

THE MCKNIGHT FOUNDATION

Collaborative Crop Research Program

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**CCRP Quarterly Newsletter**

**To:** The McKnight Foundation grantees  
**From:** Office of the CCRP Program Director  
**Reporting period:** October-December 2005

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**CCRP News**

- We are sad to announce the retirements of two people who have played key roles and made enormous contributions to the CCRP. Bob Goodman, the “founding father” of the CCRP and the head of the program’s Oversight Committee since its inception, has retired as chair of the Oversight Committee as of December 2005. Carol Berde, Executive Vice President of The McKnight Foundation, retired from the Foundation in December 2005 after 25 years. Both Bob and Carol have devoted years of their wisdom and insight to the Program and we will miss them!
- As of this quarter, the [PAndean tubers \(Peru\)](#) and [PWheat scab \(China\)](#) projects have come to a close. Please see the project Web pages, which include their recent annual technical reports, for specific information on the projects’ tremendous accomplishments. We congratulate the project teams on their many successes, thank them for their enormous efforts on behalf of their respective CCRP projects, ask them to stay in touch with updates for this newsletter, and wish them every good fortune going forward.
- Dr. Alison “Sunny” Power is serving as interim chair of the Oversight Committee. Information about Dr. Power and the other members of the Oversight Committee can be found on the [governance](#) page of the CCRP Web.
- In November, former OC member Molly Jahn accepted a position as Dean of College of Agriculture and Life Sciences at University of Wisconsin-Madison. She will be leaving Cornell to take up her new post by August 2006. Follow [this link](#) to read more about her appointment. Congratulations, Molly!
- In November 2005, Steve Vanek of the [PGreen manures/legumes](#) project was awarded the Fulbright-Hays award. These awards are sponsored by the U.S. State Department, with the dual objectives of increasing mutual understanding among nations, and the enhancement of the academic or professional development of graduating seniors and current graduate students. Congratulations, Steve!

- On December 1-3, the Oversight Committee met in Madrid to select the final set of West African projects for recommendation to the McKnight board. Five proposals were chosen. These projects will be announced following the Board's February meeting and relevant information will be posted to the CCRP Web's section on the new West Africa Community of Practice.
- The OC also selected pre-proposals for the [East Africa Legumes RFP](#) that was released in May. Eleven East African legumes pre-proposals were pre-selected and full proposals have been solicited. The selected project teams will meet in Arusha, Tanzania in late March for a Proposal Development Workshop. Dr. Beth Medvecky is currently organizing this workshop on behalf of the CCRP.
- On October 7, a new CCRP project on orange-fleshed sweetpotato (OFSP) was launched by Helen Keller International (HKI) in Ouagadougou, Burkina Faso. Burkina Faso, in the W. African Sahel, is severely affected by vitamin A deficiency. HKI and its partners will test the hypothesis that OFSP can make a significant contribution to reducing this micronutrient deficiency and the morbidity and mortality associated with it. This new project is intended to complement the CCRP's successful work on OFSP in E. Africa. Dr. Robert Mwanga of the Ugandan OFSP project participated in the inauguration event.
- On December 12, representatives of the CCRP (R. Nelson and K. Rysted) met at McKnight headquarters with representatives of the Foundation's programs in Africa and S.E. Asia, along with members of the Foundation's Board to discuss potential linkages between the CCRP and the other programs. Some areas of common interest were identified for future development.
- Last year, The McKnight Foundation asked the TCC consultancy group to evaluate the management and governance of the CCRP. The review team was positive about the program and made several constructive suggestions. One suggestion of relevance to grantees concerns the program's approach to monitoring and evaluation; more information on this issue will be made available on the CCRP Web in the near future. We would like to thank everyone who provided feedback to the consultants.
- We have initiated planning of the next Grantee Conference. Representatives of all active CCRP projects will participate in the meeting, which will take place in Chantilly, France in December 2007.
- Please see the last section of this update for news from the CCRP projects.

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## Upcoming CCRP Events

### 2007

#### *December*

1-6 Triennial Grantee Conference to be held in Chantilly, France

More details will follow as they are developed.

### 2006

#### *March*

28-30 Workshop: CCRP Proposal Development Workshop for the East Africa Legumes RFP  
Arusha, Tanzania

This workshop will involve invited project teams that have successfully competed in the initial

round of selection in the RFP focused enhancing the utilization of legumes in Malawi, Mozambique and Tanzania.

