

Minutes of the 2015 NCERA-101 Business meeting

July 11, 2015 The Ohio State University

NCERA Meeting Participants:

Dann Adair (Conviron), George Adamson (Ontario Scientific), April Agee Carroll (Purdue Univ.), Lars Aikala (Valoya Oy), Tyler Anderson (Cornell Univ.), Wade Berry (UCLA), Mark Blonquist (Apogee Inst), A.J. Both (Rutgers Univ.), Keri Bouchard (Conviron), Dave Brault (INNO-3B), Dave Bubenheim (NASA Ames), QiuXia Chen (Mich. State Univ.), Claire Cooney (McGill Univ.), Joshua Craver (Purdue Univ.), Kristen Curlee (Dow Agrosciences), Chris Curry (Iowa State Univ.), Yurij Duda (Argus), Michael Dzakovich (Purdue Univ.), Rob Eddy (Purdue Univ.), Matt Ezzo (EGC), Bruno Faucher (EnviroSult), Toby Fitzsimmons (Univ. Arkansas), Nicholas Flax (Iowa State Univ.), Jonathan Frantz (Pioneer), Carla Garcia (Univ. Arizona), Gary Gardner (Univ. Minn.), Larry Giles (Duke Univ.), Harold Griffin (DOW Agrosciences), Jimmy Gustafsson (Heliospectra), Caitlyn Hall (Univ. Arizona), Ed Harwood (Just Greens LLC), Royal Heins (Mich. State Univ.), Bichen Hu (Ohio State Univ.), Lynn Hummel (Univ. Wisconsin-Madison), Henry Imberti (Percival Scientific), Ramesh Kanwar (Iowa State Univ.), Bjorn Karlsson (Univ. Wisconsin-Madison), Meriam Karlsson (Univ. Alaska-Fairbanks), Nick Klase (BML Horticulture), Chieri Kubota (Univ. Arizona), Wee Fong Lee (Ohio State Univ.), Joan Leonard (Ohio State Univ.), Yuan Li (Rutgers Univ.), Peter Ling (Ohio State Univ.), Tom Manning (Rutgers Univ.), Gioia Massa (NASA KSC), Jeffrey Mastin (Total Grow Lights), Lucas McCartney (McGill Univ.), Charles McGibony (EGC), William Meng (Mich. State Univ.), Steve Millett (HortAmericas), Sarah Mills (West Virginia Univ.), Cary Mitchell (Purdue Univ.), Bob Morrow (Orbitec), Bill Mukanik (Conviron), Goncal Neves (Valoya Oy), Rebecca Nordin (Heliospectra), Madeline Olberg (Purdue Univ.), Suejin Park (West Virginia Univ.), Yujin Park (Mich. State Univ.), Rob Pauls (Biochambers), Michael Petercsak (Dupont), Brian Poel (Mich. State Univ.), Reg Quiring (Conviron), Sharon Reid (Conviron), Mark Romer (McGill Univ.), Erik Runkle (Mich. State Univ.), Carole Saravitz (NCSU Phytotron), Tim Sheldor (Cornell Univ.), Ivor Smith (NRC-CNRC), Todd Smith (Duke Phytotron), Chase Snowden (Utah State Univ.), Correy Spence (Argus), Ryan Stewart (Brigham Young Univ.), Lance Stott (Utah State Univ.), Tim Strebe (Syngenta), Abhay Thosar (Philips Lighting), Ted Tibbitts (Univ. Wisconsin-Madison), Tom Timbol (Texas A&M Univ.), Viktor Tishchenko (Univ. Georgia), Alex Turkewitsch (GHEngineering), Marc van Iersel (Univ. Georgia), Sydney Wallace (Univ. Maryland), Nicole Waterland (West Virginia Univ.), Dave Wilson (Stanford Univ.), Rachelle Winnamon (Philips Lighting), Yang Yang (DOW Agrosciences), Melanie Yelton (Lumigrow), Neil Yorio (BIOS Lighting), Shuyang Zhen (Univ. Georgia).

Executive Officers:

Chair: Meriam Karlsson (Univ. Alaska-Fairbanks), Vice-Chair: Carole Saravitz (NCSU Phytotron), Secretary: Gioia Massa (NASA KSC), Past-Chair: Henry Imberti (Percival Scientific)

Meeting Background: For the 2015 meeting we met with the Association of Education and Research Greenhouse Curators (AERGC), an organization of nearly 350 members with whom we share many members. Final meeting attendance was 192 persons, including 20 students. We held a student poster competition with 17 participants, and three students were awarded prizes. Student award winners are listed as **Appendix A**. In addition, student participation was enhanced with student travel grants awarded to 10 students. Business meeting agenda is attached as **Appendix B** and Membership

Summary is attached as **Appendix C**. A full conference program is attached as **Appendix D**, while **Appendix E** lists meeting sponsors.

Meeting opened at ~10 AM with a welcome from Chair *Meriam Karlsson*.

Announcement of other meetings:

Marc Van Iersel: At the upcoming ASHS meeting in New Orleans the Growth Chambers and Controlled Environment Working Group (CEWG) will have a colloquium on Vertical Farming. Speakers include Bruce Bugbee, Ray Wheeler, and Ed Harwood from our group and then Nate Storey (a supplier) and George Carter (robotics). This will be during the ASHS meeting on Thursday morning.

