

THE MCKNIGHT FOUNDATION

Collaborative Crop Research Program

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Quarterly Update for CCRP Participants

October 1, 2002-January 1, 2003

Important note: In order to follow many of the external links, you will need to be logged into the CCRP site. Please take this opportunity to go to [this page](#) and log in using your assigned user name and password. Once you have this web page open, do not close it; otherwise, you will have to log in again and re-click the links. If you receive an error message, simply try clicking the link on this report again. If you do not have a username and password yet, email [Kelly Lindsay](mailto:Kelly.Lindsay).

News

CCRP Website release. On December 18th, the beta version of the CCRP website was released to the Foundation, CCRP Oversight Committee, and grantees. More information about this can be found in the [CCRP Web](#) section of this report.

On a personal note, we would like to congratulate Bob Goodman and Debbie Acks on the announcement of their upcoming wedding!

Workshops, Conferences, Meetings, and Site Visits

CCRP events

Microarray and Bioinformatics II: Gene array applications and candidate gene identification in rice and other cereal crops (December 2-5, in Los Baños, Philippines). A group of CCRP participants working on cereal improvement took part in a workshop held at the recently-established Gene Array and Molecular Marker Application Laboratory (GAMMA Lab) at the International Rice Research Institute. The workshop was aimed at providing researchers in rice and related crops with an opportunity to explore new developments in genomics through hands-on work with gene array technologies and bioinformatics, as well as discussions and presentations. The workshop included 12 participants from the Asian Rice Biotechnology Network (ARBN) and 13 participants from the CCRP's finger millet, chickpea, rice, maize and sorghum, tef and wheat projects. For more information on this workshop, click [here](#).

Related events with CCRP participation

Facilitating the Improvement of Pearl Millet in West Africa Through Conventional and Molecular Plant Breeding, Farmers' Participation, and Comparative Genomics Strategies (October 8-14, in Bamako, Mali). This

workshop was co-organized by ICRISAT and Cornell's Institute for Genomic Diversity with R. Nelson as a member of the organizing committee. The purpose of this workshop, which was funded by the Rockefeller Foundation and several other donors, was to identify ways to maximize both current millet resources and those available for related grasses, as well as to attract donor support for jointly conceived and planned research initiatives. For more information on this event, click [here](#).

CCRP Web

The CCRP web was designed to provide a platform for the exchange of information among CCRP participants and the public. The beta version of the website was announced on December 18, 2002 to the grantees and Oversight Committee. The site is hosted at <http://mcknight.ccrp.cornell.edu>. It has been a constant "work in progress" for the past few months. Its several databases and ~1,000 image, text, and HTML files keep us (Kelly, that is) very busy!

Over the past few months, we have:

- Made several rounds of site revisions based on feedback from CCRP participants.
- Added new features, such as the Topics pages, pages for the Oversight Committee, and User's Guide.
- Established a working security system. A user name and password are required to access to links under the "For Program Participants" heading. To date, we have 16 users who have access to this portion of the site. If you don't now have access and feel you should, please consult Kelly.
- Improved database functionality and user-friendliness.

In the next few months, we plan to:

- Continue revisions based on user feedback
- Continue development and establishing the look and feel of the databases
- Update all database content

We encourage you to check out the following links:

- [Literature Service database](#)
- [People database](#)
- [Project pages](#)

We appreciate your continued feedback!

Literature Service

The literature service is aimed at providing CCRP participants with recently published or relevant literature that is hard to obtain. November was a busy month for the literature service. We:

- Set up an account with the Copyright Clearance Center (CCC) in order to clear our past debt. We are happy to announce that we are up to date with the process, and ready to handle additional literature requests!
- Established an account system for the literature service, in which each project is allotted a specific amount of funds for ordering literature items not readily available to them (we have limited this to predominately journal articles). As articles are ordered, the CCC cost is then deducted from their

fund balance. Recipients are given an invoice with their requested literature that reflects the new total. The yearly fund amount does not roll over into the next year; therefore, at the end of the year, we plan on giving all projects a sort of “free for all,” allowing any project to use the left-over funds to order literature.

We would like to commend the projects that used our literature service last year, especially Xiaolong Yan and Robert Mwanga, who ordered 5+ articles since the last report. As of January 1, your accounts have been reset to \$625 for the year. To give you some perspective, copyright costs can range anywhere from \$2.00 to \$32.00 depending on the journal and year of publication.