### *July*

#### 18-22 Meeting: 2006 Meeting of the CCRP's Andean Community of Practice to be held in Quito, Ecuador

This meeting, the second of our annual Andean CoP meetings, will together representatives of the nine Andean Community of Practice projects. This meeting will take place immediately before the XII International Congress of Andean Crops to be held in Quito, Ecuador. Project teams will give updates on their projects, listen to invited speakers, and tentatively participate in site visits to local projects. More details will follow as they are developed.

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## **Recent and Upcoming Related Events**

### **2006**

#### *March*

#### 12-15 Wrap-up meeting for the [Chickpea \(India\)](#) project

The [Chickpea \(India\)](#) project will hold a wrap-up meeting for project collaborators at the National Chemical Laboratory (NCL) in Pune, India. Project collaborators will review their accomplishments through presentations and discussions, and address implementation of results.

#### *July*

23-28 The XII International Congress of Andean Crops to be held in Quito, Ecuador, will be entitled "For the Food Security and Sovereignty of the Andes." For further information, please contact Dr. Eduardo Peralta at [<peraltae@ecnet.ec>](mailto:peraltae@ecnet.ec).

#### *October*

#### 9-13 The 2006 International Rice Congress to be held in New Delhi, India

The 2006 International Rice Congress, entitled "Science, technology and trade for peace and prosperity," will be held October 9-13 in New Delhi, India. This Congress is being jointly organized by the Indian Council of Agricultural Research (ICAR) and the International Rice Research Institute (IRRI) and will feature four major events, including the 26th International Rice Research Conference, the 2nd International Rice Commerce Conference, the 2nd International Rice Technology and Cultural Exhibition, and the 2nd International Ministerial Round-table meeting. The aim of the Congress is to bring together diverse stakeholders of the international rice community to address emerging issues and to provide a common platform for sharing knowledge and expertise. For more information, go to this website:

<http://www.irri.org/irc2006> or <http://www.icar.org.in>.

The CCRP Web is at... <http://mcknight.ccrp.cornell.edu>

**CCRP Web changes over the past quarter:**



On January 12, 2006 a newly-structured and tri-lingual version of the CCRP Web was tested and released to the public.

Below the title section of each page, you will see a menu bar offering the choice of three languages: English, Español and Français. The **bold** language indicates which language you are currently reading.

Underlined or **highlighted** languages indicate that a page is available in that language. We hope you enjoy reading the CCRP Web in the language of your choice!

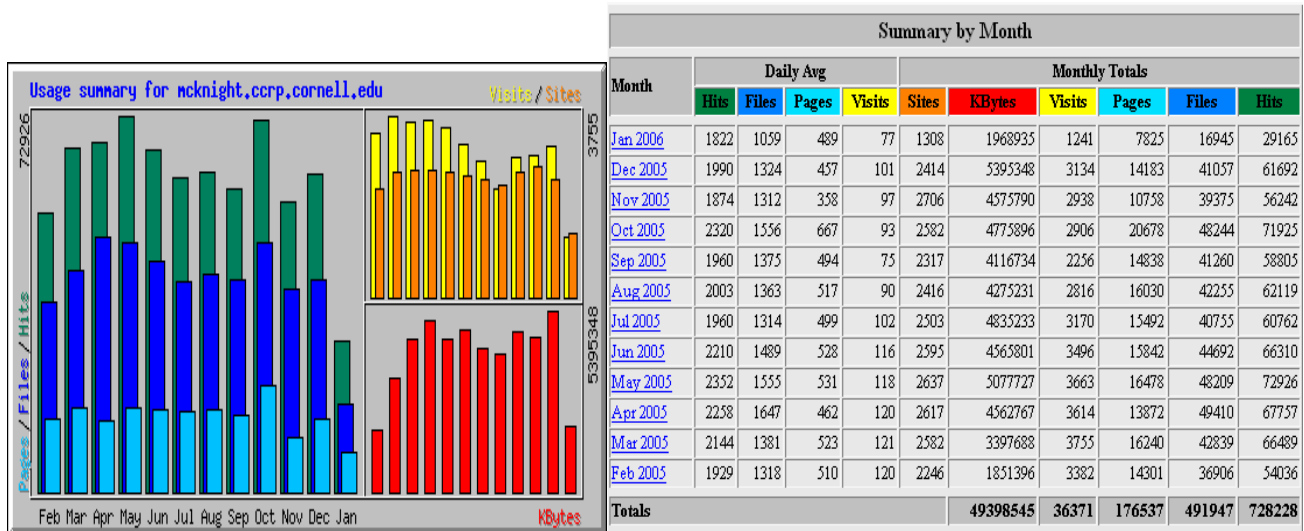
The trilingual site is aimed at better serving the CCRP's new [Communities of Practice](#).