Henri Imberti: Also there is the International Symposium for lighting in Horticulture- LightSym 2016- that Erik Runkle is organizing at Michigan State in May, 2016.

Chieri Kubota: I am teaching an online non-credit professional course of greenhouse plant physiology and technology starting in August.

Announcement to please sign in the attendance sheets.

Administrative Advisor Report from Ramesh Kanwar:

Good Morning and welcome. This is the longest living committee. I might be one of your longest living advisors too. I have really cherished this group and look forward to this meeting. Thank you for keeping this committee going. Good things happen here, it's great to see all of you and it is nice to see the new facilities.

Reminders:

1. The annual report should be on the NAMS website by Sept. 9th – 60 days from today. Make sure you have highlighted impacts, accomplishments, and the attendance to these meetings which is itself an impact and an accomplishment. With other NCR committee meetings if they get to 20 people it is considered very good. Highlight those things – e.g. technology transfer, industry participation, participation by other countries, continuation of having founding members present. Also, we need to nominate this committee for the NCRs director's award and Ted has agreed to put it together.
2. For the Australian meeting we need to look at the possibilities for grants and funding to help people attend this meeting. We can explore the NIFA program directors and speak with Dan Shultz. Cherie and I can maybe work on this. There is the potential to write a 20-25K proposal to NSF with the reason for the international conference being for information exchange to take place. We need to include 2 page CVs for each person and should be able to obtain approximately 2.5 K per person and take 10 members.
3. Renewal – Our 5-year project tenure will finish September 30, 2016. The committee has responsibility to submit the request for renewal. We can at that time change the title, name and number of the project, but Ramesh recommends keeping it the same to maintain our legacy. We have that privilege.

Deadlines:

- Annual report is due September 9th

- First step in renewal due Sept. 15th – this entails that you complete a form on NIMS that we will request renewal. Ramesh can help with online submittal since NIMS has been giving difficulty.
- October 15th – we need to upload only the objectives
- November 15th – member's reports need to be in – These are from members of the committee via the experiment station directors. You have to reappoint yourself. Members can change but most directors would like to keep the same members. The Appendix E form needs to be completed to tell the percentage of time that you are committing to this project.
- December 1st – Completely rewrite the project and goals for 5 years. Add to the members and objectives.
- December 15th – Review panel and department heads and experiment station directors will review the project. This will be complete by March or April. Will be approved if no changes are required.
- If changes are needed the committee will be notified. Revised proposals are due June 1st.
- July 15th – The committee will get final notification that it is renewed for the next 5 years.
- September 30th – Current project ends.
- October 1st, 2016 – New 5-year charter begins.

Henri Imberti: What about industry?

For renewal, industry, government, and foreign members don't need to do much, but you are free to volunteer if you want to be part of the writing. This is a responsibility for those members who are part of agriculture experiment stations. But you are part of the team. This is a national committee and they are very well aware of our accomplishments.

Jonathan Frantz: Have you selected somebody to lead the writing?

Meriam Karlsson: We are going to talk about that at the very end. It is the last item on the agenda.

Jonathan Frantz: I was going to volunteer to give what I wrote last time to whoever is doing this.

Meriam Karlsson: That's what we want.

Ramesh Kanwar: The people who wrote last time can be a very big help for the new committee. But that is my least worry. This group works as a good team.

4. A couple of other things: Please have a discussion regarding the Australian meeting – could come as part of this project, or of the next project. Because of the transition year you need to be a little bit careful.

Mark Romer: Does the approval affect people getting support from the Ag. Experiment stations if they don't know about the project approval yet to attend the September 2016 Australia meeting? If we put it in as a future project. Meeting is in September.

Ramesh Kanwar: We shouldn't have to worry about it because we should have approval by March or definitely by July 15th. But try to see if you can obtain as much funding as possible for the Australia meeting. The experiment station directors don't always fund travel or at most will fund maximum

\$1000 per person to attend a meeting and that barely covers expenses. I was looking at tickets and in September you should be able to get them for <\$1500 from any part of the US to Australia.

5. I don't think NIFA has anyone to share some of the granting opportunities. So here are some. How many are receiving funding from USAID program "Feed the Future"? How many know about? Food security issues are dominating all of us and there are some programs in Washington DC. How to feed 9 billion people in 2050 – and "Feed the future" was initiated by USAID who have started 12 university labs each funded \$25-50 Million - labs are running projects that average in size \$1-2 Million. Labs are running projects. Most are on intensification of food production systems – plants, animals, aquaculture. These labs will make announcements of opportunity from time to time. Will fund 8-10 projects. A tie in to greenhouse industry and controlled environments may be a big role. Nutritional security is another part. Gender equity is there. Think seriously and form the teams and compete for some of these grants. Canadian international development agency, CIDA, is also trying to partner. So if some of you can say that you will compete in the US and CIDA wants to become a partner, and another foundation will come, it could strengthen the proposal. Initially submit concept – then within 2 weeks they review and come back to invite for full development – they may select ~50% of these. I don't know if this group has made an effort, but I also advise: NCR-270 – water quality – and that group has received funding twice – \$5 million – 8 states are partners – Purdue is leading one. So look into some of those possibilities also. When you come to the meeting set aside time to form a group and see if you can look at some of those possibilities.

If no questions, I wish you the very best!

Meriam Karlsson: Thank you for all your support Ramesh.

NIFA report: No one attending or reporting.

