Common bean (*Phaseolus vulgaris*) is grown in Ethiopia on an estimated 267,000 hectares by more than 2.4 million smallholder farmers. The wide range of growth habit characteristic of the species has enabled the crop to be successfully cultivated under a number of different agro-ecological conditions. Beans are popular with Ethiopian farmers because the crop is fast maturing, providing a good source of both food and income at a time of the year when other crops have not yet matured.

The major producing regions in Ethiopia are in Oromiya state and in the Southern Nations and Nationalities of Peoples Region. Production in the Central Rift Valley is dominated by small white seeded types mainly destined for the export market. Elsewhere, the crop features much variation in seed color, seed size and seed shape, and much of the production is grown for domestic consumption.

The Southern Agricultural Research Institute (SARI) heads the national bean improvement program in the southern part of Ethiopia. Support from Kirkhouse Trust is now allowing us to establish the first molecular laboratory facility in the region, with the aim of integrating marker assisted selection into the breeding programme.

The infrastructure before and after the arrival of KT: The SARI bean improvement programme prior to KT’s involvement lacked any facility to carry out marker assisted selection. The breeding programme was therefore reliant on conventional phenotypic selection. Back crossing was used in some of the programmes, but progress was slow as the number of generations needed to recover the recurrent parent type was large.

Following the decision of KT to include SARI in the ABC, we have moved rapidly to (1) erect a screen house to be used for making and raising of crosses and for pathology screening; and (2) to renovate and equip a room to serve as a molecular biology facility, in which our staff will learn and then carry out marker assisted selection. KT’s financial support has allowed us to recruit and train two technicians at BSc level to run the laboratory. We are optimistic of being able at last to incorporate marker technology into our back crossing programmes, which will certainly accelerate the introduction of key resistance genes into locally favoured bean varieties.

Acknowledgements: I thank KT for the opportunity to train as a scientist in the area of modern molecular assisted breeding and the financial support which has been provided to improve our infrastructure. I also acknowledge the continuing support given by SARI, which has provided the necessary land and buildings.

Yayis Rezene is the PI of the new ABC project at SARI and has recently started his PhD at Addis Ababa University.
ABC Ethiopia: Introductions

My name is Mihiret Tadesse. I have a Bachelor's degree in Applied Biology from Woliata Soddo University where I was conducting research on identification and uses of mushrooms at Humbo. I am currently working in the KT laboratory based at SARI and my responsibility is to run the molecular marker activities in the laboratory. I was very pleased to participate in the 2014 ABC annual meeting held in Hawassa. The ABC meeting helped me acquire all sorts of new and interesting information, which I am sure will be very useful in making my work more effective.

Bethel Mulugeta: I have a BS degree in biology and am currently studying towards an MSc degree in microbiology at Hawassa University, Ethiopia. I am one of the two lab technicians working in the SARI molecular and pathology laboratory funded by KT. My job is to handle the pathology aspects of the programme. Even though it has only been a few months since I joined the ABC project, I feel that my knowledge is being added to every day. In particular, the 2014 ABC annual meeting held here in Hawassa was a very educative and exciting experience; it gave me a big push and energy for the work I will be doing.

The 8th Annual African Bean Consortium (ABC) meeting 2014 By Dr Esther Arunga

Since 2010, I have attended five ABC meetings in different countries in East Africa: Uganda, Rwanda, Tanzania and Ethiopia. During each annual meeting, there have always been new and exciting presentations and training in addition to sharing the achievements of the other projects. The annual meetings include various workshops and demonstrations, with presentations given by both young and experienced scientists in my research area. I have learned lots of new things in one way or the other from each presentation. Particularly, I have benefited from the mentorship that comes from the expertise.

The 2014 meeting had some particular experiences. We had to make the long journey of 215 Km from Addis Ababa (the capital city of Ethiopia) to the lake city of Hawassa. The city of Hawassa, where the ABC meeting was held, is home to the Southern Agricultural Research Institute (SARI). The good weather we had the fortune to enjoy made the meeting very pleasant.

The meeting started by various presentations and project progress reports which were very fascinating on their own merit. The achievements of each presenter on marker discovery, development of new varieties and characterization of different disease pathogens were presented from various countries. The most interesting part for this session, was that researchers shared their challenges and none of them left with unresolved issues.

The workshops on statistics and the component of post-harvest handling of beans were additional features of this meeting. The statistics session by Dr. Robert Koebner emphasized the need to get the statistics right first – manually. Actually, errors do occur even in data entry with computers.