**Upcoming changes to the CCRP-Web**

- Kelly will send web pages for translation into Spanish and French until the entire site is trilingual!
- Project pages will be updated with new picture pages and quarterly newsletter additions.

**“Site” visits**

The CCRP Web site stats are still flying high! Our peak this reporting period occurred in October at close to 72,000 hits. The CCRP web receives approximately 60,000 hits a month. Keep visiting the site to know what is happening in the CCRP, and check your project pages to make sure they are updated!



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**Updates from the CCRP Projects.** The updates below are published as received. Minimal edits have been made.

### Andean tubers (Peru)

- The Association of Organic Growers of Andean Tubers, which was established and initiated its activities in the cropping season of 2004-05, with 46 farmers in the communities of Pícol, Matinga, and Qqueccayoq, has increased its members to 93 farmers. Other farmers of the indicated villages, and some of the community of Chumpi have joined the Association during the current cropping season (2005-06) to plant some 3.2 Ha of organic Andean potatoes, oca, and ulluco. The main objective, as at the beginning, is to obtain better prices for their Andean tubers in the touristic city of Cusco. Thus, the Andean tuber project is sustainable in time and space.
- A seminar about “Genetic diversity analysis and glucosinolate determination in mashua (*Tropaeolum tuberosum* R&P)” was given by Mr. Oscar Ortega at the Genetic Resources Division of the International Potato Center, Lima, Peru last Spring. Mr. Ortega, a M.Sc. graduate of the University of California-Davis, showed that the greatest diversity of mashua was found in the village of Sayllafaya, suggesting that farmers of this community value to maintain on-farm the genetic resources of mashua in an effective manner. This in turn suggests that farmers of this community can provide tuber-seed of mashua to restore the diversity of crop in neighboring communities.
- Mr. Oscar Ortega, a M.Sc. student of the University of California-Davis, successfully defended his thesis “Inventory of genetic variability and glucosinolate determination in mashua (*Tropaeolum tuberosum*)” last summer. Two publishable papers were written, submitted to referee journals, and accepted for publication as following: “Glucosinolate survey in cultivated and feral mashua (*Tropaeolum tuberosum*)”, and “Genetic diversity of cultivated and non-cultivated *Tropaeolum tuberosum* (mashua) using sequence-related amplified polymorphism (SRAP)”.

### Lupine/quinoa (Ecuador)

See this project’s web page for their update.

### Finger millet (India)

- Two promising blast and drought tolerant finger millet genotypes were selected for entry into State Multilocation Trials, for pre- release evaluation.
- Five genotypes were found to be tolerant to drought and yielded 5-5 to 5 tons per hectare on an average.

- 60 SSR markers were obtained from Dr. Katrien Devos and parental polymorphism tested for the parents of mapping population (INDAF 5 and IE1012). 27 SSR markers were found to be polymorphic (44.45 percent) and will be used for progeny analysis.
- The mapping population of finger millet was evaluated for leaf and neck blast resistance for the second year successively and the data will be used for future QTL detection and identification of new resistant finger millet lines for large scale multiplication.
- Protocol for Wine preparation using two promising genotypes was standardized and the cost was worked out. This protocol is being tested for repeatability for large scale production and for comparing with other wines that are available.
- New crosses were initiated using diverse finger millet lines for future use in the second phase of the project.
- Four papers were presented in the meeting.
  1. Keshava Murthy B C, Hanamareddy B, Rudresh N.S, Nagabhushana K, Appaji Gowda H.C, Girish T.N. and **Shailaja Hittalmani**, 2005. DNA marker analysis of chemically induced mutants of finger millet (*Eleusine coracana* (L.) Gaertn). *In* International conference on ‘Plant Genomics and Biotechnology: Challenges and Opportunities’. October 26-28, IGAU, Raipur, India.
  2. Nagabhushana K, Rudresh N.S, Appaji Gowda H.C. Keshava Murthy B.C, Sanath Kumar V. B. and **Shailaja Hittalmani**, 2005. Evaluation of recombinant inbred lines for yield traits and development of molecular markers in finger millet (*Eleusine coracana* Gaertn L.). *In*, International conference on ‘Plant Genomics and Biotechnology: Challenges and Opportunities’. October 26-28, IGAU, Raipur, India.
  3. Shailaja Hittalmani, Rudresh N.S, Nagabhushana K, Sanath Kumar V. B, Appaji Gowda H. C, Hanamareddy B.G. and Keshava Murthy B. C., 2005. Identification of genotype specific markers for elite genotypes of finger millet enrolled in farmer’s participatory varietal selection using RAPD markers. In International conference on ‘Plant Genomics and Biotechnology: Challenges and Opportunities’. October 26-28, IGAU, Raipur, India.
  4. Sanath Kumar V.B, Rudresh N.S, Appaji Gowda H.C, Nagabhushana K. and Shailaja Hittalmani, 2005. Phenotypic evaluation of recombinant inbred lines of finger millet (*Eleusine coracana* (L.) Gaertn) against blast disease at different locations of southern Karnataka. In International conference on ‘Plant Genomics and Biotechnology: Challenges and Opportunities.’ October 26-28, IGAU, Raipur, India.
- One student completed M.Sc thesis on nutritional tonal aspects of finger millet and standardized the preparation on finger millet wine. Ms. Shashikala P.G.
- Three manuscript are prepared for publication and one review article on participatory breeding in English and in Local language Kannada.