Approval of minutes from last year's meeting: *Carole Saravitz:* Does anyone have any corrections or additions?

Mark Romer: Motion to Approve

Henri Imberti: Second

Minutes approved unanimously.

Membership Report by Mark Romer:

Standard form produced every year for the minutes. We continue to grow. We lose a few members and gain a few members every year. We are at 171 members from 118 institutions and represent 35 states and 11 countries. We have particularly diversified in the industry sector and have attracted biotech companies and the extending LED manufacturers recently. We have some new institutions, which in some cases is due to people migrating. Gained a few from several countries. We have a very loyal following with long attendance by some members. I want to highlight the reappearance of founding fathers, at this meeting Ted Tibbitts and Wade Berry. Ted himself has attended 34 meetings which is a record that will be hard to beat! We have a few other members who are almost founding fathers: Cary Mitchell continues to come. Royal Heins came all the way from Colorado. It is great to have that

multigenerational participation in this group. I keep learning things about people when they were students. So, that's all for membership, but I want to extend a very, very big thank you for the strong support given this year by all our industry members. We had a very good level of support, and as Jonathan will mention, that support has been channeled to a secondary purpose this year to allow the students to increase participation and to add a new dimension to how we exchange information and how we form the members of the future. Students will be professors, managers, and industry members in the future, because it has all happened before in this room. Here we are all equal and enjoying the wisdom of each other. To students – we like your opinions, comments and enthusiasm – thanks for being here with us.

Note: Membership Summary is attached as Appendix C.

Meriam Karlsson: Thank you Mark again for keeping track of us and thanks for reminding us of all the deadlines.

Website report by Carole Saravitz:

Our website can be found at controlledenvironments.org, ncera101.org and ncr101.org

I revamped it a bit format-wise to fit better on computer screens and we can still do some changes to it. We are trying things at NCSU on Wordpress, and it has a professional look so maybe I will try that and show it at the next meeting. Either way NCSU will continue to host the site without advertisements.

At the last meeting someone suggested to look at google analytics and I gave it a try and tested this with our site. It was kind of interesting. Data are snapshot of July 1, 2014 -July 1, 2015.

- We had 4600 visits last year. We have 50% of our hits from the US, 8% from Canada, and another 2-3% from different places, Taiwan, China, the UK, Russia, Germany, India and Japan.
- How are people finding us? About half are directly typing the address in, another 26% are searching, 25% are as a referral from the meeting site and only 0.13% from social media sites. Not sure who the social media visitors are.
- How are people visiting? 94% from desktop, 4% from mobile devices, 1.6% from tablets.
- Our bounce rate is ~63%. *Marc van Iersel:* What is this? *Carole Saravitz:* This is how many come and look at one page and then leave. 50% is the internet average so this is our beginning for taking this kind of data and we can think of what we can do to improve that.
- Where people are going on our site and what pages are viewed?
 - Home page – approximately 50% and this is the default
 - Meetings – 14% - this is mainly us looking at the next meeting.
 - Publications – 7.8% - indicates that updating the publication page is a good idea – send Carole references or links to add. This shows that we really do serve as a place for information for controlled environments.
 - Guidelines – 8%

In addition to sending publication links also send positions and she will be happy to post these. People are looking there but it doesn't have anything right now.

The data generated can allow you to visualize the flow of how people enter and navigate. We want to increasingly put in a format that people want to visit. Carole is always open to suggestions. Any comments or questions?

Mark Romer: Do you get any feedback on web issues?

Carole Saravitz: Mostly mistakes or changes in member pages, so please check your member page and links. Can send any comments to Mark also – he updates in his files too.

Ted Tibbitts: Do you want retired members listed?

Mark Romer: As long as they are members – you are a member!

Ted Tibbitts: Once on do you stay on?

Mark Romer: Yes, unless you ask to be dropped or unless you never came to a meeting. But there is no formal process for taking people off.

Carole Saravitz: One thing about Wordpress – I could give permissions for a private file for a group to work on and have a private spot or if someone wants to do work on a particular page. You do this one the web and don't need software. So this is a possibility for next year.

Mark Romer: There may be useful applications for that.

Gioia Massa: Is there a way to add pictures and captions?

Carole Saravitz: Yes and I did this for the meeting last year. Wordpress makes this even easier for all formats to see it. This might be a good way to make the site more appealing.

Mark Romer: It's a function of your time really. It is nice to snazz it up, but just the updates that you do on the membership side and that is already work.

Carole Saravitz: Right now I have a much more savvy computer group on my staff.

Mark Romer: Also we have a budget for student help. If it comes up, there are students that you could get that wouldn't involve lots of your time, just oversight.

Carole Saravitz: Yes, and that would be great.

Chieri Kubota: I used the growth chamber handbook for teaching and we noticed a couple of errors and want to correct these. Could we communicate with the authors and then stick a note on the original PDF or something similar?

Carole Saravitz: Yes and I would be happy to do that. It's definitely a useful item.

Ted Tibbitts: Many of those authors will be hard to find. Maybe just make corrections in parenthesis in the handbook?

Mark Romer: I think we can institute a highlight in the PDF. A person could click the highlight and see a page which says "Committee has reviewed and would like to bring your attention to this new information....."

George Adamson: Do you have to communicate with the authors and get permission?

Mark Romer: If we can.

Alex Turkewitsch: We own the document and have rights to it.

