



## Graduate Student Spotlight

# Tamara Miller

This summer I will be spending two months at Sokoine University of Agriculture in Tanzania to conduct research on the genetic basis of resistance to Angular Leaf Spot in common beans. This project is part of a larger group of breeding programs making up the African Bean Consortium, which consists of five national projects in Uganda, Kenya, Rwanda, Tanzania and Ethiopia. Collectively, the researchers in these countries seek to build capacity for breeding and develop new bean cultivars with resistance to five diseases that drive yield reduction throughout East Africa. During this trip I will also have the unique opportunity to attend a common bean workshop in South Africa to work with breeders and pathologists throughout the world to brainstorm ways to advance knowledge on the genetics of Angular Leaf Spot and root rots, diseases that widely affect common bean production throughout many growing regions. The research project I will do is aimed at understanding the genetic underpinnings of disease resistance in a particular common bean variety that is widely resistant to not only Angular Leaf Spot, but also other serious bean diseases.

As an undergraduate at U.C. Berkeley, before I decided to focus my career on plant breeding, I worked in the Diabetes Center at U.C. San Francisco in a lab that studies the cellular mechanisms leading to onset of autoimmune diseases, such as Type I diabetes. Although my time at U.C. San Francisco invigorated my interest in how immune systems operate, I ultimately decided what I am interested in is how food and health are intertwined, and the ways in which food production and consumption represent the cultures in which we live. I had the opportunity to work with Dr. Peggy Lemaux at U.C. Berkeley, where I led a project to increase the digestibility and micronutrient content of sorghum, a staple crop for

many subsistence farmers in Asia and Africa. My experience in the Lemaux Lab convinced me that of all the paths I could take as a plant scientist, breeding made the most sense to pursue because it satisfies my goals of integrating fundamental and applied research while also contributing to improving crops in order to address environmental constraints such as rising temperatures and increased pest pressure.

Since coming to U.C. Davis to pursue a Ph.D. in crop improvement, I joined Dr. Paul Gepts' lab, where I have learned about crop domestication, breeding, and the genetics of disease resistance in common beans. I completed a Master's degree in January 2015, which centered on sequencing the genomes of all the parents used in the African Bean Consortium in order to develop molecular markers for breeding. Furthermore, studying the genetics of disease resistance in beans reinvigorated my interest in how immune systems function, namely the mechanisms plants use to differentiate potentially beneficial microorganisms from pathogens. Development of disease resistant cultivars in growing regions such as East Africa, where access to inputs such as fungicides is limited, is important given that particular diseases cause yield losses of up to 100%. The genetics of disease resistance is certainly complicated, but gaining a better understanding of how plants interact with populations of pathogens is critical to developing varieties with durable resistance. From these more fundamental questions of plant/pathogen interactions I am learning how to apply statistical genetics to common bean breeding. In the future I would like to work at one of the international agricultural research centers to develop disease tolerant crops.



My suggestion for students who are interested in pursuing a degree in crop improvement is to actively engage others in the plant breeding world, and to participate in collaborations which will have a measurable impact on crop production. One of the best aspects of research in agricultural science is the collaborative atmosphere and the sense of community that is fostered by the people in this field. My work and the accomplishments I have made would not have been possible without the support of many excellent mentors and peers. First and foremost, the Kirkhouse Trust, which funds the African Bean Consortium, is responsible for supporting my graduate work. I would also like to recognize the significant amount of time and energy provided to me by my mentors Dr. Paul Gepts and Dr. Peggy Lemaux. Lastly, the support of my peers Jorge Berny, Erin Wilkus, and all the other members of the Gepts lab have provided an invaluable source of wisdom and support for which I am very thankful.

-Tamara Miller



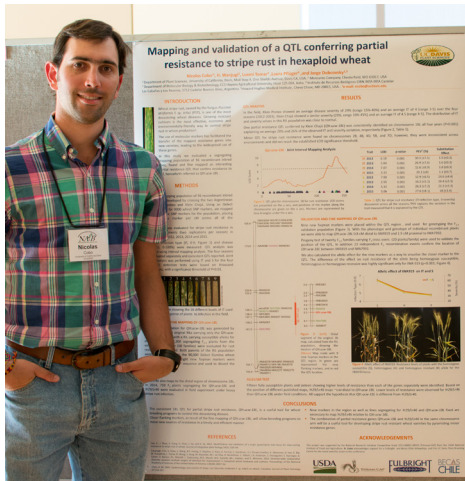
## PBC AWARDS SCHOLARSHIPS TO STUDENTS ATTENDING NAPB ANNUAL MEETING



Scholarship recipients from left: Nicolas Cobo, David O'Donnell, Randi Jimenez, Chad Jorgensen, Tyson Howell, Sarah Dohle, Karla Cordero, Joshua Hegarty, Mohan Niroula. Missing from photo: Colleen Spurlock, Jareerat Chunthawodtiporn.

On Sunday, July 26th, 11 UC Davis graduate students packed into 2 Fleet Services vans for a road trip to Pullman, Washington for the 2015 Annual Meeting of the National Association of Plant Breeders. Awarded \$500 each to cover conference costs, they took turns driving 13 hours and 800 miles to Washington State University to present their research in poster sessions, network with plant breeding professionals in industry, government, and academia, and learn about the latest research and technologies.

Nicolas Cobo, a doctoral student expecting to graduate in Fall, 2016, says he enjoyed this meeting because it is “very focused on the students, with experienced professionals interacting closely not only in topics about plant breeding, but also career development. We went to two field days that were a great opportunity to see very diverse breeding programs in action. We saw potatoes, apples, cherries, wheat, hops and others! Interacting with such a diverse range of crops helped us to understand differences between cropping systems, but also get ideas from other crops to be applied to the one we are working on.”