#### Rice biodiversity (Thailand)

- The project provided a major part of the technical inputs in the Technical Symposium on Weedy Rice. The symposium was organized by the Plant Protection Research and Development Office of the Department of Agriculture at Hotel Rama Gardens on October 21, 2005. Participants,

numbered about 200, included researchers and field officers from both the private and public sector. We contributed 14 of the 23 technical papers published (with support from a consortium of agricultural supply companies and public sector) in the proceedings of the symposium (edited by project researchers: S. Jamjod and C. Maneechote).



The entire proceedings (in Thai, with English Abstracts) can be accessed at <http://agronomy.agri.cmu.ac.th/pnlab/data/WR2005Full.pdf>

- We (B. Rerkasem and K. Rerkasem) contributed “On-farm conservation of rice biodiversity as a model for *in situ* conservation of genetic diversity of agricultural species”, an invited lecture for an FAO international training workshop on *in situ* conservation in Bangkok on October 29 – November 2, 2005. The paper is now available at <http://agronomy.agri.cmu.ac.th/pnlab/conference.asp>
- Researchers (C. Maneechote and S. Jamjod) attended the 20th Asian-Pacific Weed Science Society Conference, November 7-11, 2005. Ho Chi Minh City, Vietnam, and presented a paper entitled, “Farmers' participation in development of integrated methods of weedy rice control in Thailand.”
- PI attended national consultation of experts on “Conservation and Protection of Thai Rice Germplasm” organized by Thai Rice Foundation at Kasetsart University on November 29, 2005.

### Awards and honors

- 3 MSc students (Suwanee Laenoi, Pennapa Jaksomsak, Amena Promin) have been awarded research scholarships from Thailand Research Fund.
- 3 PhD students have been awarded scholarships: Burapa University Faculty Development: Prateep Oupkeaw; Royal Golden Jubilee Scholarship from Thailand Research Fund: Ayut Kongpan and Ekkasit Phongphitak.
- 1 PhD student (Netnapha Insalud) won best paper award and 3 MS students (Dang Huu Thang, Adirek Punyalue, Utumporn Chaiwong) best posters at the 4<sup>th</sup> Annual Meeting of Crop Science Meso Groups, 26-27 October 2005, Rayong.

### Publications

1. Youpensuk S, Yimyam N, Lumyong S, Dell B and Rerkasem B. 2005. Arbuscular mycorrhizal fungi associated with upland rice in a rotational shifting cultivation system. *International Rice Research Notes* 30: 22-23
2. Rerkasem B and Rerkasem K. 2005. On-farm conservation of rice biodiversity as a model for *in situ* conservation of genetic diversity of agricultural species”, an invited lecture for an

FAO international training workshop on in situ conservation in Bangkok on October 29 – November 2, 2005. The paper is now available at <http://agronomy.agri.cmu.ac.th/pnlab/conference.asp>

3. Maneechote C and Jamjod S 2005 (Eds.). Proceedings of Weedy Rice Symposium, 21 October 2005, Bangkok, Thailand. Plant Protection Research and Development Office, Department of Agriculture, Bangkok. Publication supported by a consortium of agricultural chemical companies and Plant Protection Association of Thailand.