The PICS bags could not go unnoticed because they were new and unique additions for the ABC meetings. They actually drew my attention a little bit from molecular markers. The enthusiastic presentation by Dr. Hippolyte Affognon reminded me that everybody in the bean value chain, including myself, needs to understand the importance of ensuring the viability and health of the seed long after it has been harvested. The PICS bag represents an amazingly simple but effective way of avoiding post harvest damage caused by bruchids.
The 8th Annual African Bean Consortium (ABC) meeting 2014 (continued)

As usual, I took a keen interest in Tamara Miller’s and Prof. Paul Gepts’ presentation on marker discovery. The steps they took in the bioinformatics tool (PhaseolusGenes Database) to identify new markers really stimulated my thinking. I appreciated the fact that bioinformatics is a cutting edge technology that is fast and can make research easy with its special features of data acquisition, storage and analysis. I went back to Kenya having faith that the unidentified genes in my program will be identified using the PhaseolusGenes tool. I cannot close my story without mentioning the journal club that has now become part of the annual meetings. The papers that we critique bring new styles of writing, new concepts and techniques. The paper critique session has made me a better writer and reviewer.

Lastly, I appreciate the various experts I have met in the five ABC meetings. Prof. Mike Timko, Dr. Merion Liebenberg, Prof. Paul Gepts, Prof. Nchimbi Msolla, Dr. Reuben Otsyula and Dr. Claire Mukankusi are among the many people who have inspired my bean research. When I read their achievements, I surge forward for the ultimate goal, ensuring the African farmer’s bean store has plenty for consumption and market. Thanks to Kirkhouse Trust Administration for ensuring that every time these meetings have been such a success.

Esther Arunga is the PI of the Kirkhouse Trust funded French Bean project at Embu University College, Kenya.

The ABC 8th Annual meeting: from the organizer’s point of view By Yayis Rezene

The 8th ABC Annual Meeting and training workshop was held from July 18 to 20, 2014 in the Haile Resort at Awassa, hosted by the Southern Agricultural Research Institute (SARI). It was an opportune time to renew contacts and to discuss issues of mutual interest with all of our colleagues from the ABC consortium. The agenda of the meeting and the subsequent training workshop covered a wide range of interesting items relating to the progress and update research work in each partner’s country and included the planning of future research activities, especially those directly related to bean molecular biology and pathology. The wonderful effort made by KT and their generous supply of funds and scientific materials continue to help us African scientists to incorporate modern molecular methods into our bean improvement programmes, which are focussed on introducing multiple sources of disease resistance and increasing the production and food security of the low income farming community.

What needed to be done in the lead up to the meeting: In the lead up to the meeting, you will need to take responsibility to ensure that everything is done to make the meeting a success. This involves lots of planning of time lines. Be warned, though! Being very effective can attract notice, which often brings upon you further responsibilities. If you discharge your responsibilities well, you will probably be landed with even more work.

What the meeting covered: The meeting involved lots of different interactions all focused on the same goal. The major focus was towards understanding the progress made in each partner’s country, which included related student projects where the students were supported by the Trust. I was also impressed with PIs’ presentations, which were well organized and analyzed the challenges and opportunities in each country’s program. Each PI had some of his or her own ideas, which were freely shared with everyone. The experience I gained during these meetings will be very helpful for my future research programme. The topics included aspects of molecular breeding and pathology research, as seen in the context of each partner country. We also were exposed to some training on appropriate statistics and marker discovery.

What delegates may have gained from the experience: Every delegate should have learned something of relevance during the meeting, as well as benefiting from the sharing of knowledge which may enhance the way in which they implement their bean improvement programmes.
Developing multiply disease resistant common bean cultivars for Rwanda using marker assisted selection By Dr John Nzungize

Our programme’s over-riding objective is to strengthen Rwanda’s national capacity for bean breeding by taking advantage of marker assisted selection. Our specific objectives are:

- To transfer resistance against anthracnose, root rot and bean common mosaic virus into cultivars recognized as being desirable to the consumer and producer, but which are susceptible to these diseases.

- To enable the development via marker assisted selection of marketable bean cultivars carrying multiple resistance genes.

- To implement and strengthen the capacity of the local scientists and technicians in the use of marker technology.

