years and are in danger of disappearing completely. The President's 2007 Budget proposes that 30% of Hatch Formula Funds be placed into a competitive program to fund nationally focused, multi-state/multi-institutional projects. Furthermore, beginning with the 2007 fiscal year, as current multi-state projects terminate, they would not be renewed and their funds would also be placed into this competitive program (approx. another 5% of Hatch funds per year). Under this budget proposal, Hatch Funds would transition to approximately 55% competitive and 45% formula based. McIntire-Stennis Formula Funds would undergo a similar transition to a ratio of 59%:41% over the next 5 years. NCERA-101 should continue to follow events and be prepared to submit a proposal later this year to take advantage of this new competitive program for national, multi-state projects. Additionally, the committee should also consider submission of other types of proposal(s) for funding, perhaps on an annual basis. Because funding of multi-state activities currently receives only 25% of the formula funds, increasing that amount to 55% would provide more funding for regional project activities, including meetings.

In other CSREES news, beginning this calendar year, two national program leaders are being assigned to each state to serve as liaisons between the agency and the research and extension programs in each state's institutions. Initially, these liaison activities will focus on developing and reviewing each state's new, 5-year plans of work for research and extension. Most program leaders have assignments for two states.

Bruce Bugbee (Utah State Univ.) inquired about how the proposal project would be completed. Dan Schmoldt responded that proposals would be multi-state, national, and probably need approval of Experiment Station Directors, either directly or indirectly. The projected outcome is that fewer multi-state projects would exist but each of those would have much more funding. Ramesh Kanwar added that most multi-state projects are not provided with funding other than to support travel to attend the annual meeting. If this group is proactive, we have potential to compete well to receive funding for research-based projects. Dan Schmoldt believes we are well positioned to compete for dollars. Ted Tibbits (Univ. of Wisconsin) asked about whether travel funds will be available. This issue is currently being discussed, but funds could dissipate given that funding would become competitive and given to PIs and project collaborators, and not to the Experiment Stations. Travel funds may not be available next year, and this group might consider applying to NRI for a conference grant (an NRI grant was submitted and received by Chieri Kubota in 2004 to support the NCR-101 meeting in Australia). Gary Stutte (Dynamac Corp.) asked about the proposal timeline. Ramesh Kanwar replied that the project will be very similar to any other competitive grant process and will be based on science-based research, but guidelines and timelines are not clear. During meetings, the group might want to discuss possible projects and PIs and outline the proposals. Dave Fleisher suggested that we form a committee for how we might identify and develop project goals. Mark Romer added that the UK Controlled Environment Working Group (CEWG) has become a society independent of universities, companies, etc., and is not reliant on funding to continue to exist. We might want to consider a similar approach, in addition to the current system.

A committee consisting of Dave Fleisher, Cary Mitchell (Purdue Univ.), Bruce Bugbee, Peter Ling (Ohio State Univ.), Ray Wheeler, Gary Stutte, and Marc Van Iersel (Univ. of Georgia) was identified and discussions were going to ensue on how to proceed. Alex Turkewitsch (Greenhouse Engineering) made a motion to recognize the support of Ramesh Kanwar and Dan Schmoldt, who have helped make this group successful. Motion was seconded by Dave Fleisher and approved by all.

ASHS CEWG Meeting Highlights

Jonathan Frantz (USDA-ARS) is secretary and chair-elect and reported that the ASHS colloquium entitled “Photosynthesis: From Chloroplast to Ecosystem” will be held in July, 2006 in New Orleans at the annual ASHS meeting. The exact date of colloquium is unknown but should be released soon. Topics for a workshop or colloquium to be held at the 2007 meeting in Scottsdale, Arizona were discussed and could include LED lighting and energy conservation.

2005 Meeting Minutes

The minutes had been previously distributed to members via email. Desmond Mortley (Tuskegee Univ.) asked for comments or proposed amendments. None were made. Don Krizek motioned to approve minutes, seconded by Ray Wheeler, and approved by all.

Membership Report

Mark Romer gave a brief membership report. This group is in its 31st year, and currently there are 135 members from 100 institutions, with a healthy balance among phytotrons, universities, governmental institutions, and industries. See Appendix A for a complete membership list. Longstanding members and Founding Members have been recognized in the past several years. Members that have made substantial contributions and long-lasting commitments to the group deserve special recognition. Awards in 2006 are to be given later in the meeting to Royal Heins (Michigan State Univ.), Environmental Growth Chambers (EGC), and Conviron.