### Sweetpotato breeding (Uganda)

- Dr. Philip Stevenson, the principal investigator (PI) of the Natural Resources Research Institute (NRI), UK, and Dr. Craig Yencho, the PI of North Carolina State University (NCSU), USA, visited Uganda (November 13-18, 2005) to review progress and plan for year three activities of the NCSU-NRI-Ugandan sweetpotato project. Besides reviewing and planning the project activities, the team met at the International Potato Center (CIP) Kampala office on November 11, 2006. Present in the meeting to interact informally and to discuss ways of strengthening of any related sweetpotato project activities were:
  1. Helen Heyd (Ph D student, University of Hohenhin, German)- working on Harvest Plus Program nutrition component in Uganda
  2. Berga Lemaga (PRAPACE Coordinator),
  3. Regina Kapinga, Patience Byaruhanga, Michael Potts, Stella Sengendo, Silver Tumwegamire (CIP team based in Kampala),
  4. Benson Odongo, Robert Mwanga and four graduate students (Benard Yada, Muyinza Harriet, Godfrey Kisembo, Mauren Solera) working on sweetpotato based at Namulonge/Uganda. The team also visited the project on Promotion of orange-fleshed sweetpotato (OFSP) varieties through schools in urban and peri-urban communities of Kampala, Uganda, funded by Farm Africa/Maendeleo Agricultural Technology Fund (MATF). The graduate committee (P. Stevenson, B. Odongo, John Murumu, David Talwana) and R. Mwanga went over the PhD research plan for Harriet Muyinza [Makerere University (MU), Kamapala].
- Dr. Bob Goodman and Dr. Rebecca Nelson have been encouraging and helping in forming cross-linkages among partnerships and projects in-country and across regions. Here are a few examples where their efforts are paying off. Most of the times the principal investigators (PI) on our partnership visit Uganda, they give seminars and interact with students and lecturers/ professors at Makerere University (MU). One of the outcomes of Dr. Yencho's interaction with the faculty at MU was a study visit for two months (October – November 2005) at NCSU by one faculty

member of MU, Dr. Phinehas Tukamuhabwa. The Vegetable Oil Development Project/Ministry of Agriculture, Uganda, funded the visit. Although his study visit was on soybean, he was greatly impressed by the program of horticulture at NCSU. The Faculty of Agriculture of MU is currently pursuing collaboration with NCSU to develop the curriculum of horticulture at MU. The PIs give lectures, seminars and supervise student theses at MU. These are spill-offs of the sweetpotato project in Uganda funded by the McKnight Foundation.

- Namulonge Agricultural and Animal Production Research Institute (NAARI) was selected for organizing and conducting the Master Trainers' Course for sweetpotato integrated production and pest management farmer field schools (IPPMFFS) for East Africa. NAARI has the right set up for training and has in its neighborhood vivid examples of sweetpotato research translated into grass root changes due to uptake by communities of improved sweetpotato technologies especially varieties and to a less extent processing. When it was proposed to conduct the Master Trainers Course in other countries trainees in the previous three courses (2002, 2003, 2005) strongly suggested the course venue not to be moved from NAARI. In Uganda, most of the sweetpotato research and technology generation that have fed into the FFS have been funded by the McKnight Foundation. The FFS efforts have led to the development of a manual designed for sub-Saharan Africa [Stathers, T., S. Namanda, R.O.M. Mwanga, G. Khisa, and R. Kapinga. 2005. Manual for Sweetpotato Integrated Production and Pest Management Farmer Field Schools in sub-Saharan Africa. International Potato Center. Kampala, Uganda. pp 168 +xxxi. ISBN 9970-01-X]. The sweetpotato FFS activities are funded by DFID and are a collaborative effort of NRI/UK, CIP, National Agricultural Research Organization (NARO/NAARI)/Uganda, FAO IPPM FFS Program/Kenya, and the Crop Protection Program/UK.