Alex Turkewitsch: How about a rewrite of it with changes you are suggesting and then issue as an "After Kreizek...." as new documents? Issue it as a rewrite

Carole Saravitz: So it would be a new document. People have asked for a newer version of the growth chamber manual. It wouldn't be a bad idea to rewrite.

Alex Turkewitsch: If it is just a couple of errors, just connect "Corrected by Chieri after e.g. Tibbitts"

Mark Romer: It would be a valuable session to have a bigger group go through and recognize what needs to be changed.

Ted Tibbitts: That's going to be a big job.

Mar Romer: It could be done as a discussion. Have a session and go through what needs to be talked about. How to respond would be a separate question and would need to be prioritized. It would be a very fun discussion.

Carole Saravitz: Correct it in pieces. Do a quick update and proceed with a longer update.

Mark Romer: Having a discussion session would be a good starting point.

Carole Saravitz: I think people are looking for more recent information. They contact me. Other questions or suggestions?

Henri Imberti: I was looking for Ted's email address on the website and I can't find it.

Mark Romer: We only list one member per institution who agrees to be on the list. You have to go to the Wisconsin member and direct it through them if you are a non-member and want to talk to Ted. Everyone gets the membership list but that is only for members.

Henri Imberti: People who read the book may want to contact the authors. Wondering if there was an easy way to find them.

AJ Both: Do you want to remind people about the station reports.

Carole Saravitz: Station reports – please send them. Annual report is due in 60 days.

Gioia Massa: Please send a PDF to Carole and a word version to me if at all possible.

Meriam Karlsson: Thank you Carole for website management, the update, and thank NCSU for hosting.

Student Poster Competition Updates from Jonathan Frantz:

In our last Ohio conference we brought back targeted support for graduate students. Ever since then we have had an effort to have a competition or meeting support for students. For the first several years Bruce gave contributions and now Pioneer is supporting. This year we expanded for the first time to travel awards. We had additional sponsors this year – generous contributions from several industry partners. That money went to the USU account and not the host account used to support the meeting. We made guidelines – those requests for applications went out several months before the meeting.

Students needed to write an abstract and a budget. Once these were received we were not sure how to distribute the funds. There were several options: choose a few and fund a few fully, same set dollar amount for everyone, or set the same percentage for everyone and fund more, and the last is what we did.

Were able to fund about half the requested dollar amount. The students wrote a budget and then made their budget stretch. We learned along the way that because the sponsors contributed dollars to USU, the students had to supply their personal information to USU and the money was taxed. Bruce fought to avoid this but was unsuccessful, so this is our precedent.

Alex Turkewitsch: We have had a similar situation at AERGC – to get around we direct the sponsor funds directly to the travel grant recipients, but it takes more organization.

Jonathan Frantz: This depends on the sponsor – Pioneer would have to hire them to fund directly, whereas now they are donating to a university.

George Adamson: If you send an invoice then you can write a check and you get a receipt.

Jonathan Frantz: In spite of this we were successful this year – we supported 10 students who were automatically entered into the poster competition. On top of the travel awards had the regular poster competition. Had 17 total applications for that this year when the most before was 6. This year it felt like a genuine competition. We did have three awards and all of those award monies came for the USU surplus. Travel awards were from this years' contribution. The average amount received was ~\$500.

Now we are at the point where we have a lot of different kinds of support for students:

- Reduced registration cost (has also been the case for previous years).
- Competition award support
- Travel support

Looking ahead: in future will we do international travel support?

I am less keen on an international poster competition but more keen on having a rapid fire oral competition perhaps? We now have an awareness of how to give out the checks. Maybe we should not always do posters – 17 is a lot and a lot of people don't get to see them all. So maybe if we have greater than 10 participants we would do it more like a station report presentation. That's my report. Any suggestions?

Marc van Iersel: I appreciate all of the work that you have done for this. Since we have a lot of new students we should have introductions of graduate students in the room.

Students introduced themselves and it was noted that we are up to 5 generations in the group.

Chieri Kubota: Shall we introduce ourselves?

Mark Romer: I am worried about time. This is not a typical year. In most years we would have posters up longer for more time and have an official session. It was hard to accommodate that this year and we didn't realize the volume. We apologize for that but hope to go back to standard model in 2017.

Bryan Wolf: was the larger volume of posters due to the meeting location?

Jonathan Frantz: I think it was because we supported some travel. Only two were from Ohio State.

Caitlynn Hall: From a student point of view a rapid fire presentation would be really effective and good to practice. This would be very beneficial since we don't do that many presentations as students. We would like the feedback.

Henri Imberti: Can the posters be posted on the website so we have more time to digest them?

Jonathan Frantz: That's a good idea. We will certainly post the abstracts and will see about posting the posters.

Peter Ling: Rapid fire presentations are good since you can get information very quickly but I think it takes out the interaction.

Marc van Iersel: We could still have that with the interaction after at the breaks. It's basically a station reports. The one think I really miss at this meeting was the station reports because it is the one thing that gets everyone talking to each other.

Gary Gardner: For the Australia meeting I think we need at least an hour of general presentation and a day for posters to be left up.

Jonathan Frantz: We will get to the Australia planning soon.

Budget Update

Meriam Karlsson: Thank you Jonathan for that information. Bruce Bugbee usually comes to these meetings and usually talks about the instrument package managed by Utah State University. Unfortunately he could not be here. He said that there wasn't much happening with the instrument package anyway. We tried to get an update on the budget but haven't heard anything yet.

