Avi Karn, Ph.D.

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EDUCATION

THE UNIVERSITY of MISSOURI, Columbia, MO, USA May 2017
***Doctor of Philosophy* (*Ph.D.*)**, Plant Breeding, Genetics and Genomics
Advisors: Dr. Sherry A. Flint-Garcia (Chair) and Dr. Anne McKendry
GPA 3.45

TRUMAN STATE UNIVERSITY, Kirksville, MO, USA May 2012
***Bachelor of Science* (*B.Sc.*)**, Agricultural Science and Biology
Advisor: Dr. Mark R. Campbell
GPA 3.44

RESEARCH & WORK EXPERIENCE

Carl R. Woese Institute for Genomic Biology, University of Illinois, UC
Position: *Postdoctoral research associate* (May 2017 – present)
Supervisor: **Dr. Andrew Leakey**
Project: An integrated phenomics approach to identifying the genetics basis for maize root structure and control of plant nutrient relations.

The University of Missouri, Div. of Plant Sciences, Columbia, MO
Position: *Graduate Research Assistant* (Jun 2012 – May 2017)
Supervisor: **Dr. Sherry A. Flint-Garcia**
Responsibility: Evaluation of Teosinte Genetic Diversity for various Agronomic and Domestication Traits in Maize

Truman State University, Dept. of Agricultural Science, Kirksville, MO
Position: *Undergraduate Research Assistant* (Jan 2009 – May 2012)
Supervisor: **Dr. Mark R. Campbell**
Responsibility: Conducted molecular genetic analysis to exploit the biodiversity of exotic inbred lines from Central and South America to develop high amylose corn

USDA-ARS, Germplasm Enhancement of Maize program, Kirksville, MO
Position: *Research Co-operator* (Jun 2009 - May 2012)
Supervisor: **Dr. Mark R. Campbell**
Responsibility: Assisted in preparing summer maize nursery with a tractor plowing, planting, cross pollinating, and harvesting

South Dakota State University, **Department of Biology,** Brookings, SD

Position: *Research Student* (Summer – 2009)
Supervisor: **Dr. Donald Auger**
Responsibility: Conducted linkage based mapping studies to identify QTLs for high amylose starch in maize

Truman Maize Annotation Team (*TMAT*), Kirksville, MO
Position: *Research Student* (Aug 2011 – Jan 2012)
Supervisor: **Dr. Brent Buckner**
Project: Studied chromosome 6 of maize and the syntenic regions to investigate copy number and presence/absence variations utilizing statistical and bioinformatics tools

Iowa State University - Department of Agronomy, Ames, Iowa
Position: *Research Student* (Jun 2010 – Jun 2011)
Supervisor: **Dr. Marvin Paul Scott**, USDA-ARS
Responsibility: Sequenced starch branching enzyme allele (*SBE1a*) from high amylose maize line, GEMS-0067, and discovered 8bp insertion site at intron 9 resulting splicing mutation, which putatively resulted in truncated protein product post-translation.

***TruScholars* (NSF) Undergraduate Research Program**, Kirksville, MO
Position: *Research Student* (Summer – 2010)
Supervisor: **Dr. Mark R. Campbell**
Project: Designed gene specific marker for a novel allele involved in high amylose starch in maize and discovered a splicing mutation site within the exon-intron boundary of *SBE-1a* allele from GEMS-0067 maize inbred line

NEXT STEP (NSF) Undergraduate Research Program, Kirksville, MO
Position: *Research Student* (Summer – 2009)
Supervisor: **Dr. Mark R. Campbell**
Project: Determined the feasibility of marker assisted selection for the development of high amylose maize

PUBLICATIONS

Karn, Avinash, Gillman, J. D., & Flint-Garcia, S. A. (2017). "*Genetic Analysis of Teosinte Alleles for Kernel Composition Traits in Maize."* G3: Genes, Genomes, Genetics, 7(4), 1157-1164.

Karn, Avinash, Heim, C., Flint-Garcia, S., Bilyeu, K., & Gillman, J. (2016). "*Development of Rigorous Fatty Acid Near-Infrared Spectroscopy Quantitation Methods in Support of Soybean Oil Improvement.*" Journal of the American Oil Chemists' Society, 1-8.

Karn, Avinash, Brent Buckner, Diane Janick-Buckner, Mark Campbell, Michael Blanco, Marvin Scott, and Adrienne Moran Lauter. "*Breeding Specialty Starch Maize Using Exotic Genetic Resources for Gene Discovery of Novel Alleles and Modifiers with Materials Generated from the USDA-ARS GEM Project.*" Maize Genetics Conference Abstracts, p. P204 (2011).