Updates from the CCRP Projects

We appreciate the efforts of those projects who submitted these updates! The text below is published as received; no edits were made on the material we received. In the future, we are requesting that updates consist of three fairly detailed bullet points (see the Sweetpotato-Uganda update for an example). The next round of updates, covering January-March 2003, and are due in early April.

Rice Biodiversity project (Thailand):

1. Meeting of PI and partners, including field sessions in Kanchanburi, Nakorn Nayok, Prachinburi, Chiang Mai and Mae Hong Son. July 1-16, 2002: a village workshop covering project focus sites in Chiang Mai and Mae Hong Son, with US partners (Padoch, Pinado-Vasquez) and on-farm team (K Rerkasem, Boonma, Sirabanchongran) to discuss and plan participatory and on-farm activities. July 18-25, 2002: a field workshop in Kanchanaburi, Prachinburi, Nakorn Nayok for US partners (Schaal, Padoch, Pinado-Vasquez, plus Yu-chung Chiang, a postdoc from WU and Kevin Coffey, a graduate student from Yale associated with the NY team) to gain insights into local rice systems and to discuss research and training activities with Thai PI's (Rerkasem, Rerkasem, Jamjod, Maneechote, Boonma, plus 3 graduate students from Chiang Mai). Plant samples were also collected for DNA analyses.
2. Training workshop on molecular evolution and DNA analysis for 35 researchers and graduate students. July 26-29, 2002 in Chiang Mai, a workshop (35 researchers and students) to review genetic characterization work done so far in Thailand, lectures and discussion on theoretical and empirical issues in measuring gene migration (Schaal), practical laboratory classes on methods for DNA analysis (Yu-Chung Chiang, WU postdoc), and discussions on future research plans and student exchange program.
3. Found simple method for screening rice grain for high iron. Paper entitled "Easy and rapid method for screening rice grain for high iron density with Perl's Prussian blue" by Prom-u-thai et al submitted for publication in ScienceAsia. In addition to varietal diversity (number of local varieties and extent of genetic differences between them) we have found variation within seed lots to be another important source of diversity in local rice germplasm. The genetic variation within seedlots found include (1) traits that are used to characterize and measure diversity, and (2) traits that are potentially useful to rice growers and eaters (we have chosen grain iron content and acid/aluminum tolerance to work on). Diversity with seed lots of selected varieties is being assessed with morphological and DNA characterization of 20 individual plants. Methods for assays of individual seeds are useful in detection of valuable traits that are present in a seed lot at low frequencies. This is what the Perl's Prussian Blue staining of Fe on individual grain does. It has enabled us to distinguish between individual grains with high (cf IR68144) and low (cf popular Thai jasmine, KDML105

and RD6) Fe. In contrast, chemical analyses of the grain average the Fe content over a least a few (with IC) to some 30-40 grains (with the AA).

4. Found local rice varieties and wild rice populations adapted to acid sulphate soil (pH 3.5).

Finger Millet project (India):

1. The previous season the seed were increased and purified. 350 lines of the finger millet RILs of parents IE1012X Indaf 5 were sown in RCBD design in the experimental field in the month of October. The plants are being evaluated for 20 phenotypic characters. Five plants in each entry are being observed to record the listed observations. The traits include early seedling growth, Number of tillers per plant, Number of days taken for first, 50% and maturity. Non-parametric traits like pigmentation, plant type, spreading, ideotype of the plant, presence or absence of pubescence color of the ear head, type of ear head. Ear head characters observed are number of fingers in one ear head, number of ear heads in each plant length of each ear heads. Disease parameters on leaf blast evaluation for percent leaf blast infection, neck blast infection and finger blast infection. The resistant genotypes are being scored. The data will be analyzed after harvest.
2. Socioeconomic study: A total of 60 farmers have been surveyed in six districts of Karnataka. Both men and women farmers have been considered for surveying. A questionnaire/schedule covering the production details of the existing practices and constraints faced by the farmers is included. The information covers variety they grow, their economic status, social conditions, income of the farmers, family details, Inputs and labours, disposal of fodder and grain patterns, information on dairy and draught animals, measures undertaken to conserve soil moisture, crop loss situations, alternates crops, drought coping and crop mechanism. The questionnaire also covers sources of information, details of different factors of crop losses.
3. Finger millet growing region based initial survey results was chosen to take up trial. Main rains failed crop could not be sown in right season. Some of the location they failed completely. We took up sowings initially in four locations but the crops failed, moisture was limitation even for germination. Hence sowing was not taken up in other locations. When the late rains arrived, we took up sowings in two locations. The results are due after three months.

