T-CAP Education

Overview of TCAP Education

By Mary Brakke and Jamie Sherman

A major contribution of TCAP will be the education and training of 29 doctoral students in plant breeding. In addition, TCAP will develop innovative approaches that will strengthen graduate education beyond the life of this project and increase the number and diversity of undergraduate students who pursue graduate study in plant breeding.

Planned activities for graduate education address the need for:

- enhanced modes of distributed expertise to build foundational knowledge in a wide range of breeding strategies and research methods,
- active learning strategies that strengthen critical thinking and problem solving skills through application of knowledge
- networks by which students develop collaborative interactions and acquire insights that facilitate transition to the workplace

Planned activities for undergraduate education will address the need for:

- curriculum and recruitment materials that help students apply biological principles to plant breeding problems and become aware of careers in plant breeding
- a virtual learning community by which research interns are supported in their work
- collaborative research between faculty at TCAP and minority serving institutions to promote minority student entry into graduate programs in plant breeding.

TCAP Researchers meet for Spectral Reflectance Training

By Jamie Sherman

Forty researchers and students, representing seventeen TCAP institutions met in Denver CO, April 8th 2011 for training in canopy spectral reflectance (CSR). Also in attendance were Jada-Star Mains, Application Sale Engineer from Ocean Optics, and Julian Pietragalla from CYMMIT.
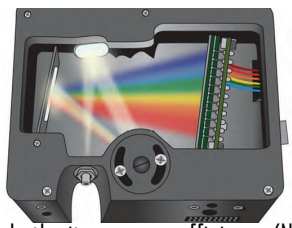
CSR is being explored as a possible high throughput phenotyping technique for both nitrogen use efficiency (NUE) and water use efficiency (WUE).

Jada-Star Mains began the training with a description of the inner workings of the Jaz Ocean Optics spectrometers. We will be measuring both downwelling (radiation from sun) and upwelling (radiation from terrestrial surfaces). Therefore, we need two sensors as indicated in figure below (downwelling ⬇ upwelling ⬆).
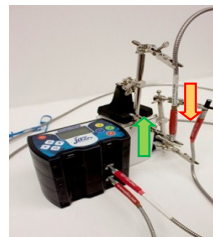
Much time was spent discussing specific configurations of spectrometer and accessories.

Jada-Star then walked us through using the Jaz and we ended the session with some hands on time.

Julián Pietragalla, of the CIMMYT-Wheat Physiology Group, discussed his experience utilizing CSR in wheat breeding, comparing it with other phenotypic measures.

Marc Moragues, of Colorado State University, and Vada Prasad, of Kansas State University, also shared their experience in measuring WUE.

Jorge Working In the Field

Minority

Serving

Institutes

Jorge Dubcovsky's Story

Tell us about your background and training.

I am originally from Argentina where I worked with native forage species including fescues and wild relatives of wheat. I came to UC Davis as Visiting Scientist from 1992-1994 and worked with Dr. Jan Dvorak for 3 years learning about wheat genetics, I then worked for two years in the wheat program in Argentina and returned to UC Davis in 1996 as Assistant professor.

What do you like best about plant breeding?

My favorite thing about plant breeding is the impact that it has on other people's lives. It is very interesting to work in diverse traits and problems.

What made you want to be involved in plant breeding?

I wanted to have a job that have a positive impact on society. I like to be an active part of the research process and feel that I am contributing to generate new knowledge.

What do you think is the most important potential contribution of the TCAP?

●Allow to integrate barley/wheat public plant breeding programs and researchers across the US

●Make better use of the small grain collection

●Development of new technologies into breeding

●Training new plant breeders

What is the most important question or problem you are trying to answer or resolve with your research?

Right now I am working on cloning several different genes including two genes for partial resistance to stripe rust and one gene for drought tolerance. The cloning of the genes underlying the differences in the traits is the first step to understand the mechanisms controlling the trait and to engineer novel approaches to improve these traits.