What I do know about the budget is that last year we had \$24,661 in April of 2014 and after the Alaska meeting we added \$5,725. A few costs went out but we have between \$25,000-\$30,000 in the account.

Note: later note from Bruce indicated that the current account balance is \$28,661. This includes a surplus from the Alaska meeting, a \$2500 contribution from Pioneer, and expenses of \$2840 in awards to students.

Upcoming Meetings

Meriam Karlsson: We now want to talk about the upcoming meetings. Mark has been leading the Australia meeting discussion for our group.

Mark Romer: Future meeting – Slides from Tony Agostino. There were two committees – one doing speakers and one doing funding but now those have merged. First I want to finish about this meeting.

Mark Romer: I want the minutes to recognize a thank you to Peter and Joan for organizing the biggest meeting we have ever had and a very complicated meeting with two societies with different meeting profiles. Some of the little issues that we were not able to resolve are just a result of trying this experimental union of two groups. But we should emphasize that there were several positive aspects. Thanks to the organizers – it is huge amount of work when you have 200+ people – so thank you Peter and Joan!

For the 2016 Australian meeting

The 5th International Controlled Environment Conference will be 18-23 of September, 2016. Originally it was just the three groups (ours, UK and Australian CE) but due to circumstances at CSIRO and Tony Agostino who has agreed to host, it was decided to combine with a Phenomics component.

Australia does have a gathering of phenomics folks every few years and there is a strong CE component. It was felt that this would be a suitable time to combine the two. The site is in Canberra, the Australian capital. There will be a mixer and registration on the 18th at the Discovery Center. The program is under development. We had a meeting on Wednesday to discuss the 2016 speakers and meeting agenda. A current potential list of topics is:

- Developments in CE
- Phenomics Imaging Technologies
- Phenomics Data Management
- CE Automation
- Research in CEs and Phenomics
- Light, Temperature, Humidity
- New CEs and Phenomics Facilities
- Vertical Farming: The nexus between CEs, Automation and Phenomics Technologies

Our goal is to have speakers from all three continents or more, to have diverse representation. It has been noted and I will push for a poster session – many people need to be participating to justify their travel. Some element of student participation might be realistic but may want to do a head count early to see if there are any real possibilities given funding situations. In Canberra we will tour the world's oldest phytotron (>50 years old). This has been fully renovated to the Australian Phenomics Facility. There are also facilities at the Australian National University (ANU) including LED technologies and other growth chamber and greenhouse-related research. There will be an overnight trip out of town to Charles Stuart University to see their new facilities. We will return to Canberra the next day at the end of the day. Dennis Grier, for many years involved in New Zealand, is now a professor of Enology there and their controlled environment specialist. He is organizing that part. We may organize a weekend before or after on the coast where the ANU has a field station, with accommodations, and we could do other aspects of discussion there. I hope that many people will be able to come. The funding is a challenge but it should be well worth the effort. We may be making an early call to sponsors so that we can budget appropriately. Late donations lead to our surplus. Early ones can allow us to set the lowest possible registration. Any questions?

Cary Mitchell: International travel is very expensive. Station support could be limited. Most universities do award international travel grants- these typically are around \$1000, but you have to have an invitation letter and a role/responsibility. If this can be arranged 6-8 months in advance it can help people raise funds to get there.

Mark Romer: I don't see a problem with that. Certain people fall into topic categories, but others may not fit into the program slate. The poster angle is another way to go.

Marc van Iersel: We can write a letter and Tony can put it on his letterhead and sign and send back.

Mark Romer: Someone in the system should find out what kind of letter is needed.

Chieri Kubota: One of the conferences we organized had online access. It was a reduced cost but actually money making. Many people wanted to get that information access. This is a good way to reduce registration fee across physical participants.

Mark Romer: Aren't you worried people will then stay home?

Chieri Kubota: A conference is a great way to interact and participate. People will go if there is funding available.

Mark Romer: Or at least have a post-proceedings, even if it is just informal.

Gioia Massa, Dave Bubenheim: If it is available online and you work for the government you cannot attend.

Chieri Kubota: You could offer it selectively for only some sessions.

Mark Romer: I don't want to offer that right now and possibly restrict participation.

Marc van Iersel: You could reach a different audience.

Alex Turkevitsch: You could offer video post-sessions to get around the restrictions.

Jonathan Frantz: Have you talked about how the meeting support might be done where maybe the travel support is independent from the meeting sponsorship or are they one and the same.

Mark Romer: I haven't talked about it but our focus has been that we would get funds and help our group get there. Usually it is your group's responsibility to get your numbers there. Tony had mentioned trying to get support to attract a good non-member keynote speaker. Looking at sponsorship possibly to cover some of that. It will depend on the level of support we can garner from all our sponsors.

Peter Ling: The biggest value for me is the interaction but some people just want the information. Recording powerpoint and voices is pretty straightforward with software.

Mark Romer: Is there a cost factor we should discuss? A form of income for the conference? If you are charging for people to see it, it gets complicated. The Australian group is not nearly as cohesive as ours.

Peter Ling: Technically we can do that.

Mark Romer: Then you also have the authors – you will need their permission. And they may deserve remuneration if you are charging for their work. If you are charging for people to see it, it gets complicated. The Australian group is not nearly as cohesive as ours.

