VIVEK SHRESTHA

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1. EDUCATION

GRADUATE

DOCTOR of PHILOSOPHY

Graduate Student, Division of Biological Sc. 2016-present
Laboratory of Ruthie Angelovici
University of Missouri, Columbia, MO
(Expected Graduation Date) (December 2020)

MASTER of SCIENCE July 2016

Graduate Student, Biological Sc. Department 2014-2016
Laboratory of Donald L. Auger
South Dakota State University, Brookings, SD

UNDERGRADUATE

Bachelor of Science in Agriculture 2007-2011
Elective – Plant Pathology
Tribhuvan University, IAAS, Nepal

2. Research Experience

GRADUATE

PhD Research Assistantship 2016-present

Uncovering the genetic architecture of free and protein bound amino acids in maize kernels using multi-omics Integration:
Involved in the overall goal of the project is to improve the quality protein in maize. I am using genome wide association study (GWAS) for hundreds of free amino acids (FAAs) and protein bound amino acids (PBAAs) traits using multiple growth of Goodman-Buckler maize association panel. GWAS with multiple traits often provides a large list of candidate genes. Hence, I am using multi-omics integration approach by combining GWAS with protein or gene co- expression data

using an orthogonal experiment to prioritize high candidate genes that regulates the FAAs and PBAAs in maize kernels. In addition, I am also involved in metabolic characterization of FAAs and PBAAs as well as their proteome in different developing seeds of wild B73 and o2/B73 mutant. Besides these, I have also co-involved in developing R pipelines that involves pre-GWAS (outlier removal, Boxcox transformation and BLUPS/BLUEs generation) and post-GWAS (haploblock analysis) integration steps in GWAS.

MS Research Assistantship 2014-2016

Involved in the quantitative trait loci (QTL) mapping of the modifiers of the maize gametophyte factor (Ga1-s) using two founder parents (Ky21 and M162w) of NAM population. Also, involved in the study of quantitative trait polymorphisms emerged from the descendants of the double haploid maize lines using 15 different traits.

UNDERGRADUATE

Involved in the complete cultivation practices along with the yield quantification of *Pleurotus sajor-kaju* mushroom on various substrates.

OTHER PROFESSIONAL RESEARCH INSTITUTION

International Maize and Wheat Improvement Center (CIMMYT) January 2013- August 2013

Worked with the team led by Dr. Medha Devare and Dr. Ananta P. Regmi. Involved in a food security project in the rural areas of Nepal. Routine works involved the research trials of different hybrid and OPVs of maize as well as lentils in various farmer's field. Also involved in appropriate mechanization, seed marketing and value chain analysis.

Nepal Academy of Science and Technology (NAST) April 2012- 2013

Worked with the team led by Dr. Sangeeta Shrestha at Molecular Biological Unit. Worked as junior research assistant in the project on PCR based diagnosis of Huanglongbing disease (Citrus Greening) of various species of Citrus from various location of Nepal.

3. PUBLICATIONS

Google Scholar: (https://scholar.google.com/citations?user=NII5NbgAAAAJ&hl=en)

2020

(1) Marianne L. Emery; Abou Yobi; Clement Bagaza; **Vivek Shrestha**; Samuel Holden; Ella Katz; Christa Kanstrup; Alexander E. Lipka; Daniel J. Kliebenstein, Hussam Hassan Nour-Eldin, Ruthie Angelovici "*mGWAS uncovers Gln-Glucosinolate seed specific interaction and its role in metabolic homeostasis".* Plant Physiology, 2020. (In press: https://doi.org/10.1104/pp.20.00039)

(2) Aaron Fait; Albert Batushansky; **Vivek Shrestha**; Abou Yobi; Ruthie Angelovici "*Can metabolic tightening and expansion of co-expression network play a role in stress response and tolerance*." Plant Science, 2020 (In press: https://doi.org/10.1016/j.plantsci.2020.110409)

(3) Abou Yobi; Clement Bagaza; Albert Batushansky; **Vivek Shrestha**; Marianne L. Emery, Samuel Holden; Sarah Turner-Hissong; Nathan D. Miller; Thomas P. Mawhinney; Ruthie Angelovici "*The complex response of free and bound amino acids to water stress during the seed setting stage in Arabidopsis*." Plant Journal, 2020 (In press: https://doi.org/10.1111/tpj.14668)

(4) Marianne Slaten; Yen On Chan; **Vivek Shrestha**; Alexander Lipka; Ruthie Angelovici "*HAPPI GWAS: Holistic Analysis with Pre and Post Integration GWAS*, Bioinformatics, 2020.(In press: https://doi.org/10.1093/bioinformatics/btaa589) (Also, In bioRxiv: https://doi.org/10.1101/2020.04.07.998690)