Nicolas Cobo, Ph.D. expected Fall 2016, presenting poster on mapping and validation of a QTL conferring partial resistance to stripe rust in hexaploid wheat.

Information sessions and field trips covered topics such as *Identifying and utilizing genetic diversity in plant breeding programs*, *Breeding for consumer product quality: successes and challenges*, and *Essential career skills for plant breeders*. Colleen Spurlock, a doctoral student expecting to graduate in Winter, 2015, said that the presentations she attended opened her eyes to the realities of a consumer-driven agricultural market. Says Spurlock, “after listening to Rex Bernardo [University of Minnesota] talk about maintaining genetic diversity in breeding programs, I would say that most people, even a layperson, would agree that genetic diversity and biodiversity are important, and could probably come up with several reasons why.



Varieties of specialty potatoes from the Potato Variety Management Institute

At the same time, a graduate student from WSU had earlier described cultivar development in apples. She pointed out that the one thing that consumers cannot stand is non-uniformity. This brings up an interesting paradox because ultimately a breeder is driven by the market and the consumer puts pressure to focus on uniformity as a priority.”



Expansive wheat fields in Pullman, WA.

Of course, one of the more important elements of these annual meetings is the sharing of findings across a wide spectrum. Promoting scientific literacy is a goal of plant scientists across the board.

With so many new technologies cropping up every day – and the ability to instantly share new information – it is important that the information scientists promote comes from experts in the field. Mohan Niroula, a doctoral student expecting to graduate in Winter 2016, attended the meeting to present on his own research: “I presented a poster about genetic and environmental variation associated with lettuce seed plasticity... In addition, I presented a new alternative method of efficiently estimating GxE variation using P2P (Plant-to-Plant Sampling) method. I got good responses on P2P method from plant breeders. They agreed that P2P method could be an efficient alternative to multi-location trials for estimating GxE variation especially for vegetable crops.” He says he also attended as “part of NAPB Annual Meeting 2015 organizing committee as a member of the Graduate Student Working Group of National Association of Plant Breeders. I worked as a social media manager... Those who couldn't attend the meeting were updated with instant tweets... during the conference.”

Part of the Plant Breeding Center's mission is to support student learning in and out of the classroom, and promote their innovative research. Career success is aided by exposure to new people and new research happening across the world. Cobo reflects on the experience, saying, “The meeting was a great chance to meet and interact with professionals from industry, government and academy, but also students that will be our colleagues in the future, giving us the opportunity to create connections for future collaborations.”



Chad Jorgensen, Ph.D. expected Winter 2015, presenting poster on the use of wild emmer wheat as a source of genetic variation to increase yield and other agronomic traits.

- Amanda Pietras

Links:

Read this article online [here](#).

<https://www.plantbreeding.org/>

<https://www.facebook.com/groups/napb.breeders/>

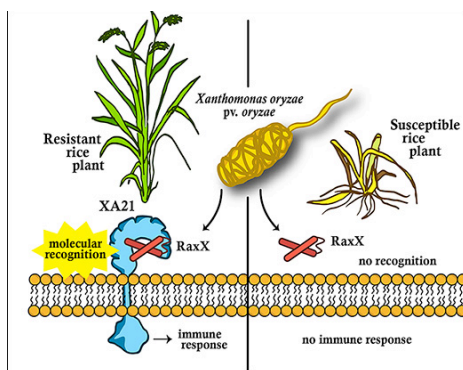
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RICE DISEASE-RESISTANCE DISCOVERY CLOSES THE LOOP FOR SCIENTIFIC INTEGRITY

- UC DAVIS NEWS

When disease-resistant rice is invaded by disease-causing bacteria, a small protein produced by the bacteria betrays the invader. Upon recognizing that protein, the rice plants sense that a microbial attack is underway and are able to mount an immune response to fend off bacterial infection, reports a research team led by the University of California, Davis.



Identification of the tiny protein, called RaxX, holds promise for developing more disease-resistant crop varieties and therapeutic treatments for blocking microbial infections in both plants and animals, said the researchers, who found particular satisfaction in this discovery, two years after retracting the announcement of a similar find.

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SCIENTISTS CREATE LOW-METHANE RICE

- BUSINESS INSIDER

Paris (AFP) - Scientists said Wednesday they had created a rice variety with starchier grains that emits less methane, a step towards the twin goals of feeding more people and curbing global warming.



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- THE SALT

Rearranging veggie genes is big business, and we're not even talking about biotechnology. Private companies and university researchers spend hundreds of millions of dollars every year breeding better genetic varieties of food crops.



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But organic farmers say those programs have a big blind spot when it comes to figuring out which new varieties are truly better. Few companies or researchers test those varieties under organic conditions.

THIRD THURSDAY

MORNING STAR

2:00-4:30PM, AUGUST 20TH, 2015

2211 OLD HIGHWAY 99

WILLIAMS, CA 95987

This month, we will be collaborating with Seed Central to visit Morning Star for a tour of facilities and tomato fields. Please note the change in time due to summer hours. The van will arrive behind PES at 12:45PM and will depart at 1:00PM sharp. Registration for this trip is required [here](#).

BEAN FIELD DAY

8:00AM-12:00PM, AUGUST 20TH, 2015

Detailed announcement forthcoming. There is just enough time to attend Bean Field Day and then hop on the bus to Morning Star!

ASA, CSSA, AND SSSA ANNUAL MEETING

NOVEMBER 15-18, 2015

MINNEAPOLIS CONVENTION CENTER, MN

The 2015 Annual Meeting offers a unique opportunity as ASA, CSSA, and SSSA co-locate with the Entomological Society of America (ESA) to connect more than 7,000 scientists, professionals, educators, and students. For more information, or to register, click [here](#).

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