



Feed the Future Innovation Lab for Climate Resilient

Chickpea

Newsletter – Spring 2016

Annual Meeting Review

2016 Annual Meeting of the Feed the Future Innovation Lab for Climate Resilient Chickpea



The 2016 Annual Meeting of the Feed the Future Innovation Lab for Climate Resilient Chickpea was held May 30 through June 2 at Ege University in Izmir, Turkey, jointly hosted by Professor Bahattin Tanyolac of Ege University and Professor Douglas Cook of University of California, Davis. Funding for the meeting was provided by the U.S. Agency for International Development, the U.S. National Science Foundation and the Global Crop Diversity Trust.

The four-day meeting involved 68 scientists from nine countries, participating in plenary sessions to communicate project outcomes and parallel working groups to set priorities and coordinate efforts. This year's working groups focused on pre-breeding, nitrogen fixation, disease resistance and genomics. Similar planning efforts conducted at the 2015 annual meeting in Addis Ababa resulted in tangible outcomes that were reported during the 2016 plenary session. Among those outcomes were substantive collaborations and progress in the areas of drought tolerance phenotyping, pre-breeding population development, nitrogen fixation, pod borer resistance and *Fusarium* disease resistance. New initiatives planned during the meeting include activities on heat tolerance to be conducted at the International Crops Research Institute for the Semi-Arid Tropics in India, phenotyping for components of plant architecture relevant to mechanical harvesting to be conducted in Ethiopia, and field testing of rhizobial inoculum for increased nitrogen fixation in Ethiopia and India.

The agenda, participant list, abstracts, and group reports are available on the Chickpea Innovation Lab website at ChickpeaLab.ucdavis.edu.



Director's Corner

Welcome to the Spring 2016 edition of the Chickpea Innovation Lab newsletter. Here we introduce you to new students and new connections among our partner institution, and highlight a major international conference on legumes in Africa.

Douglas Cook,
Univ. of California,
Davis
Professor,
Dept. of Plant
Pathology
Director, Feed the
Future Innovation
Lab for Climate
Resilient Chickpea
Director, NSF Project

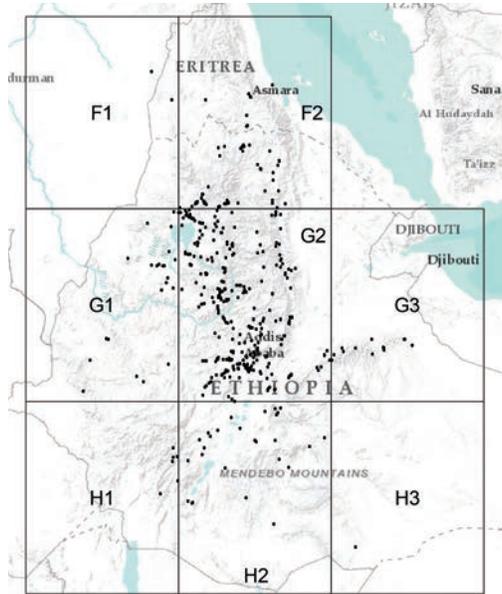
During this quarter, the Chickpea Lab brought together 68 international scientists from developing and developed world laboratories to review progress from 2016 and to plan activities and collaborations for 2017.



Comings & Goings

Mr. Gashaw Sefara is a Masters student in the Chickpea Innovation Lab from Hawassa University. He is currently conducting research at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India. Working under the guidance of entomologist Dr. Hari C. Sharma, Gashaw is characterizing wild and cultivated chickpea germplasm for antifeedant and resistance traits against the devastating pod borer insect pest.

Mr. Kassaye Dinegde and Mr. Syed Gul Abbas Shah Sani visited the laboratory of project coPI Dr. Sergey Nuzhdin at the University of Southern California. Kassaye and Gul, PhD students in Pakistan and Ethiopia, respectively, worked along side senior computational biologist Dr. Peter Chang to gain knowledge in computational analysis of chickpea landrace diversity. Both Kassaye and Gul are working with landrace collections from their respective home countries. By way of example, the geographical origin of Ethiopia landraces currently being analyzed by Kassaye is depicted in the adjacent figure, with a collection of >600 accessions spanning the geography and cultivation practices of chickpea from the early 1920's to modern times.



