the PLANT BREEDING CENTER
UNIVERSITY OF CALIFORNIA, DAVIS
February 2015

GRADUATE STUDENT SPOTLIGHT

SARAH DOHLE

I enjoy watching people grin or laugh out loud when I say that I research lima beans. It's a memorable introduction and a wonderfully approachable way to get people curious about science and the potential of agricultural research.

I'm a fourth year Ph.D. student in the plant biology graduate group studying plant genetics and breeding. Specifically, I'm looking at lygus bug resistance in lima beans for California growers and trying to find regions of the genome associated with this resistance. After spending three years developing lima bean Recombinant Inbred Lines (RILs) I just completed my first season of field phenotyping for resistance and will follow-up with a second season for verification in 2015. I hope to finish my graduate work by the end of 2016.

I work with Dr. Paul Gepts, who took on the UCD dry bean breeding program the year that I started graduate school. I chose Davis for the opportunity to work with Paul and to learn how to do applied field research. Beans and field work are both new to me. Before I came to UC Davis, I had been working as a molecular biologist at an agricultural biotechnology startup company, Agrivida, outside of Boston for 5 years. While at a biofuels conference in 2010 I listened to a group of talks on the footprint of agriculture on environment, economy, and society and it was like someone turned a light on. I was inspired by reading the biographies of Norman Borlaug and Nikolai Vavilov. I started reading all of the news headlines that had anything to do with agriculture, famine, biofuels, and drought. Frequently, UC Davis and Cornell research was mentioned. I applied to both of these programs and ended up choosing UC Davis so that I could work with Paul Gepts on a lima bean project directly associated with California growers. I was also drawn to Davis because of it's proximity to so much year-round agriculture. During the application process I found relatively few graduate programs with applied field research components, so I feel lucky to be part of one.

TAKING ACTION

When I first arrived at UC Davis, I was surprised by the focus on in-class seminars and basic research rather than applied research. I also noticed the improvements that could be made on field equipment to make planting, harvesting, and dry storage more efficient. At a recent Seed Central meeting, Helene Dillard, Dean of the College of Agriculture and Environmental Sciences, presented on the tremendous research and educational capacity and accomplishments of UCD, and after her talk I asked what we as graduate students could do to improve the agriculture field research facilities in order to maintain our status as a number one Ag school - a sentiment strongly shared by my peers. Dean Dillard was very receptive and asked for a list of priorities for improvements. In response, a group of graduate students, faculty and staff created a survey to find out what people are using the fields for and what could be done to make their research and education programs better. Organized survey results were presented to Dean Dillard during a tour of the Plant Science field headquarters. We left the January field meeting feeling very optimistic about the future of field research at UC Davis.

NEW OPPORTUNITIES

I'm currently writing this piece from the International Center for Tropical Agriculture (CIAT) in Colombia, where I'll be for the next two winters. While at CIAT I am working with Dr. Daniel Debouck, the Director of the Genetic Resources Center. CIAT has a collection of over 3,000 lima bean accessions - the largest collection in the world. I hope to add some knowledge about the diversity of the lima bean collection based on sequence analysis to direct future conservation efforts of wild germplasm, as well as increase utilization of the germplasm repository by breeders and researchers. Once my RILs make it through customs, I will plant them in

Colombia to evaluate phenotypes in an entirely different environment from California. The RIL population is interesting beyond California agriculture because it is from a cross between two separate gene pools from different domestication events. Phenotyping in a second location will help us understand which traits are more influenced by genetics or environment. I'll be in Colombia for 3 months on this first trip in order to set up research logistics, and then I'll return for 9 months later this year to follow-through on research plans. I'm here as a National Science Foundation (NSF) and United States Agency for International Development (USAID) Research and Innovations Fellow, part of a program to build collaborations between US graduate programs and select developing country research institutions. Figuring out how to orchestrate field research at UC Davis has been a learning experience, and trying it in Colombia is going to be a whole new challenge. At least I'll learn Spanish and how to Salsa dance.

THE EXPERIENCE

I'd recommend that anyone considering graduate school should take time off after their undergrad to work in a different field or different country. Broaden your experience so that you can bring richness to your graduate community and give your research more validity. The more practical applications you know about, the easier it is to keep your work in context. Keep in mind, during those moments of self-doubt, that Imposter Syndrome exists and your peers and supervisors likely have it as well, so go easy on yourself and do your best.