Sweetpotato project (Uganda):

1. The National Sweetpotato Program under the umbrella of the National Agricultural Research Organization (NARO), participated in the World Food Day held on October 16, 2002 in Kisoro District in southwest Uganda. The sweetpotato group from the Namulonge Agricultural and Animal Production Research Institute (NAARI) exhibited six orange-fleshed sweetpotato (OFSP) varieties as important sources of beta-carotene (vitamin A) for alleviation of vitamin A deficiency that is severe and widespread in the country. Approximately 900,000 people visited the OFSP exhibits.
2. On December 4, 2002 James Arwata Foundation (JAF) donated about ten metric tones of storage roots of OFSP as food aid to the suffering displaced people due to insurgency in Lira municipality in northern Uganda. The donation came from JAF farmers in Loro, Ibuje and Akokoro sub-counties where JAF has spearheaded production and consumption of OFSP to mitigate the widespread vitamin A deficiency, especially among children, breast-feeding and pregnant mothers. JAF is a Christian non-government

organization (NGO), which involves communities in development using local available resources to reduce poverty, illiteracy, and disease.

3. NARO (the sweetpotato research team) has linked up with NGOs such as JAF, Volunteer Efforts for Development Concerns (VEDCO), and Buganda Cultural and Development Foundation (BUCADEF), and the Soroti Catholic Diocese Development Organization (SOCADIDO), and other stakeholders such as the International Potato Center (CIP), the potato and sweetpotato network for East and Central Africa (PRAPACE), and the National Agricultural Advisory Services (NAADS) to speed up dissemination of OFSP varieties in the country. Currently, generation of OFSP populations and cultivars, evaluation on-station and on-farm are among the major activities of the Ugandan sweetpotato program supported mainly by the McKnight Foundation.

Andean Tubers project (Peru):

1. Morphotype identification. It has been identified visually 604 morphotypes of the Andean tuber complex (332 of Andean potatoes, 122 of oca, 102 of mashua , and 48 of ulluco) out of 2526 samples studied (1096 Andean potatoes, 860 oca, 342 mashuas, and 228 ullucos) grown independently in six Andean rural communities of Cusco, Peru (Sayllafaya, P'oques, Chumpi, Matinga, Queccayoq, and Picol). Farmers of each village participated in the morphotype identification, that is, our results are consistent and will be confirmed by molecular markers soon.
2. Farmer's workshop. Four farmers workshops concerning with the integrated management of the weevil complex in oca, ulluco, and Andean potato took place last November in the rural villages of Picol, P'oques, Chumpe, and Sayllafaya. Fifty one farmers of the rural communities of Picol, Matinga and Queccayoq discussed in Picol the results of previous years on the integrated management of oca weevil and the strategy that could be followed for the integrated management of the weevil complex in oca, ulluco, and Andean potatoes as one system. Furthermore, farmers of the three villages suggested to explore the possibilities of conducting research on the integrated management of Andean tuber crops to improve their productivity.
3. Two hundred and seven farmers attended the other workshops (117 in P'oques, 45 in Chumpe , and 45 in Sayllafaya) in which they discussed the strategy to be followed for integrated management of oca, ulluco, and Andean potato weevil as one system. Farmers of Sayllafaya and Chumpi suggested to take into consideration the utilization of local repellent plants for the management of the weevil in oca, ulluco, and Andean potato. They also suggested to do the work in a participatory manner. It is also important to point out that farmers of Sayllafaya attended the workshop with their wives and their children, suggesting the sustainability of the project.

Soybean project (China):

1. Two seasons of field screening experiments in two locations of South China with more than 300 soybean germplasm materials from both China and abroad were completed with promising genotypes identified. Some P-efficient genotypes outperformed some local varieties by 50-100 % in both biomass and grain yield under low P conditions.