Geographical map documenting the origin of chickpea landraces across Ethiopia over the past 100 years.

- University of California, Davis
- University of Southern California
- Florida International University
- Ethiopian Institute of Agricultural Research
- Addis Ababa University, Ethiopia
- Harran University, Turkey
- Dicle University, Turkey
- International Crops Research Institute for the Semi-Arid Tropics
- International Center for Agricultural Research in the Dry Areas
- Aegean Agricultural Research Institute, Turkey
- Assam Agricultural University, India
- Banaras Hindu University, India
- EGE University, Turkey
- Grains Research Development Corporation, Australia
- University of Saskatchewan, Canada
- Legume Federation



Meeting Review – excerpts from the meeting website¹

Joint Pan-African Grain Legume and World Cowpea Conference February – March 2016 in Livingstone, Zambia

In Africa, grain legumes are sown over millions of hectares. Their capacity for symbiotic nitrogen fixation makes legumes key vehicles for the delivery of humankind's nutritional nitrogen and primary agents in the maintenance of soil health. In the developing world legumes contribute to the livelihoods of millions of farmers, including women and children, and they sustain the broader agrarian societies. Despite their overriding importance, a combination of factors contribute to large gaps between potential and realized legume yields throughout Africa. The cause of these yield gaps define much of the research and development agenda on legumes in Africa, including tolerance to abiotic and biotic stress, the need for improved agronomic practices and infrastructure, and better connection to markets.

The Joint Pan-African Grain Legume and World Cowpea Conference was organized by the International Institute of Tropical Agriculture (IITA), the Feed-the-Future Innovation Lab for Collaborative Research on Grain Legumes (Legume Innovation Lab), and the International Center for Tropical Agriculture (CIAT), in collaboration with major international agricultural research organizations and development partners and sponsors. The goal of the conference was to create synergies and enhance networking and collaboration on grain legume research.

Douglas Cook² gave an overview presentation on "Agriculture Under Stress", emphasizing the complexity of stress responses in crops and the need for a combined approach to improve legume production in Africa. He noted that drought and heat predispose legumes to pests and disease, and they reduce rates of vital nitrogen fixation, while the seasonality of pest and disease incidence pushes legume cultivation into periods of low moisture availability. Combining new sources of genetic variation with modern breeding, genomics and phenotyping technologies represents an essential way forward, according to Cook.

¹Text for this article was taken from the conference website at <http://gl2016conf.iita.org/>.

²Conference presentations are available on the conference website including the full presentation by Douglas Cook.

Student Profiles



Susan Moenga

Ph.D Student
Plant Biology
University of California, Davis
United States of America

Blog: Chickpea Wild Relatives: Using Science to Change the World
www.CWRdiversity.org
Under “News” & “Feature Stories”

Susan Moenga is a Ph.D. student in the Plant Biology Program at the University of California-Davis. Her research is supported jointly by a fellowship from the Legume Innovation Lab at Michigan State University and by the Global Crop Diversity Trust. Within the Chickpea Innovation Lab her research aims to understand the physiological and molecular mechanisms of drought tolerance in wild chickpea.

“I am interested in beneficial, adaptive drought responses in wild chickpea relatives that can be of interest to downstream breeding efforts for drought tolerance in chickpea. We hypothesize that the much higher degree of genetic diversity present in wild relatives compared to cultivated chickpeas, includes adaptive variation conferring tolerance to drought stress.”

Her research involves subjecting plants to low soil moisture and then assessing their performance relative to modern elite cultivars. Early results from her work suggest that wild species are more conservative for water use than are cultivated varieties, an observation that has potentially important implications for chickpea crop improvement. Among her objectives are to identify the genomic basis of drought resilience traits and to use this information to guide gene introgression into high-yielding cultivars.