Much to my surprise, my favorite part of graduate school so far has been teaching. Seeing students light up and get excited when they find something interesting, or connect the dots between what we're covering in class and how it fits into their life and their place in the world, is very gratifying. I like to think some of the students will go on to become plant scientists - maybe even the next Borlaug or Vavilov, or at least citizens with an awareness of the value of plants.

Developing my ability to network and find the right people to ask for help has been my greatest asset in accomplishing my greenhouse and field work. The Davis community is very helpful and generous with sharing knowledge when you find the right person to ask. My lab mate, Jorge Berny, who has experience breeding hot peppers and beans in Mexico, has been my go-to person for class work and field work. Another key component to moving my research forward has been help from undergraduate interns. Besides adding more hands to the field work, they frequently have ideas on how to make processes more efficient. I think it's an empowering experience for them as well. Self initiated, Ninh Khuu continues to move the the lima bean breeding forward by doing crosses while I'm in Colombia, and Karla Sison and Vanessa Mora have created a **blog** to share their work.

I really lucked out ending up at UC Davis at this time; when there seems to be such a revival in campus interest in plant breeding education and research. I'm very appreciative to be working with Dr. Gepts on lima beans for California growers and have the opportunity to with Dr. Debouck at CIAT on the lima bean germplasm collection.

VAN DEYNZE NAMED ASSOCIATE DIRECTOR

The Plant Breeding Center is extremely pleased to announce that Dr. Allen Van Deynze has accepted the position as Associate Director of the Plant Breeding Center. He has had a long history with UC Davis, conducting breeding and genetics research on pepper, cotton, and other crops. He has developed research collaborations with scientists at UCD, in other public institutions, and in the seed industry. He has developed outreach programs through the UCD Student Farm to engage K-12 students with plant improvement. He has strong international connections, including involvement in the **African Orphan Crops Consortium**. He has been active in outreach and educational activities through the Plant Breeding Academy. In addition, Allen has worked tirelessly on behalf of plant breeding through his active engagement with the **National Association of Plant Breeders**. Allen will split his time between the PBC and his current role as Research Director at the Seed Biotechnology Center at UC Davis, which will provide a strong link between the two programs. Allen's enthusiasm for plant breeding, his interest in developing and integrating new technologies into breeding programs, and his passion for educating and training the next generation of plant breeders make him an ideal person for this position. Welcome, Allen!

UC DAVIS NEWS

ILLUMINA ANNOUNCES AFRICAN ORPHAN CROPS CONSORTIUM TO RECEIVE AGRICULTURAL GREATER GOOD INITIATIVE GRANT
BUSINESS WIRE

SAN DIEGO--Illumina, Inc. (NASDAQ: ILMN) announced that the African Orphan Crops Consortium (AOCC) is the 2015 recipient of the Agricultural Greater Good Initiative grant. African Orphan Crops Consortium plans to use the grant of Illumina reagents and consumables to further its work studying the genetic diversity of 100 different species of African crops, particularly those grown by subsistence farmers. The grant program is designed to help identify measures that can increase crop yields and improve livestock welfare and productivity to alleviate poverty and hunger in the developing world.

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UC DAVIS DEVELOPING FASTER, MORE ACCURATE ROBOTIC CULTIVATOR
UC DAVIS NEWS AND INFORMATION

Controlling weeds could soon become more effective, affordable and sustainable for vegetable growers in California and beyond, thanks to a system under development at UC Davis that will help plants communicate with a robotic cultivator.

"Machines can recognize a weed, and they can recognize a crop plant, but they have trouble distinguishing one pattern from another when they are co-mingled, as is often the case with weeds and young crops in the field, particularly when traveling at a typical tractor speed of three-feet-per-second or more," Slaughter said.

Slaughter's team is designing a robotic cultivator that can remove weeds in commercial fields as carefully as gardeners pull weeds in their own backyard, without the time-consuming labor and cost. They're developing a "smart" cultivator with small knives that reach out to uproot weeds and retract to keep crops intact.

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RELATED NEWS

2015 GATES ANNUAL LETTER: FARMING GATESNOTES

When Melinda Gates visited Tanzania in 2012, Joyce Sandiya spoke to her with the zeal of a preacher giving a sermon. That year, for the first time, Joyce had planted a newkind of maize seed, bred to tolerate drought. When drought came, most of her crops withered and died, but her maize was more productive than ever. She sold the surplus to buy beans and vegetables and other nutritious food for her family, and had money left over to pay her children's school fees. "That seed," she said, "made the difference between hunger and prosperity."