#### Sweetpotato diversity (Kenya)

- Ph.D studies for Douglas Miano continued at Louisiana State University. Douglas has been working on DNA samples he extracted from sweet potato in Kenya. The interest has been on identifying the virus causing the symptoms observed in the Kenyan fields which are similar to those caused by sweet potato leaf curl virus (SPLCV). Using both degenerate and specific primers, he has detected the presence of a geminivirus in eight samples. Partial sequence has revealed over 90% homology to SPLCV. This is the first report of a geminivirus to be identified infecting sweet potato in Kenya, and the East African region. The presence of the virus will be a big challenge to dissemination of clean planting materials especially because geminivirus-infected plants do not show symptoms, but may cause considerable loss in yields.
- MSc. Studies for Johnson Kwach in Kenya and Theresia Ngendello in Tanzania continued successfully. Johnson Kwach, whose thesis research is on agronomic evaluation and farmer selection criteria for sweetpotato varieties in western Kenya, harvested the long rains mother and baby experiments in 4 agro-ecological zones in October, 2005. Analysis of the data has been completed and planting of the short rains experiments was done in November and December, 2005. The current severe drought may affect these trials. Theresia Ngendello successfully completed her first year's courses. She is currently preparing to start her thesis research on culinary qualities and farmer's preferences in sweetpotato varieties.

- Post harvest training of 110 farmers was conducted between 15<sup>th</sup> and 29<sup>th</sup> October in Miatu, Misungu and Serengema Districts in the Lake zone of Tanzania. The current severe drought in many parts of Kenya and Tanzania adversely affected the FFS activities, breeding trials and seed multiplication activities. The project planted conservation nurseries at Ukiriguru, Kabete, Kiboko and Kakamega. In Tanzania 6 varieties selected by the project have been submitted for official release.
- The project key partners met to finalize development of a renewal proposal on 18<sup>th</sup> and 19<sup>th</sup> November, 2005 in Nairobi Kenya. The meeting was attended by Don LaBonte (Louisiana State University), Kornel Burg (Austrian Research Centres, Seibersdorf), Mr. Silver Turygamwire (International Potato Centre), Simon T. Gichuki and Violet Gathaara (Kenya Agricultural Research Institute). The participants visited with CIP's new Regional Representative for Sub-Saharan Africa, Dr. Jan Low and toured the newly established biotechnology facilities at the Bioscience Centre for East and Central Africa (BECA). The team developed draft outline for the renewal proposal and agreed on the key issues of project management, coordination, communication, monitoring and evaluation as well as provisional budgets and workplans.
- A core group of Kenyan and Tanzanian collaborating scientists met again in Nairobi between 19<sup>th</sup> and 24<sup>th</sup> December 2005 and finalized the proposal including the workplans and budgets. This core team included Simon Gichuki (Molecular breeder and principal Investigator for the project), Jeremiah C. Simon (Entomologist and PI - LZARDI), Stella Makokha (Socio-economist, KARI), Violet Gathaara ( Socio-economist, KARI), Rhoda Nungo (Food scientist, KARI), Elizabeth Rwiza (Food scientist, LZARDI) and Johnson Kwach (Breeder, KARI). Simon Gichuki and Stella Makhoha fine-tuned the proposal and prepared the relevant support documents and submitted it to the CCRP for consideration. The renewed proposal aims to address the entire process of sweetpotato value chain from production to consumption. It focuses on research gaps in the region and builds on the results and progress so far achieved by the project in addressing sweetpotato production constraints in East Africa.
- Dr. Jan Low, an agricultural economist, took up her new position as CIP's Regional Representative for Sub-Saharan Africa in October, 2005. Jan has previously worked for the promotion of orange-fleshed sweetpotato in Kenya and Mozambique. The CCRP East African sweetpotato diversity project welcomes her back and looks forward to renewed collaboration with CIP in development of sweetpotato in the region. The project also got an additional boost with the posting of Stella Makokha, a socio economist to the KARI Biotechnology Centre which coordinates the project. Stella has just completed her PhD and will be playing a prominent role in this project as she joins the team of Simon Gichuki and Violet Gathaara in coordination, monitoring and evaluation of the project