(5) **Vivek Shrestha**; Abou Yobi; Marianne Slaten; Yen On Chan; Sam Holden; Abiskar Gyawali; Sarah T. Hissong; Timothy M. Beissinger; Sherry Flint-Garcia; Alexander E. Lipka; Ruthie Angelovici "*Uncovering the genetic architecture of protein bound amino acids (PBAA) in maize kernels using multi-omics integration". 2020 (In Prep.)*

2019

(6) Abiskar Gyawali; **Vivek Shrestha**; Katherine E. Guill; Sherry Flint Garcia; Timothy M. Beissinger "*Single-plant GWAS coupled with bulk segregant analysis allows rapid identification and corroboration of plant-height candidate SNPs*", BMC Plant Biology, 2019. (In press: https://doi.org/10.1186/s12870-019-2000-y)

(7) **Vivek Shrestha**; Mani Awale; and Avinash Karn "*Genome Wide Association Study (GWAS) on Disease Resistance in Maize*." *Disease Resistance in Crop Plants*. Springer, Cham, 2019. 113-130. (In press: https://doi.org/10.1007/978-3-030-20728-1_6)

4. Skills

I) Proficient in R and R studio

II) Familiar with Python, Linux and Git

III) GWAS (GAPIT, FarmCPU and TASSEL)

IV) QTL mapping (R/QTL and WinQTL)

V) Omics data analysis (Transcriptomics- RNAseq, Proteomics and Metabolomics data analysis)

VI) Coexpression network analysis - WGCNA

VI) Strong background in Quantitative genetics, Statistics and Bioinformatics

VII) Familiar with DNA, RNA and Protein extraction and PCR based analysis

VIII) Field experimental design

5. Teaching Experience

Teaching Assistantship

University of Missouri, Columbia Fall2016, 2018, 2019 and Spring2017

Introduction to Cell Biology2300 - Discussion session 3 sections per week. Revision of the important concepts as well as comprehensive discussion of the lecture materials using participatory approach and multi-media. Also, involved in grading and guest lecturing.

South Dakota State University Fall2015

General Biology and Genetics 151 Lab - Laboratory session 3 sections per week.

Guest Lectures

"Transport across cell membranes" – Fall 2018 – Class size of around 90 students
"Endomembrane System" – Fall 2019 – Class size of around 110 students

6. Oral Presentations

2020

(1) "*Uncovering the genetic architecture of protein bound amino acids in maize kernels using GWAS combined with gene co-expression network analysis*" V. Shrestha and R. Angelovici. 62nd Annual Maize Genetics Conference, Scheduled for Mar 12-15, 2020, Kailua Kona, Hawaii. *(Invited but canceled due to COVID 19 threat but doing webinar soon)*

(2) "*Uncovering the genetic architecture of protein bound amino acids in maize kernels using multi-omics integration*" V. Shrestha and R. Angelovici. *Fourth Annual Plant Research Symposium*, Feb 20, 2020, University of Missouri, Columbia, MO.

2018

(3) "*Genetic and metabolic basis of seed amino acid composition in Maize*" V. Shrestha and R. Angelovici. *Plant Talks*, Oct 25, 2018, University of Missouri, Columbia, MO.

(4) *"Uncovering the genetic architecture of seed amino acid composition in Maize"* V. Shrestha and R. Angelovici. Missouri Informatics Symposium, Apr 10, 2018, University of Missouri,

Columbia, MO.

2016

(5) *"The search for modifiers of the Maize Gametophyte Factor (Ga1-s)"* V. Shrestha and D. Auger. DuPont Pioneer Plant Breeding Symposium, Apr 8, 2016, University of Minnesota, St. Paul, MN, USA

7. Poster Presentations

2019

(1) *"Metabolic-GWAS reveals several distinct regulators of free and bound Amino acids in the dry seeds of Maize"* V. Shrestha, M. Emery, A. Yobi, S. Turner, A. Gyawali, S. Flint-Garcia, T. Beissinger, A. Lipka and R. Angelovici. Maize Genetics Conference, Mar 14-17, 2019, Saint-Louis, MO, USA

2018

(2) *"Genetic Architecture and Relationship Within and Between Seed Free and Protein Bound Amino Acid Pools in Maize"* V. Shrestha, M. Emery, A. Yobi, S. Turner, S. Flint-Garcia, T. Beissinger, A. Lipka and R. Angelovici. National Association of Plant Breeders, Aug 7-10, 2018, University of Guelph, Guelph, Ontario, Canada

(3) "*The Genetic basis of seed amino acid composition in Maize*" V. Shrestha, M. Emery, A. Yobi, S. Turner, S. Flint-Garcia, T. Beissinger and R. Angelovici. Missouri Life Sciences Week Apr 10, 2018, University of Missouri, Columbia, MO.