Joyce's story, multiplied by hundreds of millions of African farmers like her, is the reason innovation in agriculture is so important. Seven out of ten people living in sub-Saharan Africa are farmers. (Compare that to the United States, where the ratio is two out of a hundred.) And yet Africa has to rely on imports and food aid to feed itself. Though it's the poorest continent in the world, it spends about $50 billion a year buying food from rich countries.

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THE TRUTH ABOUT GMOS
WEBMD

If you've eaten today, chances are you've had a food that's been touched by science as well as Mother Nature. Up to 80% of processed foods in the U.S. have something that's been changed by man from the way it would grow on its own. This happens at a very basic level -- in the plant's genes. We say these are genetically modified (GM). Their number is growing by leaps and bounds. Key crops include corn, soybeans, and cotton. (Yes, cotton products are in foods.)

Scientists tinker with plants for many reasons. They often take a gene that controls a desired trait in one plant -- less need for water, so it can survive a drought, for example -- and add it into a different plant. The end result: hardier crops, more colorful berries, even seedless watermelons and grapes.

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OPPORTUNITIES AND EVENTS:

2015 SUMMER PLANT BREEDING WORKSHOPS
THE OHIO STATE UNIVERSITY
MAY - JUNE, 2015

Intensive training in theory, practical application and hands-on data analysis covering:

- Phenotyping: Field design and analysis (May 18-22)
- Marker Assisted Selection (June 1-5)
- Genome Wide Analysis (June 15-19)

Find more information on the workshops here.

2015 ANNUAL MEETING
NATIONAL ASSOCIATION OF PLANT BREEDERS
JULY 27-30, 2015
PULLMAN, WA

Planning is underway for the next NAPB/PBCC annual meeting. A pre-conference tour of the ARS Central Ferry location and the WSU/ARS Prosser location will provide an opportunity to view breeding programs and production activities for a range of cereal, oilseed, legume, forage and specialty crops. Organizational business sessions, technical presentations, graduate student functions and workshops will be held on the Washington State University Pullman campus. A local campus tour will feature cereal and cool season food legume breeding programs. Venue and lodging details are currently being finalized.

CONSERVATION INNOVATION GRANTS
UNITED STATES DEPARTMENT OF AGRICULTURE

The Natural Resources Conservation Service (NRCS), an agency under USDA, is announcing availability of Conservation Innovation Grants (CIG) to stimulate the development and adoption of innovative conservation approaches and technologies. Proposals will be accepted from all 50 States, the District of Columbia, the Caribbean Area (Puerto Rico and the U.S. Virgin Islands), and the Pacific Islands Area (Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands).NRCS anticipates that the amount available for support of this program in FY 2015 will be up to $20 million. Proposals are requested from eligible governmental or non-governmental organizations or individuals for competitive consideration of grant awards for projects between 1 and 3 years in duration.

DEADLINE: Pre-proposals, February 24, 2015
DEADLINE: Selected Proposals, April 30, 2015

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AGRICULTURE AND FOOD RESEARCH INITIATIVE (AFRI) REQUEST FOR APPLICATIONS UNITED STATES DEPARTMENT OF AGRICULTURE

The new USDA NIFA AFRI request for applications for the Food Security challenge area is now open, and includes an opportunity for plant breeding.

DEADLINE: Letters of intent, April 6, 2015
DEADLINE: Applications, June 4, 2015

"This program will also develop regionally adapted crop cultivars and livestock/breeds that contribute to rural economic development and prosperity while enhancing food security."

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THIRD THURSDAY
4-5:30PM, FEBRUARY 19TH, 2015
BOWLEY LECTURE HALL
EXTENSION CENTER DRIVE

This month, zucchini breader and UC Davis alum Bill Johnson, Ph.D., will lead our seminar. Bill targets the markets of North and South America, the Middle East, and North Africa at Seminis Vegetable Seeds in Woodland. Previously, he worked in the public sector breeding. He will be leading a discussion about what the daily work life might be like in various types of organizations, as well as give suggestions for how to most effectively pursue your career path. Light refreshments will be served.

ABOUT THE NEWSLETTER

The Plant Breeding Center newsletter will be produced monthly for internal audiences, and quarterly for external audiences and industry partners. Newsletters will be distributed on the first week of every month. Submissions for the February newsletter will be accepted up to **Friday, February 27th.**

If you have information you'd like featured in the newsletter, or would like to be added to the mailing list, send an email to:

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