Carole Saravitz: Then that's a good reason to have the phenomics group there. Lots of good interaction at NCSU meeting with international phenomics folks and it turned out really well.

Mark Romer: It has been mentioned that the agenda looks kind of long. We need interaction time apart from formal talking. We need to insert tours and informal interaction within program.

Jonathan Frantz: For the tentative agenda are you looking for suggestions on format? Maybe a larger block of time for shorter talks?

Mark Romer: These are points that I have taken note of and we will bring them forward. I welcome anyone's comments by email but we are not the organizers.

Future meetings

Meriam Karlsson: For 2017 we put out feelers and have an offer from California. Melanie Yelton from Lumigrow is one of them and Dave Bubenheim from Ames Research Center has indicated that he may help out. UC Davis may also get involved.

Mark Romer: We will leave this as under discussion but we are hoping to head to California in the spring of 2017 for a conventional meeting. We have no more info at this point.

Meriam Karlsson: Then in 2018 we have an offer from NCSU/Duke (with Syngenta).

Carole Saravitz: This will be the 50th anniversary of the Duke and NCSU phytotron. We think it would be nice to have a festive event. Duke is willing to help and also Matthew at Syngenta has said he is willing. For us it will be a traditional meeting. We will figure out if we want to have it in Research Triangle Park – where there are many companies, versus downtown Raleigh where there are restaurants and nightlife. I have started looking into Raleigh, but I will make sure it works for Syngenta. The downtown is booming. I will look to pick a date and get price different times. Carole will try to get all the folks available for history. If you have suggestions let me know.

Melanie Yelton: I just want to mention that for the 2017 California meeting we might want to consider Asilomar state park as the meeting location and then visit different sites like Syngenta, Monsanto, NASA. Email me if you have ideas and we are happy to brainstorm.

Greg Short: For the 2017 meeting I would like to put in a vote for TED-like short talks.

Mark Romer: In conventional meetings we don't organize talks – we have enough people want to talk and that fills up all available time. We might try to figure out who wants to talk ahead of time and pick themes a bit in advance in the future so we are not jumping topics around so much.

Marc van Iersel: I like the fact they jump around, because some topics are more interesting than others. So this makes things more interesting.

George Adamson: Randomness of it works – it prevents falling asleep.

Mark Romer: I take back my suggestion.

Meriam Karlsson: For 2019 and beyond we have heard from Nicole Waterland (UWV), Chris Curry (Iowa State) and Erik Runkle (Michigan State) as backup. Any others who are interested please let us know and keep suggestions coming.

Meriam Karlsson: Next topic: election of a new secretary.

The nomination from your executives is Bob Morrow from ORBITEC. Any other nominations from the floor?

No other nominations are provided.

Mark Romer: I put a motion on the floor to accept Bob Morrow as Secretary for next year.

Jonathan Frantz: Second

All in favor – all unanimously vote aye.

Congratulations Bob!

Other Business

Meriam Karlsson: Ramesh already went over the deadlines for renewal. The September 15th first step is already done and we have permission to move forward. The objectives section is next and we will try to do that pretty quickly. After that you should get information to fill out Appendix E from the experiment stations. Please do these soon after you are notified. We will make sure we send out a reminder when that happens through Mark.

Mark Romer: Also we should send a note about station reports and timelines after this meeting with successive reminders targeted.

Meriam Karlsson: The station reports are really important because we don't have that much time before the annual report is due. As to the proposal and for the renewal we don't anticipate large changes in our goals and objectives. Information exchange in all forms is our main purpose. Unless there is consensus here that we should go in a different direction, so are there any suggestions? Since there are none, your executive committee started working on this and will take the lead. If anyone else wants to help please volunteer. We have the previous proposal from 5 years ago and will use it as our guideline. But we are open for suggestions and assistance.

Meriam Karlsson: So that leads us to the end here. Thanks to Mark and to Henri. Thank you to the membership. I now turn the role of chair over to Carole.

Carole Saravitz: Thanks Meriam. Are there any more questions or discussions?

Marc van Iersel: I move to adjourn.

Peter Ling: Second.

Motion passes, Meeting adjourned at 12:01 PM.

Minutes respectfully submitted by Gioia Massa.

Appendix A: Student Poster Competition Winners

1st place was Bizhen Hu from Ohio State (\$350)

2nd place was Toby Fitzsimmons from the University of Arkansas (\$250)

3rd place was Madeline Olberg from Purdue University (\$150)

Appendix B: NCERA-101 Business Meeting Agenda

Columbus, Ohio, July 11, 2015

- Announcements of Other Upcoming Relevant Conferences (membership)
- Administrative Advisor's Report (Kanwar)
- NIFA Representative Report (TBD)
- Approval of Minutes from 2014 (Saravitz)
- Membership Report (Romer)
- Website Report (Saravitz)
- Student Poster Competition & Travel Awards (Frantz)
- Financial Update and Funding of Students (Bugbee)
- Future Meetings:
 - 2016 – Australia (report from Tony Agostino and Mark Romer)
 - 2017 – California
 - 2018 – NCSU and Syngenta (Carole Saravitz, Matthieu de Carbonnel)
 - 2019 and beyond – offers from Nicole Waterland, West Virginia; Chris Curry, Iowa State; Erik Runkle, Michigan State
- Election of New Secretary
- New Business

Application for Renewal of NCERA101 in 2016

September 15, 2015: Request to write proposal by uploading Issues and Justification in NIMSS.