Representatives from minority serving institutions meet with TCAP education team in Chicago

By Jamie Sherman and Mary Brakke

Mary Brakke, Don Lee, Frances Lawrenz, Eric Moore and Jamie Sherman met with 8 representatives from minority serving institutions (MSI) in Chicago. Minority serving institutions that were represented included Arkansas State Pine Bluff, Alabama A&M, Chicago State, Delaware State, Elizabeth State, Fayettville State and Fort Valley State. The goal of the meeting was to initiate collaborations between TCAP and MSIs. We spent time getting to know each other with each group sharing their successes and challenges in attracting students to the Plant Sciences. The TCAP project was introduced so that MSI faculty might see potential areas of collaboration. MSI faculty expressed interest in true collaborations that provide opportunities to train students and to participate in fruitful research leading to publications. Participants were particularly interested in long term collaborations that would afford them time to participate in valuable research projects.

From interactions at this meeting, personal conversations with other MSI faculty and the focus group report, the education committee with input from executive committee drafted a request for proposals (RFP). The RFP has been sent to 43 Historically Black Colleges and Universities, 20 Tribal Colleges, and 18 Hispanic serving institutions. Proposals are due May 15th and funding announcements will be made in June.

Plant Breeding Training Network

By: Deana Namuth-Covert

Our Plant Breeding Training Network is taking shape. We've begun working on two different aspects: 1) the community of people and 2) the electronic environment to facilitate collaborations and training for the community. Already there are ongoing meetings among different teams of the T-CAP project, as each group has hit the ground running to reach Year 1 goals. These include various research teams, the education team, the evaluation team and also a team of 22 graduate students who are involved with T-CAP. It is these teams or "communities" of people which are the heart of T-CAP's mission.

To help facilitate their collaborations, we are building an electronic Plant Breeding Training Network (PBTN). One feature the PBTN will have is webinar and live conferencing capabilities. Several T-CAP groups have tested Adobe Connect (Breeze), a software which enables teams to meet virtually on the Web using headsets and WebCams. The software also allows you to share files and computer screens. Contact Dr. Deana Namuth-Covert (dcovert2@unl.edu) if you would like to set up space for your group to also use this software.

We are currently bringing into the PBTN education and training materials from Barley CAP, Wheat CAP, The Plant and Soil Sciences eLibrary and eXtension which will provide resources for many of our T-CAP education and outreach projects. We are also in the process of connecting to Google's education apps, which will bring in useful social media tools.

The PBTN is in its infancy, but you can watch its development and access it by going to: http://passel.unl.edu/pagespbtn/

Contact Dr. Namuth-Covert with any question, comments or feedback you may have.
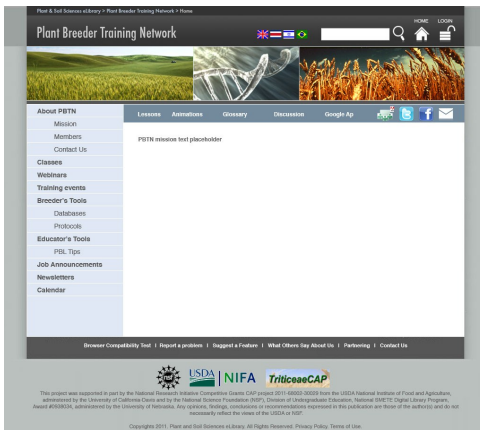
Summer Plans

By Carol Speth and Mary Brakke

Evaluation tools are now being developed and put into place. Students and faculty will soon receive a request to complete a TCAP education survey. This survey will serve to establish baseline conditions for expectations and attitudes toward education and describe research-related interactions and collaboration. An annual survey will track changes in these areas and collect evaluative information. Similarly, tools to establish baseline conditions for interactions with faculty and student at MSIs will be developed and implemented in the coming months. In addition, online activities and interaction of graduate students is being followed.

Donald Lee and Carol Speth, University of Nebraska, are using feedback obtained from TCAP faculty on a recent survey to identify concept areas for development of educational materials such as animations and cases. The materials will be made available to all educators on the UNL Plant and Soil Sciences eLibrary.

