



Graduate Student Spotlight

Travis Parker

I have always been interested in plants. I originally come from San Diego County, where as a kid I had a garden along the side of our house. In that shady, clay-ridden plot I planted every seed I could get my hands on: tomatoes, melons, sweetcorn, giant pumpkins, and of course beans of every variety. From these experiences I gained an appreciation for plants, biology and agriculture, which today are so central in my personal and professional interests. In 2009, I joined the College of Agriculture at California Polytechnic State University, before eventually transferring into the biology department and graduating at the end of my fourth year. As an undergraduate, I was strongly influenced by Jared Diamond's *Guns, Germs and Steel*, which describes, amongst other things, the role of domestication and early plant breeding on the fates of human societies. The origins and improvements of crop plants are fascinating, and it was something I was interested in pursuing professionally.

In 2013 I entered into a Ph.D. program with the Plant Biology Graduate Group at UC Davis, and joined the Gepts lab the following spring. Since then, I have worked on a number of projects related to common bean, investigating variation in early season growth rate, susceptibility to pod shattering, and breeding for improvement in high-value heirloom dry bean varieties. Central to these projects is the need to develop varieties that are well suited to organic production, particularly in California.

Weed competition is a major problem for California's organic bean producers, who cannot rely on synthetic herbicides. Therefore, we are looking at strategies to improve the ability of common bean to tolerate or outcompete these weeds.

Early season growth rate has been correlated to weed suppression across many species, so I am interested in identifying genetic markers that are associated with this trait. In summer 2016, for example, I plan to use an unmanned drone to take overhead imagery of a field-planted diversity panel, and then run the data through a software pipeline that can separate the plots and quantify the canopy area of each. I will then use these data to determine which genetic markers non-randomly associate with early-season canopy cover. Ultimately, this will allow for efficient marker-assisted selection for improved vegetative growth rate.

Pod shattering can also be problematic in common bean. Many of California's most productive agricultural areas experience hot, dry summer conditions, which exacerbates the issue. Shattering is known to be heavily influenced by fiber deposition, and I have made sections of many of our shatter-prone and shatter-resistant varieties in Judy Jernstedt's lab. Evaluating the shattering-susceptibility of the genotyped Middle American diversity panel is a logical next step in identifying the control of this complex, quantitatively inherited trait, and is therefore an objective for 2016.

Finally, California's organic dry bean producers largely sell heirloom bean varieties, which excel in terms of seed colors, flavors, and textures. Unfortunately, these varieties generally lack the disease resistance, quality growth habits, and yield potential of improved commercial lines. In 2014, I started two breeding projects to make these varieties better suited to commercial production. First, I began a recurrent backcrossing program to introgress resistance to bean common mosaic virus (BCMV) into these heirloom varieties. BCMV can reduce yields by more than 50% in severe cases, but is effectively controlled with resistance alleles. I am currently growing the second and third backcross generations for this project, which has given me the opportunity to use marker-assisted selection and inoculations on a regular basis. The second breeding program seeks to improve the growth habit and yield of these heirloom varieties under organic California production regimes. This summer we will grow F3 families in the field, and will select plants with ideal plant architecture and heavy pod set.



Sibling plants from the same backcross. The plant on the left inherited virus resistance and displays no symptoms, while the plant on the right did not inherit the resistance and shows symptoms of BCMV.

Pursuing my graduate education at UC Davis has afforded me the opportunity to conduct both lab-based studies and extensive field trials, which would not be possible at some institutions. The university also hosts immense human resources, which are invaluable in planning and carrying out effective studies. After graduating, I plan to continue breeding plants to better suit the needs of a rapidly changing world. It is an exciting time to be involved in plant breeding, and I look forward to the challenges and opportunities to come.

-Travis Parker

UC DAVIS NEWS

CAMPAIGN TO PUT BARBARA MCCLINTOCK ON \$10 BILL

- Capital Public Radio



Barbara McClintock made scientific discoveries that have changed human medicine and food production forever. Now, a group of students at the University of California, Davis, is pushing for this woman geneticist — the only solo woman recipient of the Nobel Prize in Physiology or Medicine to date — as the U.S. Treasury Department's choice when it decides the face of the new ten-dollar bill in fall 2015. Donald Gibson is the doctoral researcher at UC Davis who started the whole campaign.

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RELATED NEWS

CRISPR IS COMING TO AGRICULTURE — WITH BIG IMPLICATIONS FOR FOOD, FARMERS, CONSUMERS AND NATURE

- ensia

“...the company is marketing the product as non-genetically modified, as only a few snippets of the plant's existing genes have been changed and “no gene has been inserted from a different kind of organism, nor even from another plant.”



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CALIFORNIA'S GRAND PLAN TO FIGHT CLIMATE CHANGE ON THE FARM

- Civil Eats

The suite of proposed agricultural programs include existing strategies such as methane digesters on dairy farms, and new ones, like the Healthy Soils Initiative, which aims to increase soil organic matter and carbon sequestration. They would all receive an unprecedented allotment of funds from the state's cap and trade program...

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UC Davis Plant Breeding Center



@UCDplantbreeding

OPPORTUNITIES AND EVENTS

**THIRD THURSDAY
SYNGENTA SEEDS, INC.
FEBRUARY 18TH, 2016
21435 COUNTY ROAD 98
WOODLAND 95695**

The PBC invites you to join us on a site and greenhouse tour at Syngenta on Thursday, February 18, 2016. We have two carpool vans that will meet at the tennis courts behind PES. We will leave Davis at 2:30PM sharp. The tour starts at 3PM and we expect to be back in Davis at 5:15PM. You **must** register for this field trip to be allowed inside. Register with the calendar [here](#).

**2016 ORGANIC, FRESH MARKET TOMATO
PRODUCTION EXTENSION MEETING
FEBRUARY 24TH, 2016
8:30AM-12:30PM
NORTON HALL - YOLO COUNTY
70 COTTONWOOD ST.
WOODLAND, CALIFORNIA**

For details, click [here](#).

**UC DAVIS PLANT BREEDING SYMPOSIUM
APRIL 18TH, 2016
8AM-5PM
UC DAVIS CONFERENCE CENTER**

The UC Davis Plant Breeding Symposium is an annual student-organized event which brings together researchers in academia, industry, and the non-profit sector to discuss the latest advances in the field of plant breeding. This year's theme is “Breeding for Stress Resilience” and we have invited speakers from around the world to present on this highly relevant and important topic. Register [here](#).

**5TH INTERNATIONAL CONFERENCE ON
QUANTITATIVE GENETICS
JUNE 12-17, 2016
MADISON, WISCONSIN**

For more information, or to register, click [here](#).

**POPULATION, EVOLUTIONARY, &
QUANTITATIVE GENETICS MEETING (PEQG)
JULY 13-17, 2016
ORLANDO WORLD CENTER MARRIOTT, FL**

The meeting will be held in conjunction with The Allied Genetics Conference (TAGC) and offers a unique opportunity to network with other researchers from various fields of genetics and share findings. For more information, click [here](#).

PLANT BREEDING CENTER:

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