A number of pathogens are responsible for reducing the productivity and/or increasing the production cost of the bean crop. Including genetically-based resistance to the most important of these pathogens is a major objective of breeding programmes. Where a marker linked to one or more of such resistance genes can be identified and exploited, selection for resistance can be carried out in the absence of any visible symptoms of disease. In this way, several independent resistance genes can be incorporated simultaneously. At least 15 resistance genes protecting against infection by Colletotrichum lindemuthianum, the causal pathogen of anthracnose, are known, and markers are available for six of these (Co-1, Co-2, Co-4, Co-5, Co-6 and Co-9); these six genes each lie on a different linkage group. The breeding line G 2333 harbours two of these genes (Co-4, Co-5) and also Co-7. Markers for the former pair will be used in the RAB ABC project to incorporate anthracnose resistance using marker assisted selection into a locally favoured, but anthracnose susceptible cultivar. The project’s activity will be centred at the RAB laboratory and screen house Kigali. KT have provided the support to renovate a pre-existing screen house and will be underpinning the marker work by providing the necessary laboratory supplies.

In terms of capacity building, I was granted a scholarship to enable me to conduct my PhD research work, during which I was fortunate to be sponsored to participate in a conference in the Netherlands, where I presented a research paper. This was very exciting for me as it was an opportunity not only to share my research results but also to be informed on what other researchers are doing in my research area. After my PhD was concluded, I returned to RAB, where I was appointed as a principal researcher, working both in the bean breeding programme and also coordinating research activities for other crop-based programmes. As the bean breeder, I was responsible for developing the RAB proposal to improve common beans supported by KT. We have included two students (1 MSC and 1 PhD) as part of the programme, which also provides the salary for two technicians, working on both marker technology and pathology.

I would like to express my deep gratitude to KT for giving me the chance to share this information in the Newsletter and also for their unbroken financial support over a number of years.

Dr John Nzungize has now left RAB; we would like to welcome Alice Kabeja who will be the new PI for the ABC project.

ABC Rwanda: Introductions

My name is Francoise Mururunkwere, from Rwanda. I hold an MSc degree from Makerere University (Uganda) in Plant Breeding and I am presently (since July 2014) a PhD student at Sokoine University of Agriculture (Tanzania) supported by the Kirkhouse ABC project and the Rwanda Agriculture Board. My research topic is Improving resistance to bean common mosaic virus and root rot using gene pyramiding in Rwandan common bean varieties. I am expecting that the output of my research work will contribute a lot to the bean programme.
in Rwanda and to bean production in general, given that these diseases are among the major constraints to bean production in Rwanda and the use of resistant varieties is the most economically and efficient way to manage plant diseases. This is particularly the case for seed- and soil-borne pathogens, since these are difficult to control by other usual pathogen control methods. I am at the stage of research proposal writing. The research will have a component of determining the diversity of the BCMV/BCMNV pathogen in Rwanda and an evaluation of how the viruses are transmitted through the seed.

My experiences travelling to and studying at Sokoine University of Agriculture: Sokoine University, where I am studying, is in Tanzania, at Morogoro, far from Dar es Salaam. When I went there for the first time I felt a bit uncomfortable, but I realized that this was a wrong impression; the people are friendly and I was well received and well guided for social and academic aspects.

My name is Annuarite Uwera. I’m from Rwanda and I work for the Rwanda Agriculture Board (RAB) as a junior researcher. Currently I am an MSc student at Sokoine University of Agriculture (SUA) in Tanzania. My research work focuses on improving common bean by incorporating resistance against anthracnose and root rot in Rwanda through the use of marker assisted selection.

My experiences travelling to Tanzania and studying at Sokoine University of Agriculture: Going to SUA was my first experience of Tanzania. The trip was very long but interesting. Very long, because I left Kigali in the early afternoon, and did not arrive at SUA until midnight. Interesting because it gave me the chance to see some of the natural beauty of Tanzania. I have learned a lot about Tanzanian culture. I have enjoyed the coursework, which was very instructive, and have been able to pick up lots of knowledge from my supervisors and the technical staff at SUA, as I used to spend a lot of my free time in the laboratories learning about DNA extraction, gel preparation, etc. By now I feel like I am at home. I would like to take this opportunity to thank SUA and RAB for allowing me pursue my post graduate studies. I am also grateful to KT for providing the necessary financial support. I do hope this collaboration will last for some years to come, since I think that I would like to continue studying up to the PhD level.