2. Physiological comparisons with contrasting genotypes are under way. Preliminary results indicated that the relative performance of soybean in low-P soils seemed to be correlated with outstanding root traits, which were indicated by better root morphology (greater root length, more branching, finer roots, longer and denser root hairs, etc.) and better root architecture (greater width/depth ratio, great basal root angles relative to the tap root, more even distribution of basal and lateral roots, etc.). Other aspects of root traits, such as rhizobium symbiosis, mycorrhizal association, and rhizosphere secretion of root exudates (organic acids, acid phosphatases and others) are being characterized.
3. Conventional breeding is also in progress. Several permanent and non-permanent genetic populations (including recombinant inbred line population and F2 segregated population) are being constructed with crosses of contrasting soybean varieties in adaptation to low soil P conditions. Both F1 and F2 seeds have been obtained.
4. Using the suppression subtractive hybridization (SSH) technique, a low P induced cDNA library was constructed for the roots of a P-efficient soybean genotype. Nineteen cDNA clones were identified, 9 of which were specific to the roots and 10 with enhanced expression in the roots. Several positive clones were confirmed by Northern Blot to be specifically expressed in the root under low P availability. These clones are being sequenced and characterized for their physiological functions.
5. As part of the effort in identifying genotypes efficient in P acquisition and having long and dense root hairs as a favorable trait, Catalina Posada has acquired a soybean collection from USDA that contains a good representation of wild (*Glycine soja*) and cultivated (*Glycine max*) genotypes from all over the world, with emphasis in genotypes from countries with soils with problems in phosphorus availability. This collection will be screened for root hair and other traits and selected genotypes will be used in further studies.
6. R. Jaramillo, a Ph.D student supervised by Dr. J. Lynch at Penn State University, has focused on information retrieval about several soil and crop models, from which he has selected A priori the following: Century (“Grassland and Agroecosystem Dynamics Model”), which is a model that may help in the estimation of the amounts of Phosphorus available to the plant in different “pools” in the soil. This model coupled with DSSAT (“Decision Support System for Agrotechnology Transfer”), which is a comprehensive collection of different crop models, will be used to attempt an estimation of the impact that the new soybean P-efficient varieties may have on the dynamic of soil fertility. Nevertheless, some other models are still being considered and they might be included as means of comparisons.
7. Weaver has completed training of Yi Xu, Chinese research associate, on analysis of field level data for assessment of economic performance of genotypes and farm level decision modeling to predict adoption of new field practices, technologies, or genotypes. Training continues to cover development of databases from survey data.
8. Weaver and Xu developed and delivered an extensive field survey that is being implemented by Hai Nian. This represents a revision of the initial draft survey developed while Weaver and Xu were in China during May 2002. The data will be collected by a team of students trained by Weaver, Xu, and Hai Nian. Methods for analysis of the resulting data set by Weaver, Xu, and Hai Nian are being developed by Weaver and Xu. Weaver and Xu completed a draft overview of the soybean subsector in China and more specifically in South China. The review will be finalized during the next quarter. It reviews current production, processing, markets, and policy affecting the economic performance of soybeans in China.

Tef project (Ethiopia):

1. Ms. Elizabeth Graznak completed her master's study at Cornell University. She did QTL identification study in tef.
2. The PI visited four partner research Centers, Holetta, Melkassa, Mekelle and Adet, to see the performance of the variety trials, and thesis material of the PhD student. Discussions were held on several aspects of collaboration and training aspects.
3. Farmers' Participatory Varietal Evaluation for tef improvement has started at the Debre Zeit area. A two-day sensitization workshop that included researchers, officials and extension workers from the Ministry of Agriculture and resource scientists, was held at the Debre Zeit Agricultural Research Center on 23-24 September 2002. Lectures on historical developments of Farmers Participatory Research (FPR) and its methods were given; theory and practices of the tools used in FPR were explained. Also presented were case studies from Ethiopia and elsewhere. Finally, the objectives of the participatory variety evaluation (PVE) work on tef were explained and work plan was presented and discussed.
4. In November 2002, forty-one farmers from two districts, Akaki and Debre Zeit, participated in the selection of 12 released tef varieties grown on-station in the respective localities. One interesting feature was that the brown-seeded (white grain color is preferred in these areas) tef variety, DZ-01-99, was selected by 63% of the farmers for subsequent on-farm trial.
5. A paper entitled "Inheritance of morphological and agronomic traits in tef (*Eragrostis tef*)", authored by Hailu Tefera, has been accepted for publication in the Journal of Genetics & Breeding. The major finding is that grain yield and several other traits in tef crosses exhibit high level of non-allelic gene interaction (dominance and dominance x dominance interaction effects), thus making selection improvement at early generations difficult. That means segregating populations of tef should attain a high degree of homozygosity before selection is practiced.
6. Aderajew Haddis, a PhD student, left for Cornell University to carry out the molecular part of his thesis work at the Sorrells lab for one year, starting from October 16, 2002.
7. The PI, Dr. Hailu Tefera, took part in the workshop "Gene array applications and candidate gene identification", held in December 2-5, 2002, at the International Rice Research Institute, Los Banos, Philippines.
8. Debre Zeit Agricultural Research Center held a field day in October and over 200 participants that included farmers, development agents, researchers and managers of research institutions and agriculture related offices visited the research activities of the Center. Tef research was one of the major activities that was visited.