### Tef (Ethiopia)

- In Ethiopia, the National Variety Release Committee has evaluated three candidate varieties of high grain quality for market purposes. The performance data submitted to the Committee are unequivocal, which was also visible in the verification field trials. Therefore, we expect that at least one of the three candidate varieties will be officially approved in May 2006. These candidate varieties were developed from a targeted cross (DZ-01-196 x DZ-01-974) intended to combine high seed-quality (DZ-01-196) and higher yield and good plant stature (DZ-01-974). An interesting development in our Participatory Variety Selection (PVS) was the increasing acceptance of the released variety, DZ-01-196, in the farming communities around Adet Agricultural Research Center, Northwest Ethiopia. The initial seeds were distributed from the Center's PVS activity. Because DZ-01-196, unlike other tef varieties grown in the area, has a clear purple lemma color one can easily spot it in the field.
- A training course was held on "Tef Research Methodology" during 13 - 15 October 2005 at Debre Zeit Agricultural Research Center. The overall aim of the training was to bring together tef researchers from the various Centers participating in the National Tef Research Project and increase their knowledge and capacity in conducting tef research. The specific objectives were: To create awareness and broaden researcher's outlook at countrywide and international levels, evaluate and devise mechanisms of effective tef research coordination, promote the spirit of cooperation among researchers and institutions, and to sharpen the research caliber at individual level. The course focused on different disciplines of tef production, and research and development. Relevant topics covered were the following; basic biology of tef (evolution, genetic diversity and molecular genetics), hybridization and handling of segregating populations, conducting efficient tef research in the different disciplines (agronomy/breeding/nutrition/pests), quality breeder-seed production, potentials of participatory approaches in tef research, current and potential applications of biotech tools (anther culture/marker-assisted-selection/transgenics) in tef, and international perspectives in tef production and research. These topics were addressed through presentations, discussions, demonstrations and field visit. Ten individuals, most of them with BSc or MSc degrees, attended the course. At the end, participants evaluated the course through questionnaire and their overall judgments were from very good to excellent.
- A manuscript titled "Expressed Sequence Tag Analysis in Tef [*Eragrostis tef* (Zucc) Trotter]", and co-authored by Ju-Kyung Yu, Qi Sun, Mauricio La Rota, Hugh Edwards, Hailu Tefera, and Mark E. Sorrells, has been accepted for publication in the journal "Genome". Among 126 finger millet markers, provided to us by Dr. Katrien Devos, University of Georgia, 72 (57%) were functional with tef DNAs and five showed length polymorphism between tef mapping parents. The sequence variations of monomorphic markers will be tested using SSCP (single strand conformation polymorphism) method. These finger millet markers will be mapped on tef and will be used for comparative analysis among tef, finger millet and rice.

### Wheat scab (China)

- Evaluated 258 local germplasms for resistance to infection of *Fusarium* spp. through a 2-replication trial. There was significant difference in resistance among the lines but not between the replications. Sixteen of these lines showed resistance similar to the resistance control ‘Wangshuibai’.
- From the progenies of Wangshuibai treated with EMS, 83 lines showed susceptibility to scab. Through two-year trials, we concluded that eleven of them are significantly more susceptible than Wangshuibai (Table 1).

Table 1 Comparison of the scab susceptibility of the mutants with Wangshuibai

Lines	NDS14 (2005)a	PIS (2004)b	Lines	NDS14(2005) )	PIS (2004)
Wangshuibai	0.98	0.30	234000	3.27**	0.55*
MY87-19	11.02	0.76	234010	1.47**	0.55*
233992	1.53**	0.60**	234040	1.96**	0.58*
234091	2.07**	0.77**	233955	1.21*	0.53*
233990	1.56*	0.59**	233981	1.24*	0.52*
234062	1.07*	0.63**	234077	1.58*	0.55*
233951	1.98**	0.55*			

\*: P=5%, \*\*: P=1%, NDS: number of diseased spikelets, PIS: percent infected spikes

- Using the resistance germplasms we identified through field survey as the parents, 71 SSD populations have been created to map the resistance genes and pyramid scab resistance genes. Breeding lines are also being developed through SSD or backcross using the elite cultivars as one of the parents.
- To characterize the genetic basis of scab resistance in ‘Wangshuibai’, we conducted quantitative trait loci (QTL) mapping for type I and type II resistance using a recombinant inbred line (RIL) population created by single seed descent from ‘Nanda2419’×Wangshuibai and a molecular marker map of 3410 cM constructed using RAPD, SSR and EST-STS markers. The results showed that type I resistance had higher broad sense heritability than type II resistance. The major QTLs for type I resistance in Wangshuibai were mapped to chromosomal regions in 4B and 5AS (Table 2), and those for type II resistance were mapped to chromosomal regions in 3BS and 6BS (Table 3). Within each type, the QTLs functioned additively. Epistasis analysis showed that co-adapted gene complex and complementary epistasis QTLs also conferred the scab resistance. For type I resistance, significant QTL x E interactions were detected. The molecular markers tightly linked to the QTLs will accelerate

the use of Wangshuibai in wheat improvement for scab resistance. These kinds of information will be useful for improving scab resistance through breeding.