October 15, 2015: The Objectives section is due in NIMSS. The NCRA office will send out a national request for participation when completed.

November 15, 2015: All participating Experiment Stations should have submitted completed Appendix E forms to NIMSS.

December 1, 2015: Completed proposal due in NIMSS.

June 1, 2016: All proposal revisions must be completed in NIMSS.

September 30, 2016: Old project expires.

October 1, 2016: New project begins.

Appendix C: NCERA-101 Membership Summary May 2015

Mark Romer, *List Curator*

Membership Number March 2014 167

March 2015 171

- Additions..... 12
- Deletions..... 8
- Net Gain(Loss) 4

Membership Composition

Members

- Phytotrons & Controlled Environment Facilities 12.....18
- University Departments, Agr. Exp. Stations 56.....79
- Government Organizations &
Contractors 12.....13
- Industry Representatives 38.....61

Total Number of Institutions / Members 118.....171

Total Number of Countries 11

Total Number of US States.....35

New Institutions in 2014-5 :

- CANADA
Cantera Systems Ltd.
- FINLAND
Valoya Oy
- MEXICO
Universidad Autonoma de Chihuahua - Facultad de Zootecnia y Ecologia

- USA
 - Purdue University – Department of Agriculture Administration
 - The Ohio State University - Department of Molecular Genetics
 - NASA Kennedy Space Center - Exploration Research and Technology
 - BIOS Lighting, LLC
 - BML Horticulture

Appendix D: Conference Program



2015 AERGC/NCERA-101 JAM Agenda

Wednesday, July 08, 2015

4:00 pm – 7:00pm	Registration, Blackwell Lobby	
4:00 pm – 6:00pm	AERGC Executive Meeting Knowlton Hall Lobby NCERA 2016 Meeting Planning Knowlton Hall Lobby	Informal Tours Ag Campus Greenhouses Take CLS to Ag Campus stop or walk to Howlett Hall Tours start every half hour (Howlett GH (Horticulture and Crop Science), Howlett Green Roof, Ornamental Plant Germplasm Center, Kottman GH (Plant Pathology))
6:15 pm – 9:00 pm	Welcome Reception, Sponsor Meet & Greet Blackwell Patio	

Thursday, July 09, 2015

7:30 am – 9:00 am	Registration, Blackwell Lobby
7:15 am – 8:15 am	Breakfast, Blackwell Ballroom
7:45 am – 8:00 am	Sponsor Roll Call, Blackwell Ballroom
8:00am – 9:00 am	Sponsor Roundtable, Blackwell Ballroom
9:00 am - 9:30 am	Travel to Center for Applied Plant Sciences (CAPS) Take CLS & Shuttles to Bevis Hall Poster Session open in 100 BioTech Support Facility (BSF)

9:30 am – 3:00 pm	Demonstrations and Tours, CAPS							
9:30 am – 11:30 am	Group A	Group B	Group C	Group D	Group E	Group F	Group G	Group H
9:30 - 9:55 am	ABRC	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100
10:00 – 10:25 am	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100	ABRC
10:30 - 10:55 am	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100	ABRC	TML RH 205
11:00 – 11:25 am	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100	ABRC	TML RH 205	Trellis Demo RH 102
11:30 am – 12:45 pm	Lunch, Beekman Park							
1:00 pm – 3:00 pm	Group A	Group B	Group C	Group D	Group E	Group F	Group G	Group H
1:00 – 1:25 pm	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100	ABRC	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6
1:30 – 1:55 pm	Demo 3 BSF 122	Demo 4 BSF 124	Poster Session BSF 100	ABRC	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114
2:00 – 2:25 pm	Demo 4 BSF 124	Poster Session BSF 100	ABRC	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122
2:30 – 3:00 pm	Poster session BSF 100	ABRC	TML RH 205	Trellis Demo RH 102	Demo 1 BSF Chamber #6	Demo 2 BSF 114	Demo 3 BSF 122	Demo 4 BSF 124

Demo 1: Spectroradiometer: Jimmy & Rebecca Gustafsson, Heliospectra, Rachelle Winingham, Phillips
Demo 2: Air Movement: Sylvia Courney, CGS, James Kleinke, Shaefer Fans
Demo 3: Measurement of surface reflectance for diagnosing plant health: Mark Blomquist, Apogee
Demo 4: Soil/ Root Zone Measurements: Corey Spence, Argus
Poster session (break snacks): NCERA-101 grad students
Trellis Demo- Greenhouse Management Software: Joan Leonard, OSU
ABRC (Arabidopsis Biological Resource Center) Tour: Chris Calhoun and Diana Shin, ABRC
TML (Targeted Metabolomics Lab) Tour: Christophe Cocouron and Donnalyn Roxey, CAPS

3:00pm - 3:30 pm	Travel to Main Campus CLN and CLS buses to St. John Arena, walk to Stadium Rotunda
3:45 pm – 4:45 pm	Zero Waste Tour of Ohio Stadium Tony Guillund, Energy Services and Sustainability, The Ohio State University
6:00 pm – 7:00 pm	Ohio Wine & Beer Tasting, Blackwell Ballroom
7:00 pm – 8:00 pm	Dinner, Blackwell Ballroom
8:00 pm – 9:00 pm	Anniversary Presentations , Blackwell Ballroom Ted Tibbitts & Mark Romer, NCERA-101 40 th Anniversary Jennifer Simek, AERGC 30 th Anniversary
9:00 pm – 11:00 pm	Mix & Mingle, Blackwell Ballroom