Karn, Avinash, Alex Lipka, Kathryn Guill, Christopher Bottoms, Justine Gerke, and Sherry A. Flint-Garcia
"Epistasis Analysis of Plant Development and Ear Morphology Traits in Teosinte Synthetic Population"
– In preparation

Karn, Avinash and Sherry A. Flint-Garcia
"Genome Wide Association and Epistasis Analysis for Kernel Composition Traits in the Teosinte Synthetic population"
– In preparation

LEADERSHIP ACTIVITIES

Organizing Committee member – MU DuPont Pioneer plant sciences symposium
Spring 2017

Part of the graduate student-driven and DuPont Pioneer sponsored symposium at the University of Missouri Columbia. The aim of this symposium was to bring together numerous groups across Mizzou, other universities, and the community with vastly diverse research directed towards a unified goal: improving crops to solve problems facing food and agriculture today.
http://MUPioneerSymposium.org

President - Graduate Student Association - Division of Plant Science at MU
Aug 2014 – May 2016

IT Specialist - Interdisciplinary Plant Group - Student and Post Doc at MU
Jan 2015 – May 2016

Webmaster - Nepalese Student Association - University of Missouri (MUNSA)
Apr 2015 – May 2017

AWARDS & HONORS

2017 Research in Plant Biology Award, University of Missouri
2016 Life Sciences Week research recognition award, University of Missouri
2012 Dr. Marcus Zuber Endowment, University of Missouri
2010 Dr. Max E. Bell Scholarship, Truman State University
2008 President's Honorary Scholarship, Truman State University
2013 Interdisciplinary Plant Group Travel Grant, University of Missouri

2016/17 Division of Plant Sciences Travel Fund, University of Missouri

PROFESSIONAL TRAINING

Preparing tomorrow's Leaders for Science (PTLS) Class of 2014-15

PTLS is a program at college of agriculture and natural resources (CAFNR) at MU, developed to equip an elite set of graduate students in the sciences with essential interpersonal and communication skills so that they contribute to teams at an accelerated pace.

TEACHING EXPERIENCE

The Joseph Baldwin Academy – Truman State University Summer - 2011

Guest instructor

- Lectured students enrolled in the 7th, 8th, or 9th grade from different elementary schools across the country on basic principles of Molecular Genetics; DNA finger printing; PCR and Gel electrophoresis
- Conducted and supervised lab work on DNA extraction, pipetting, Polymerase Chain reaction (PCR), preparing Agar gel, Electrophoresis of amplified PCR Analysis and interpretation of results

VOLUNTEERING ACTIVITIES

Research Mentor
MU Bio-Engineering Team
Worked with Ag-Engineering undergraduate students to help design, build and test a high-throughput phenotyping robot
Fall 2015

Editorial Duties – Reviewer
Journal of *Plant Breeding*
Crop Science Journal

Student Health Worker
World Health Organization-Nepal
June 2004 – January 2006 (1 year 8 months) | Health
Helped immunizing children under the age of 5 with polio vaccine

Educator - Mizzou Adventures in Education
University of Missouri
April 2014 | Science and Technology
Showed K-6 students different kinds of products that contained corn (both edible and non-edible) and also had an activity in which they made their own plastic from corn products.

RESEARCH PRESENTATION AT CONFERENCES/MEETINGS

- International Plant and Animal Genome conference, San Diego, CA
- ASA, CSSA, SSSA meeting, Phoenix, AZ
- Plant Sciences symposium, University of Illinois – Urbana Champaign, IL
- Genetics and Genomics of Crop Improvement symposium, Donald Danforth Plant Science Center, St. Louis., MO
- 2016 Universities Fighting World Hunger summit, Columbia, MO
- BioBash networking event, Danforth Plant Science Center, St. Louis, MO
- PhenoDays: Imaging & Robotics, Danforth, Plant Science, Center, St. Louis, MO
- Plant Sciences and Bioengineering Colloquium, Columbia, MO
- Maize Genetics Conference, St. Charles, IL and Jacksonville, FL
- MU Life Sciences Week, Columbia, MO
- Interdisciplinary Plant Group Symposium, University of Missouri, Columbia, MO
- Student research conference, Truman State University, Kirksville, MO
- Adair County extension center, University of Missouri extension, Kirksville, MO

TECHNICAL SKILLS

- **Genetics and Genomics**
  - Quantitative and Mendelian genetics
  - Genotype by Sequencing and Next Generation Sequencing data analysis
  - QTL mapping
  - Joint Linkage QTL mapping
  - Genome Wide Association Studies (GWAS)]
  - Generalized linear models and line mixed models
  - Alignment, Assembly and Annotation