Table 2 QTL for Type I resistance QTLs in Wangshuibai genome

Interval	Location	Length (cM)	Peak position (cM)
Xwmc322~Xmag615-1	3AL	16.4	Xwmc322+10
Xgwm149~Xcfd22-2	4B	5.5	Xgwm149+0
Xmag1281~Xmag1036-2	5AS	10.8	Xmag1281+9
Xgwm408~Xbarc140	5B	26.2	Xgwm408+0

Table 3 QTL for type II resistance QTLs in Wangshuibai genome

Interval	Location	Length (cM)	Peak position (cM)
Xgwm389~Xgwm533-3	3BS	9.4	Xgwm389+6
Xgwm644~Xwmc341	6BS	3.4	Xgwm644+2

- Near-isogenic lines for four major QTLs have been developed through marker assisted selection using elite lines as the recurrent parents and their resistance performance will be evaluated. These lines, once confirmed for the resistance performance, will be distributed to breeders as germplasms.
- Five persons attended the Sixth Plant Genomics Conference in China, held in Kunming, Yunan. Co-PI Dr. Z. Q. Ma also attended the International Symposium on Genomics-based Plant germplasm Research held in Beijing, the Sino-German meeting on Plant genome research enhancing stress resistance of major crops held in Wuhan and the Proceedings of the 2005 International Conference on Plant Breeding held in Sanya, China and presented their research on scab resistance orally.
- Academic exchange:
  1. Ma ZQ. Genetic basis of Scab resistance in the local wheat germplasm 'Wangshuibai'. Intl Symp on Genomics-based Plant germplasm Research, April 25-28, 2005, Beijing, China. (Oral).
  2. Ma Z.Q. Ma. Toward dissecting the molecular basis of scab resistance in wheat. Sino-German meeting on Plant genome research enhancing stress resistance of major crops. OCT 12.-13, 2005, Wuhan, China. (Oral).

3. Ma ZQ. Genomics-based studies of a few traits of wheat. Proc. the 2005 Intl Conf on Plant Breeding, Oct. 27-30,2005, Sanya, China. (Oral).
4. Yang YZ, NIH molecular geneticist. Signaling in skeletal development, Aug. 4, Nanjing Agricultural University.
5. Sorrells, ME, Wheat Geneticist and breeder, Cornell University. Seminar; (1) Comparative DNA sequence analysis of mapped wheat ESTs reveals complexity of genome relationships between rice and wheat, (2) Association Mapping as a Breeding Strategy, (3) Marker assisted selection, principles and case studies. Also held discussion on comparative genomics, association mapping and comparative genomics, Oct 19-29, Nanjing Agricultural University.

- Publications:

1. F. Lin, S.L. Xue, Z.Z. Zhang, C.Q. Zhang, Z.X. Kong, G.Q. Yao, D.G. Tian, H.L. Zhu, C.J. Li, Y. Cao, J.B. Wei, QY Luo, Z.Q. Ma. 2005. Mapping QTL associated with resistance to Fusarium head blight in the Nanda2419 × Wangshuibai population. II. Type I resistance. Theor Appl Genet, <http://dx.doi.org/10.1007/s00122-005-0156-3>.
2. Z.Q. Ma, C.Q. Zhang, F. Lin, S.L. Xie, Dagang Tian, Z.X. Kong, D.M. Zhao, H.Y. Yi. 2005. Genetic basis of Scab resistance in the local wheat germplasm 'Wangshuibai'. Intl Symp on Genomics-based Plant germplasm Research, April 25-28, 2005, Beijing, China. P62.
3. Z.Q. Ma. 2005. Toward dissecting the molecular basis of scab resistance in wheat. Sino-German meeting on Plant genome research enhancing stress resistance of major crops. OCT 12.-13, 2005, Wuhan, China. p15.
4. Z.Q. Ma. 2005. Genomics-based studies of a few traits of wheat. Proc. the 2005 Intl Conf on Plant Breeding, Oct. 27-30,2005, Sanya, China. P12.
5. Zhongxin Kong, Kun Wu, Jinyan Wang, Fei Ma, Guoqi Yao, Zhengzhi Zhang, Caiqin Zhang, Zhengqiang Ma. 2005. Establishment of a mutant library for wheat, Conference of Plant genomics in China VI, p229.
6. Shulin Xue, Feng Lin, Dagang Tian, Chunjun Li, Yong Cao, Zhongxin Kong, Haiyan Jia, Zhengzhi Zhang, Caiqin Zhang and Zhengqiang Ma. 2005. Detecting QTLs for wheat scab resistance using two different disease evaluation strategies. Conference of Plant genomics in China VI, Aug 17-20, 2005, Kunming, China. p55.