Meet the Education Team

Dr. Mary Brakke, Education Specialist, Dept of Agronomy and Plant Genetics, University of Minnesota. Mary has been involved in teaching, curriculum development and educational programming for undergraduate and graduate students for 14 years. She teaches undergraduate courses in biology and plant physiology which emphasize active learning strategies. She advises undergraduate interns and is especially interested in enhancing experience-based learning. Mary earned her M.S. and Ph.D. in crop physiology from the University of Florida, Gainesville.

Dr. Deana Namuth-Covert is no stranger to wheat and barley. She grew up on a wheat farm in western Nebraska, then earned her BS in Agronomy/Ag Honors at the Univ of Nebraska. Her graduate programs were done at Colorado State University, where her research involved genetic mapping in wheat and barley, plus physical mapping in barley. Following graduate school, she spent a year teaching at the Univ of Helsinki. Since 2000 she has taught several genetics courses and led agronomy distance education programs at the Univ of Nebraska, including the Plant and Soil Sciences eLibrary, which will be utilized in the development of the Plant Breeding Training Network.

Dr. Jamie Sherman, Associate Research Professor, Department of Plant Sciences and Plant Pathology Montana State University, Vice-Chair of Education Subcommittee National Association of Plant Breeders, and past Extension/Education lead for TCAP. One focus of Jamie's research is to identify and utilize markers in support of wheat breeding at MSU. Recently, she has been involved in the identification of QTL for midge resistance, sawfly resistance, high tillers, stay green as well as other drought and yield related QTL. Jamie is looking forward to interacting with TCAP students and believes the Plant Breeder Training Network will be a useful tool to build collaboration and facilitate training of students.
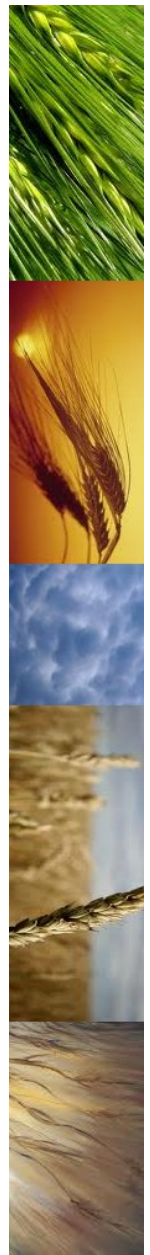
Dr. Donald Lee is Professor of Genetics, Biotechnology and Plant Sciences, Department of Agronomy and Horticulture, College of Agriculture and Natural Resources, University of Nebraska-Lincoln. He won a University-Wide Award for Outstanding Teaching and Instructional Creativity in 2009. He teaches Plant Science to first-year students, always trying to make science concepts accessible to as many students as possible. He also teaches Introduction to Genetics, Crop Genetics, and Crop Genetic Engineering. He has 20 years of experience in teaching undergraduate courses in both on-line and face-to-face environments and has taught in outreach settings to students from second grade to senior citizens. His recent course development work includes courses customized for science teachers that provide the opportunity to create, share and critique active- and inquiry-based teaching strategies. He is a major contributor to the Plant and Soil Science eLibrary and uses e-Library learning objects in all his teaching.

Amy Lathrop is a graduate of the University of Nebraska-Lincoln with a B.S. in Horticulture and an M.S. in Agronomy. She has experience teaching in genetics, plant science and introductory biotechnology. Her teaching includes classroom and online settings as well as assisting at extension events in Nebraska. In her spare time she enjoys running, baking and gardening. She will help make learning objects and other content.

Meet the Evaluators

Dr. Frances Lawrenz, Associate Vice President for Research and Wallace Professor of Teaching and Learning in the Department of Educational Psychology, College of Education and Human Development, University of Minnesota. Frances has extensive experience evaluating NSF-funded programs in science and mathematics education.

Abdi Mohamed, Doctoral student in Curriculum and Instruction, UM. Abdie holds a M.S. in chemistry and a B.S. in biochemistry and chemistry. Abdi's work will focus on participant observation and evaluation of the effectiveness of problem-based learning in an on-line environment. Abdi is advised by Dr. Gillian Roehrig.

