Laying the Foundation for Triticeae-Coordinated Agricultural Project (T-CAP) Education
First Meeting of Advisory Board – July 5, 2011

Purpose
- Describe project goals and provide rationale for approaches aimed at enhancing graduate education in plant genetics and plant breeding and increasing the number and diversity of undergraduates who pursue graduate studies in the field.
- Describe efforts and progress to date.
- Seek recommendations that facilitate efforts and enhance the impact of T-CAP education activities.

Project Goals
Yield constraints resulting from abiotic and biotic stresses due at least in part to climate change, increasing demand for food and increasing costs of crop production inputs are creating a need for a national plan for innovative plant breeding research and education. A primary goal of the Triticeae Coordinated Agricultural Project (T-CAP) is to identify the genetic basis of disease resistance, water and nitrogen use efficiency and yield improvement in wheat and barley and expedite the movement of this material into breeding programs.

An increased need for plant breeders trained in the use of modern methods of marker-assisted selection and genomic selection occurs at a time when reductions in plant breeding positions in the public sector have contributed to a loss of expertise that supports training of plant breeders. A concomitant loss of a critical mass of students necessary to provide a stimulating learning environment accompanies reductions in programs. The educational activities of T-CAP will address critical aspects of plant science education at the graduate and undergraduate levels in order to better prepare students for work in plant breeding and to increase the number and diversity of students in the field.

TCAP – Education Team
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TCAP – Evaluation Team
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TCAP Education Activities – Year 1 (Feb 1, 2011 to date)

Graduate Education
A recent Delphi study of private sector stakeholders showed that in addition to technical knowledge, experience designing and managing experiments and “soft” skills, such as the ability to work collaboratively and to network, are essential for plant breeders. The T-CAP will educate 29 Ph.D. students, provide training in modern research methods and breeding strategies and create a collaborative learning community through which students develop essential skills. The Plant Breeder Training Network (PBTN) will provide online and face-to-face interactions. The online learning environment will decrease student isolation, increase access to technical expertise on a range of topics essential to modern plant breeding and provide opportunities for skill development. The PBTN will offer live and recorded seminars with experts in plant genetics and plant breeding and coursework that emphasizes collaborative problem solving, training in mentoring and opportunities for networking. Face-to-face interactions include technical workshops (a workshop on the use of canopy spectral reflectance was held in April), annual participation in two professional conferences, travel to an international plant breeding research center and opportunities for internships with industry partners.

Plant Breeder Training Network – Online Environment
The online environment of the PBTN has been created and is being used by project personnel for project management, technical seminars and meetings of graduate students and faculty. The site offers social networking tools for synchronous and asynchronous interaction, text-based blogging tools and the ability to create individualized web environments. Educational resources within eLibrary and eXtension have been linked to the PBTN. The site will also be used for an online learning community of undergraduate research interns.

Undergraduate Research Experience
To help meet current and future demand for graduate students in breeding programs that serve diverse crops and to provide skilled workers for the plant breeding industry, T-CAP will create more than 100 undergraduate research internship positions in plant genetics and plant breeding. Students will be mentored by T-CAP graduate students who receive training in mentoring. To address the lack of representation of minority students in plant sciences, a collaborative research program between faculty at T-CAP and minority serving institutions has been initiated. A focus session, held in April 2011, was attended by eight faculty of minority serving institutions (MSI). A report of information and insights gained was prepared and was used in developing an RFP for a collaborative research program. The RFP was distributed to 80 MSIs. Ten proposals were received and eight, two-year collaborative research projects have been funded. To support learning from research experiences, an online learning community for undergraduate interns from MSI and TCAP institutions will be established in fall 2011.

Undergraduate Teaching and Recruitment Materials
To better acquaint undergraduate students with the work of plant breeders, educational materials in which principles of genetics are taught in the context of plant breeding will be developed, disseminated and made freely available on the PBTN website. Materials will include digital learning objects that illustrate and animate principles of genetics as well as problem-based cases that feature real-world issues related to food production and plant breeding. A survey of MSI faculty has been conducted to obtain suggestions of topics for educational materials. Video taping of plant breeding research and project activities is currently being conducted. Segments of these videos will augment learning materials and will also be used for recruitment videos that will be made freely available to educators and displayed at events.
**Evaluation**

A logic model building process was used to identify project outputs and outcomes. From that, an evaluation plan that utilizes three major approaches was developed. Approaches involve: tracking participation in project activities; surveys, interviews and participant observation in order to assess changes in perceptions and describe behaviors; and targeted research projects that will address specific questions (see Logic Model and Spring Newsletter, page 6). Potential research questions of particular interest relate to activities that build collaborative skills, the effectiveness of educational materials, and the use of online communities to enhance research experience. An evaluation plan and data collection plan have been developed. Baseline surveys of graduate students’ confidence in content and skill areas and perceptions of education and faculty members’ perceptions of the importance of content and skill areas and approaches to education have been distributed. Student and faculty interview questions have been developed and will be used to gain more detailed understanding after educational programs have been conducted.