Friday, July 10, 2015

7:00am – 7:45 am	Breakfast 2 Go, Blackwell Lobby Board buses at 7:30 AM -Departure at 7:45 AM
7:45am – 9:30 am	Travel to Wooster
9:40 am – 10:00 am	OARDC Welcome Remarks Dr. Steven Slack, OARDC Director OARDC Tours Introduction
9:30 – 12:00 pm	Tours

	Group A/B	Group C/D		Group E/F	Group G/H
10:00 am – 10:30 am	Gourley GH Tour	Gourley GH Tour	10:00 – 10:20 am	PAAR, Ag Eng Tour	Ag Eng, PAAR Tour
10:30am – 11:10 am	Williams GH Tour stop 1 Williams GH Tour stop 2	Williams GH Tour stop 1 Williams GH Tour stop 2	10:20 – 10:40 am	Gourley GH Tour	Gourley GH Tour
11:10 am – 11:50 am	PAAR, Ag Eng Tour	Ag Eng/PAAR Tour	10:45 – 11:50 am	Williams GH Tour stop 1 Williams GH Tour stop 2	Williams GH Tour stop 1 Williams GH Tour stop 2
11:50 am - -12:00 pm	Bus to Secrest Arboretum			Bus to Secrest Arboretum	
12:00 pm – 12:30 pm	Lunch			Secrest Tour 1	Secrest Tour 2
12:40pm – 1:20pm	Secrest Tour 1	Secrest Tour 2		Lunch	
1:20pm – 1:30 pm	Return to Shisler Center				
1:30 pm – 2:00 pm	OARDC: From Tornado to Tomorrow Michelle Jones and Brian Hanna, The Ohio State University				
2:00 pm – 2:30 pm	Plant and Animal Agrosecurity Research Facility Juliette Hanson, The Ohio State University				
2:30 pm – 3:00 pm	Horticultural Lighting Standards Erik Runkle, Michigan State University				
3:00 pm – 3:15 pm	AERGC Travel Grant Presentation: Atop a Residence Hall: A Tale of Two Years Operational Thomas Bryan, University of Wisconsin-Madison				
3:15 pm – 3:30 pm	AERGC Travel Grant Presentation: Institute of Agriculture at University of Tennessee Lori Osburn, University of Tennessee				
3:30 pm – 3:45 pm	Afternoon Break				
3:45pm – 4:15 pm	Moisture Sensing & Irrigation Controls Mark van Iersel, University of Georgia				
4:15 pm – 4:45 pm	LED Lighting Research Cary Mitchell/SRCILED, Purdue University				
4:45pm – 5:15 pm	Sustainable Approaches to Greenhouse Heating Jim Kramer, Delta T Solutions				
5:15 pm - 6:15 pm	Happy Hour				

6:15 pm - 8:00pm	Dinner, Shisler Center Entertainment, Ohio Light Opera
8:00pm - 9:30 pm	Travel to Columbus

Saturday, July 11, 2015

7:30 am – 4:00 pm	
7:15 am – 8:00 am	Breakfast, Blackwell
8:00 am – 8:30 am	Reporting Guidelines for Greenhouse Experimentation A.J. Both, Rutgers University
8:30 am – 9:00 am	Small-to-Large Scale Imaging Technologies for Your Growth Facility Kevin Reilly, Donald Danforth Plant Science Center
9:00 – 9:30 am	Energy Grant Opportunities Dan Kuipers, BioTherm
9:30 am- 10:00 am	Travel to Bio Sci Greenhouse
10:00 am- 11:30 am	Tour Bio Sci Greenhouse, Insectary & AERGC Plant Swap
11:30 am-12:30 pm	Lunch, Jennings Courtyard
12:30 pm – 1:30 pm	AERGC Business Meeting, 001 Jennings Hall
1:30 pm -1:40 pm	AERGC Travel Grant Presentation: NAIT Boreal Research Institute and Plant and Seed Solutions to Reclamation Challenges Jean-Marie Sboze, NAIT Boreal Research Institute
1:45 pm – 2:00 pm	AERGC Travel Grant Presentations: TBA Steven Meyer, Lincoln Park & Garfield Park Conservatories, Chicago
2:00 pm – 2:30 pm	NASA Veggie Habitat Gioia Massa, Kennedy Space Center

2:30 pm – 2:45 pm	AERGC Travel Grant Presentation: Managing the Mundane Clinton Morse, University of Connecticut
2:45 pm – 3:00 pm	AERGC Travel Grant Presentation: The Indoor Feedstocks Plant Growth System at the Joint BioEnergy Institute (JBEI) Mi Yeon Lee, JBEI
3:00 pm – 3:30 pm	Greenhouse Energy Audits: Evaluating Sustainability Practices and Measures for Research and Education Greenhouse Facilities Bruno Faucher, EnviroSult and Alex Turkewitsch, Greenhouse Engineering
3:30 pm – 3:45 pm	Final Comments/Adjourn, 001 Jennings Hall
3:45 pm – 4:00 pm	Plant Swap pick up, Bio Sci Greenhouse

Appendix E: NCERA-101 2015 Sponsors



THANK YOU

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NCR-101
Committee on Controlled Environment Technology and Use

2015 Annual Meeting Sponsors!



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