Dr. Carol Speth, Education Assessment Specialist for the Agronomy and Horticulture Department, helps faculty with assessment of teaching and learning and evaluation of grant-funded programs. She is an educational psychologist, who for more than 20 years has done research on individual differences in student learning, especially learning from technology. As a Research Fellow at the University of Edinburgh, Scotland, she helped that team develop software to identify and help students at risk because of poor study skills, part of a Teaching and Learning Technology Project. As a Research Associate at the University of Kansas, she managed research and evaluation for the five-state Midlands Consortium Star Schools Project that provided secondary level instruction by satellite to small rural school.

Eric Moore, Senior member of Rainbow Research, Mpls, MN and an advanced doctoral candidate in evaluation studies, Organizational Leadership, Policy and Development Department, UM. Eric's areas of expertise includes K-16 barriers to student learning, evaluation theory, organizational theory and development, adult learning processes, K-12 achievement gaps, and the application of dominant and non-dominant identity and cultural mismatch models to improve student learning.

Mao Thao, Doctoral student in Educational Psychology, UM. Mao holds a B.S. in sociology and a B.A. in communication studies. Mao's work will focus on the TCAP's Plant Breeder Training Network and the effectiveness of online interactions. Mao is advised by Dr. Lawrenz.

UNIVERSITY OF Nebraska Lincoln

UNL Success in Developing online Resources

By: Carol Speth

Don Lee, Deana Namuth-Covert and Carol Speth work in the Department of Agronomy and Horticulture Department at the University of Nebraska-Lincoln. One of their current projects is an NSF grant to bring the Plant and Soil Sciences up-to-date with social networking technologies, allowing users to interact in communities of learning and develop their own lessons using existing learning objects. Another emphasis is to allow users in public service, industry and agriculture to re-package eLibrary resources for their training needs.

They were part of a team (representing several universities and departments) that won the 2004 ADEC National Excellence in Distance Education Award for the Library of Crop Technology, which is now part of the Plant and Soil eLibrary. This open source database was tested with thousands of learners and is used by teachers and journalists internationally. Lessons and animations cover topics in crop technology, genetics, and weed science, nutrition and food safety. Some lessons are available in Spanish. Funding has been provided by grants from the National Science Foundation, American Distance Education Consortium (ADEC), the United States Department of Agriculture (USDA), and the University of Nebraska.

Evaluation of TCAP Education

By: Mary Brakke, Frances Lawrenz, and Eric Moore

To help conceptualize a comprehensive approach to evaluation, the education team sought input during the grant-writing phase from professional evaluators, Dr. Frances Lawrenz and Mr. Eric Moore. In February, two quarter-time doctoral students were added to the evaluation team (see box below). The two teams have met regularly since January 2011. Initially, a logic model building process, led by Eric Moore and Frances Lawrenz, was used to articulate outputs, outcomes and goals of the proposed education activities. This resulted in a framework for evaluation and identification of multiple approaches that will be used to measure effectiveness of educational activities. Three major approaches have been identified,

- Monitoring of participation in activities

Outputs identified in the logic model such as numbers of students and faculty participating in project activities (online course, online blogs, workshops, etc), frequency of their participation in these activities; number of recruitment presentations, and use of curriculum and recruitment materials, will quantified and characterized. Extensive monitoring of what is happening in the project, who is involved, when and to what extent, will be used to provide a rich description of the reach of TCAP activities. Monitoring will be implemented through Jamie Sherman's office.

- Surveys, interviews and participant observation

Yearly surveys of students involved in TCAP activities, of TCAP PIs and of MSI faculty as well as interviews with selected members of these groups will be designed to assess change in perceptions over time as well as to provide formative information for improvement of project activities. Participant observation will provide an 'insider graduate student' view of the project. Longitudinal (3-5 years) case studies of at least three MSI institutions and their related TCAP institution(s) will be conducted to provide detailed information on the process of collaborative relationships and recruitment of students to graduate programs in plant breeding.

- Targeted research

Targeted research projects will be conducted to test underlying assumptions of causality and effect. Specific areas for research are being discussed. Areas of particular interest are the effectiveness of online networks for building collaborative skills; the use of problem based learning to strengthen critical thinking and problem solving in plant breeding; and the effectiveness of mentoring undergraduate research interns and using online communities of practice to develop research skills and encourage interest in graduate studies.