Website Update

Mark Romer gave an update of the NCERA-101 website, address is: <http://ncr101.montana.edu> and resides at the Univ. of Montana. The website is operated by Tracy Dougher (Univ. of Montana) and Mark Romer. Updates to the membership and other additions have been made. The Growth Chamber Handbook is now available in pdf format (courtesy Chieri Kubota) through this website. Hard copies are still available through Iowa State Univ. Press (link available on website). Don Krizek thanked Mark Romer and others for continuing to work on the website. Gary Stutte suggested that we should list the proper citation of this handbook on the website.

Instrument Package Report

Bruce Bugbee reminded participants that there are two packages available for rent: a spectroradiometer package and a quantum sensor calibration package. Rental for 2 weeks costs \$300 for one package and \$450 for both packages. The packages were rented 7 times from March 2005 to March 2006. Current balance of the instrumentation package is \$2,696. Bruce Bugbee suggested to add a new, advanced chlorophyll meter (cost of ≈\$1,200) to the spectroradiometer package (output unit is chlorophyll content index). The group decided that this meter is more suited to be available from the manufacturer as a demo since it would not be

used for calibration purposes. A sensor that measures the reflectance of a leaf canopy and connects to the spectroradiometer has been donated by Apogee Instruments and will be included in the spectroradiometer package. Chieri Kubota suggested that a humidity sensor could be purchased and used to calibrate other humidity sensors. Bruce will consider and evaluate which sensor would be appropriate. A four-way radiometer that measures short- and long-wave radiation will be made available from Bruce Bugbee and can be signed out for \$300. More information on the instrumentation package is available at the NCR-101 website. A sign-up sheet was passed around for people to check out the packages.

Awards to Attendees

Chieri Kobota reported that funding of \$2,088 was left over from the 2005 meeting. This funding was partially used to support staff members (e.g., technicians and post-docs) to participate in the 2006 meeting. \$600 was awarded to two participants (David de Villiers, Cornell Univ. and Jeffrey Akers, Rutgers Univ.), and the remaining balance will be used to support future meetings.

The meeting hosts made additional funding available from sponsorships and registration fees to subsidize the registration cost for graduate students. In addition, four graduate student posters were selected to receive awards to defray some of the travel costs to attend. The winners and poster titles were Nicole Waterland and Richard J. Gladon (Hypoxia Controlled Radicle Growth in Germinated Impatiens Seedlings); Roberto G Lopez and Erik S. Runkle (Daily Light Integral Influences Rooting and Quality of New Guinea Impatiens and Petunia Cuttings); S. Contreras, D. Tay, and M. A. Bennett (Effects of Day Length During Seed Development in Lettuce); and Noriko Takahashi and Kenji Kurata [The Cuticle-silica Double Layer Formation in the Rice (*Oryza sativa* L.) Panicle under Elevated Atmospheric Carbon Dioxide Concentration].

Other Committee Reports

There was some discussion among members for this group to consider merging with, and/or coordinating activities with, the NE-1017 Group (Developing and Integrating Components for Commercial Greenhouse Production). Some of the NE-1017 members receive funding for being participants and have expressed hesitation of merging with NCERA-101 because of possibly losing that funding. A joint meeting between these two groups was desirable among group members. Perhaps the international meeting to be coordinated in 2008 would be a good time to have the first joint meeting.

Developing Tissue Culture Guidelines

Chieri Kubota and A.J. Both informed the group that a new chair has been established in an attempt to increase efforts on developing a draft. Little progress has been made to date on this project.

Guidelines for Measuring and Reporting Environmental Parameters

A.J. Both led the discussion on the posters and pamphlets that have been developed, printed, and distributed to members. The large poster with the reporting guidelines is not being used. Contact Marc van Iersel if you are interested in presenting the poster at future meetings. Many members were sent small posters to be used at their own facilities. Letter-size drafts of the minimum guidelines are available electronically on the NCERA-101 website. Full guidelines are

available to members of the American Society of Agricultural Engineers. Guidelines can also be found in the Growth Chamber Handbook that is available in pdf format on the NCERA-101 website. A motion was made by Don Krizek (seconded by Mark Romer) to add to our website the different guidelines and summarize the resources available for the minimum and complete reporting guidelines. Motion was approved by all.

Selection of 2006-2007 Officers

Gary Stutte was suggested by the Executive Committee to be nominated as Incoming Secretary. The funding uncertainty at NASA was discussed, but several members expressed that this should not prevent Gary from being nominated and fully supported Gary's nomination. Bruce Bugbee nominated Gary Stutte as Incoming Secretary, seconded by Dick Gladdon (Iowa State Univ.) Members voted unanimously in favor of the nomination.

Site of 2007 Meeting: Tuskegee Univ.