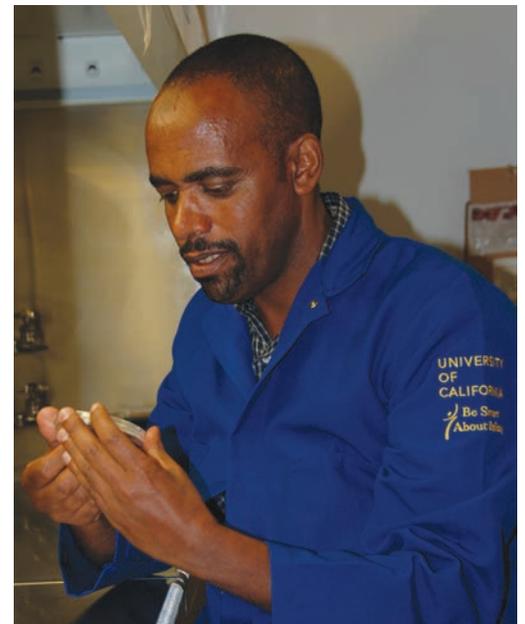
Susan joined UC Davis in 2014 as an MSc student intern from Wageningen University. During her internship at UC Davis, she studied phenotypic diversity and patterns of local adaptation in wild *Cicer* populations.

While in Wageningen, Susan studied with Professor Ton Bisselling in the Department of Molecular Biology, where she investigated the genetic basis of nitrogen fixation traits in *Parasponia*. She received her undergraduate degree from Kenyatta University in Kenya. Prior to obtaining her MSc in the Netherlands, Susan worked on the Water Efficient Maize for Africa project, developing drought tolerant corn varieties.

Sultan Mohammed Yimer is a doctoral student affiliated with the Chickpea Innovation Lab, jointly sponsored by the International Center for Agricultural Research in the Dry Areas (ICARDA), the U.S. Agency for International Development and the 2Blades Foundation. His research focuses on developing genetic resources to combat the *Fusarium* wilt pathogen of chickpea.

Before joining the project, Mr. Yimer had surveyed a significant portion of chickpea’s cultivated area in Ethiopia, collecting pathogen isolates for analysis. His role in the Chickpea Lab is to characterize the diversity of this pathogen collection and to use that knowledge to screen germplasm for broad disease resistance traits and ultimately to breed for durable resistance.

Mr. Yimer received his Bachelor degree in Biology and his MSC in Botanical Science from Bahir Dar University, Bahir Dar, Ethiopia, and from 2011 he served as a lecturer and researcher in the Department of Biology at Woldia University, Ethiopia. He is currently a Ph.D. candidate in Plant Pathology in the Department of Plant Science at Haromaya University in Ethiopia. As part of his doctoral training he is conducting a research internship at the University of California Davis, gaining familiarity with fungal genomics, bioinformatics and disease resistance phenotyping.



Sultan Mohammed Yimer

Ph.D. Student
Haromaya University
Haromaya, Ethiopia

Upcoming Events

July - August, 2017 - Date To Be Determined

Feed the Future Innovation Lab for Climate Resilient Chickpea 2017 Annual Meeting

Past Events

May 30-June 2, 2016

Feed the Future Innovation Lab for Climate Resilient Chickpea 2016 Annual Meeting, Izmir, Turkey. Download or view the agenda, participant list and working group reports at ChickpeaLab.ucdavis.edu under the Events tab.

August 24-27, 2015

Feed the Future Innovation Lab for Climate Resilient Chickpea 2015 Annual Meeting, Pyramid Resort, Debre Zeit, Ethiopia. Download or view the agenda, participant list and working group reports at ChickpeaLab.ucdavis.edu under the Events tab.

July 13-15, 2014

Feed the Future Innovation Lab for Climate Resilient Chickpea 2014 Annual Meeting, University of California, Davis, USA. Download or view the meeting program at ChickpeaLab.ucdavis.edu under the Events tab.

Chickpea crosses germinate in the UC Davis agricultural fields. (Left to Right) Susan Moenga measuring chickpea plants. Douglas Cook and Syed Gul Abbas Shah Sani phenotyping young plants and Laura Perilla Henao tagging plants for DNA extraction.



NEXT ISSUE

Summer: July – August 2016

- **Research:** Revisiting the origins of crops to solve the challenges of modern agriculture.
- **Event Review:** White House Summit on Global Development
- **New Connections:** 2 Blades Foundation, Mars Incorporated, Indo-U.S. Science and Technology Forum
- **Student Profile:** Lijalem Balcha, Ph.D. Student, Addis Ababa University, Ethiopia.
- **Comings and Goings:** Mr. Alex Abare, Dr. Atif Rana, Dr. Kashif Raiz, Mr. Dagnachew Bekele, Mr. Lijalem Balcha and Mr. Kassaye Negash.

CONTACT

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