My name is Jovia Kamatenesi and I work with the Rwanda Agriculture Board (RAB), based at Head Quarters Kigali - Rwanda. I have served as a seed pathologist with the seed unit in the Rubilizi station National Seed Laboratory since 2012 November. I am responsible for providing technical support to scientists and students doing their internship within the National Seed Laboratory. I gained my BS degree in Biotechnology from the Kigali Institute of Science and Technology (KIST) in 2011.

In additional to my current responsibilities within the seed unit, I have been nominated as the technician in charge of the marker assisted selection activity in common beans under the project “Development of Common Bean lines with multiple disease resistance in Rwanda using Marker Assisted Selection” funded by KT. I recently attended the training programme “Introduction to Molecular Biology and Bioinformatics”, held in Bioscience Eastern and Central Africa in Nairobi, Kenya, which is really useful for my current job. I have also been trained by the USDA in the detection of maize chlorotic mottle virus.

Angular Leaf Spot (ALS) collaboration work between Tanzania and Puerto Rico By Luseko Chilagane

Following an invitation by Dr. Tim Porch from USDA - ARS, TARS and funding by the Norman Borlaug Commemorative Research Initiative between USAID Feed-the-Future and USDA-ARS, I was able to travel to Puerto Rico in the month of September 2014. The aim of the invitation was for me to participate in the ALS (Angular leaf spot) and BNF (Biological Nitrogen Fixation) workshop. The nomination was due to the work that I am doing on ALS in Tanzania as part of my PhD research funded by the Kirkhouse Trust project and the similar kind of work on ALS that is being done by a PhD student from University of Puerto Rico. The focus was to assemble and share common protocols and experiences on ALS and BNF.
research and possibly initiate a collaborative research effort in these two research areas.

After my arrival I started working with Dr. Consuelo in Juana Diaz mainly on Biological Nitrogen Fixation. With her I was able to learn different protocols and procedures of isolation of the Rhizobia bacteria, differentiating different strains of Rhizobia and ways of testing the efficacy of different strains of the bacteria in the lab and in the screen house. In the station I had the opportunity also to visit some field trials on heat stress of the Andean Diversity Panel (ADP) and we did some evaluation (Data collection) on response to heat stress.

After finishing this part of workshop on BNF, I travelled back to Mayaguez where I worked on ALS at the TARS – Mayaguez in Dr. Porch’s lab. This work was done in collaboration with another PhD student from the University of Puerto Rico, Luz Miryam Serrato. We worked together on isolation of the pathogen from leaves collected from Puerto Rico. We had some sample DNA for the different isolates of the P. griseola pathogen causing ALS from Puerto Rico and Tanzania. We worked together on running the PCR for amplification of the different genes, including the ITS region, Calmodulin (CAL), Actin (ACT) and the Small subunit (SSU) and we purified the PCR products and sent plates for sequencing and diversity analysis. This was just to put together some ideas to get a snapshot on the future collaborative work on the ALS isolate collections from Tanzania, Puerto Rico, and Guatemala.

I want to express my sincere thanks to Dr. Tim Porch for inviting me and for all the arrangements he did to make my stay in Puerto Rico valuable and to Kirkhouse Trust, for funding my research work on breeding for ALS resistance. You are of great help in my research endeavor. A big thank you!

Luseko Chilagane is a Kirkhouse Trust funded PhD student at the Sokoine University of Agriculture, Tanzania

Awards and graduations

- **Professor M. Byre Gowda** has been awarded the "NAGAMMA DATTATREYA RAO DESAI AWARD for outstanding adaptive Agricultural Research for Agro-climatic region of Karnataka" for the year 2013-14. The award was presented on Foundation Day function of the university held on 15-10-2014 at University of Agricultural Sciences, Bangalore.


- **Mutsa Takwunda**, University of Namibia: Doctor of Philosophy, Reduction of the Reproductive Cycle in Marama Bean (Tylosema esculentum (Burchell) Screiber).

- **Emmanuel Nepolo**, University of Namibia: Doctor of Philosophy, Isolation and Characterization of Starch, Biosynthetic Genes, Protein and Protein Inhibitors from Marama Bean (Tylosema esculentum (Burchell) Screiber).

- **Anastasia Musyimi**, University of Nairobi: MSc, Marker assisted gamete selection for breeding large seeded common beans with multiple disease resistance in Kenya.

- **Samwel Njuguna Mwangi**, University of Nairobi: MSc, Gamete Selection for Multiple Disease resistance in Mesoamerican bean genotypes and race typing angular leaf spot, Phaeoisariopsis griseola, pathogen in Kenya.

The Kirkhouse Trust would like to thank all those who contributed to this newsletter.