Desmond Mortley informed us that a symposium and NASA site visit is being organized at Tuskegee in July or August, 2007 and the NCR-101 meeting was suggested to be part of this symposium. The symposium is expected to last about 4 days in total (including 1.5 days for the site visit). Ray Wheeler suggested that the business meeting could occur before the symposium and tours. Mark Romer reminded us that the information exchange portion could be excluded if time was a constraint. There are many potential conflicts with a summer meeting, and a meeting in April is preferred to ensure good attendance. A motion was made by Don Krizek to have Tuskegee Univ. host the NCERA-101 meeting. Motion was seconded by Ray Wheeler and approved by all.

Site of 2008 Meeting

Dave Fleisher led the discussion about an international meeting to be possibly held at Kennedy Space Center. Interest in this meeting was expressed by the UK CEWG for a meeting in 2008. Ray Wheeler mentioned that Florida is an appealing option for attracting participants and their families. There is uncertainty about plant research at NASA, but Ray thought that a meeting at KSC was still a good idea. A date from mid-April to early May was suggested to avoid the spring break rush. September was briefly considered but ruled out because it is in the middle of hurricane season. John Sager asked the group about a preferred location and meeting duration. Mark Romer encouraged numerous site visits to enable more UK participants to participate so that they could further justify the educational component of the meeting. Gary Stutte reiterated uncertainty of what NASA could showcase. Alex Turkewitsch reminded the group that Yoshi Kitaya from Osaka Prefecture Univ. had volunteered at the 2004 meeting in Australia to host a meeting in Japan. A draft of the technical program should be developed before the end of 2006 and submitted to the UK CEWG. A committee including members of NCERA-101, UK CEWG, and Australasian Working Group should be developed to coordinate the program. A theme should also be considered. Erik Runkle made a motion to have Kennedy Space Center host the 2008 meeting in Florida. Motion was seconded by Bruce Bugbee and approved by all. A Committee composed of Dave Fleisher, Chieri Kubota, Bruce Bugbee, Mark Romer, Desmond Mortley, Gioia Massa, and Erik Runkle will assist the hosts (Neil Yorio, Ray Wheeler, John Sager, and Gary Stutte) with organizing the program.

Sites of Future Meetings

None were formally identified. Institutions interested should nominate themselves. A meeting in the Midwest or in Japan may be desirable for 2009.

New Business

John Sager and Royal Heins suggested that the group generate a list of appropriate instrumentation, to include companies, contact information, caveats of instruments etc., for how to measure particular environmental parameters. The information could be provided on our website. Dave Fleisher emphasized that care should be taken to avoid endorsements of particular products. A motion was made by John Sager (seconded by Don Krizek) to develop a list of sensors for each of the reporting guidelines, with contact information, and be made available to all members. Bruce Bugbee volunteered to work with John Sager to generate a draft, which will not include explicit recommendations.

Updating the Growth Chamber Handbook was briefly discussed by A.J. Both. Little progress has been made to date. Chapters that need to be updated will be identified and potential revision leaders will be identified. Anyone interested in working on a particular chapter should contact A.J. Both or members of the Executive Committee.

At 12:05pm, a motion to adjourn the meeting was made by Marc van Iersel. Seconded by Don Krizek and approved by all.

Subsequent activities of the group included tours to controlled environment facilities, including:

- Greenhouses and growth chamber facilities of the OARDC
- Green Circle Growers, Oberlin, OH
- Petitti Garden Center, Strongsville, OH
- Cleveland Growers Marketing Company, Parma, OH

*Minutes submitted by Erik Runkle, Secretary
May 3, 2006*

APPENDIX A
NCERA-101 Membership Summary

April 2006

Mark Romer, *List Curator*

<u>Membership Number</u>	April 2005	130
	2006	135
• Additions		9
• Deletions.....		4
• Net Gain(Loss)		5

<u>Membership Composition</u>	<u>Institutions</u>	<u>Members</u>
• Phytotrons & Controlled Environment Facilities	14.....	17
• University Departments, Agr. Exp. Stations.....	49.....	65
• Government Organizations & Contractors	15.....	18
• Industry Representatives	22.....	31
• Independent		4
Total Number of Institutions	100	
Total Number of Members		135

New Institutions

Canada

- University of Windsor - Earth Sciences Department
- Ontario Scientific Limited

New Zealand

- HortResearch - Palmerston North Level 3 Quarantine Facility

United Kingdom

- Weiss-Gallenkamp Ltd.

USA

- Bigelow Aerospace
- Duke University Phytotron
- University of Florida - Soil and Water Science Department
- University of Florida - IFAS Brevard County Extension
- University of Illinois at Urbana-Champaign - Department of Agricultural and Biological Engineering
- Michigan State University - Plant Research Laboratory
- Texas Tech University - Plant & Soil Science Department