- **Data Analysis and Visualization**
  - Programing Languages & Software: R, SAS, PERL, UnScrambler, HTML
  - CIRCOS
  - MapMan
  - TASSEL

- **Instrument calibration and Statistical Modeling**
  - Near Infrared Reflectance Spectroscopy (NIRS)
  - Near Infrared Transmittance Spectroscopy (NITS)
  - Nuclear Magnetic Resonance (NMR)

- **Bioinformatics Tools**:
  - Genome browsers (MaizeGDB and MaizeSequence.org), gene expression databases (PlexDB, QTeller), protein functional prediction software (InterProScan) and comparative genome platforms (CoGe), Biology WorkBench
  - Fgenesh, BioEdit, ClustalW
  - Databases : Genbank and, Ensembl

- **Statistical Genetic Analysis**
  - Joint-Linkage Analysis in SAS
  - Statistical programing language R, SAS and PERL

- **Laboratory Skills**
  - DNA & RNA extraction & quantification; PCR & Gel Electrophoresis
  - GBS/ RAD Library preparation
  - Iodine Colorimetric Analysis and Spectroscopy

RESEARCH PRESENTATIONS TITLES

Epistasis Analysis of Teosinte Allele for Agronomic and Domestication Traits in Maize

Avi Karn[1] and Sherry Flint-Garcia[2]
[1]Division of Plant Sciences, University of Missouri, Columbia, MO, USA
[2]United States Department of Agriculture, Agricultural Research Service, Columbia, MO, USA

Evaluating Teosinte Alleles for Kernel Composition in Maize

Avi Karn[1] and Sherry Flint-Garcia[2]
[1]Division of Plant Sciences, University of Missouri, Columbia, MO, USA
[2]United States Department of Agriculture, Agricultural Research Service, Columbia, MO, USA

Enriching Biodiversity of Grain Crops as a Basis for Optimizing the Present and Future Global Food Demands

Avi Karn[1] and Sherry Flint-Garcia[2]
[1]Division of Plant Sciences, University of Missouri, Columbia, MO, USA
[2]United States Department of Agriculture, Agricultural Research Service, Columbia, MO, USA

Joint-Linkage QTL analysis for total kernel protein content in teosinte near isogenic lines

Avinash Karn [1], Sherry Flint-Garcia [1,2]
[1] Division of Plant Sciences, University of Missouri, Columbia, MO
[2] United States Department of Agriculture, Agricultural Research Service, Columbia, MO

Near-Infrared spectroscopy based phenomics study: Understanding the effect of

teosinte alleles on kernel composition in maize

Avinash Karn [1], Sherry Flint-Garcia,[1,2]
[1] Division of Plant Science, University of Missouri, Columbia, MO
[2] United States Department of Agriculture, Agricultural Research Service, Columbia, MO

Breeding Specialty Starch Maize Using Exotic Genetic Resources for Gene Discovery of Novel Alleles and Modifiers with Materials generated from USDA-ARS GEM Project

Avinash Karn[1]; Dr. Mark Campbell[1]; Dr. Brent Buckner[1]; Dr. Diane Janick-Buckner[1]; Dr. Michael Blanco[2, 3]; Dr. Paul Scott[2, 3], Dr. Adrienne Moran-Lauter[2,3]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501
[2] Iowa State University, Agronomy Department, and USDA-ARS, Ames, Iowa 50011-1010
[3]USDA-ARS-MWA-PIRU, Ames, Iowa

Analysis of paralog evolution within homeologous regions of chromosomes 6, 5 and 9 of maize

Avinash Karn[1]; Dr. Brent Buckner[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501

Bioinformatic analysis of the intra-genomic evolution of retained homeologous paralogs in maize

Avinash Karn[1]; Dr. Brent Buckner[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501

Continued studies for optimizing a molecular marker assisted selection (mas) Backcross technique for introgression of a novel allele involved in starch synthesis Into genetically diverse maize lines of Latin American origin

Avinash Karn[1]; Dr. Mark Campell[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501

Evaluation of marker assisted backcross selection for the development of high amylose Corn

Avinash Karn[1]; Dr. Mark Campell[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501

Development and evaluation of specialty starch maize germplasm utilizing biodiversity from GEM releases to optimize grain quality, composition, and yield

Dr. Mark Campbell[1], Avinash Karn[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501

Genetic studies to examine high amylose modifier gene(s)

Dr. Mark Campbell[1], Avinash Karn[1]
[1]Truman State University, Department of Science and Mathematics, Kirksville, MO 63501