(4) "*Genetic basis of seed amino acid composition in Maize*". Vivek Shrestha, Marianne Emery, Abou Yobi, Sarah Turner, Sherry Flint-Garcia, T. Beissinger and R. Angelovici. MU Plant Research Symposium, Feb 8, 2018, University of Missouri, Columbia, MO, USA

2017

(5) "*Genetic architecture of seed amino acid composition using various tools of Genome Wide Association Study*" M. Emery, V. Shrestha. A. Gyawali, T. Beissinger and R. Angelovici. Missouri Transact Annual Meeting, Aug 15, 2017, Saint Louis, MO, USA

2016

(6) *"The search for modifiers of the Maize Gametophyte Factor (Ga1-s)"* Gamma Sigma Delta (Honor Society of Agriculture) poster contest, Apr 4, 2016, SDSU, SD, USA

(7) *"The search for modifiers of the Maize Gametophyte Factor (Ga1-s)"* and *"Quantitative Trait Polymorphism emerging from Double Haploids Maize Lines"* V. Shrestha and D. Auger. Maize Genetics Conference, Mar 17-20, 2016, Jacksonville, FL, USA.

2015

(8) *"Study of Quantitative Trait Polymorphism emerging from Double Haploids Maize Lines"* V. Shrestha and D. Auger. Crop Science Society of America (CSSA) meeting, Minneapolis

Convention Centre Minneapolis, MN, USA and Maize Genetics Conference, Mar 12-15, 2015, St. Charles, Chicago, IL, USA.

8. Awards and Recognition

2020

(1) Midwest American Society of Plant Biologist (ASPB) travel award, 2020 *(Postponed due to COVID-19 threat)*

(2) Maize genome annotation Jamboree award, Maize Genetics Conference, 2020

2018

(3) Douglas D. Randall Young Scientist Development Fund, University of Missouri, Columbia, MO.

(4) 3rd place received at Missouri Life Sciences week 2018 poster research competition on Bioinformatics category, University of Missouri, Columbia, MO

(5) Travel Grant Award, Division of Biological Sciences, University of Missouri

2016

(6) 1st place received at Gamma Sigma Delta Second annual student poster contest (Master's Category), South Dakota State University, Apr 4, Brookings, SD

(7) Travel Grant Award (Oral Presentation), Pioneer Plant Breeding Symposium, University of Minnesota (UMN), Apr 8, St. Paul, MN

(8) Outstanding Bio-Micro Graduate Student Award, Bio-Micro Graduate Student Association, SDSU

2015

(9) Travel Grant Award, Department of Biology and Microbiology, SDSU

*(10)*Outstanding Bio-Micro Graduate Student Award, Bio-Micro Graduate Student Association, SDSU

2007-2011

(11) Merit Full Scholarship, BS Agriculture, Tribhuvan University, Nepal- *2007-2011*

9. Professional Development

2020

(1) Organized a one-day workshop; providing introduction to GWAS, hand-on-skills on GWAS with GLM, MLM and FarmCPU model to Dr. Ruth Welti group (https://www.k-state.edu/biology/people/tenure/welti/) from Kansas State University, Jan 14, 2020 at University of Missouri, Columbia, MO.

2019

(2) Chairperson, MU Plant Research Symposium, Corteva agriscience symposium series (Faculty Advisor: Dr. Sherry Flint-Garcia) (http://mupioneersymposium.org/)

2018

(3) Webmaster, MU Plant Research Symposium, Corteva agriscience symposium series (Faculty Advisor: Tim Beissinger)

10. Training and workshop

2019

(1) Attended one-day *Introduction to Python Short Course* by "Steven Stehnach", Jan 25, 2019, at Department of Statistics, University of Missouri.

2018

(1) Attended *Tucson Plant Breeding Institute, Module I ("Introduction to Plant Quantitative Genetics") and Module II ("Advanced Statistical Plant Breeding")* by Dr. Bruce Walsh, Dr. Mike Gore and Dr. Lucia Gutierrez, Jan 10-12, 2018, at BIO5 institute, University of Arizona, Tucson, AZ.

11. Mentoring

Undergraduate – 2
Rotational Graduate Student - 2

12. Service to Scientific Community

Journal (Manuscript) Review

BMC Plant Biology – 3
Journal of Cell and Development Biology – 1

13. Professional Affiliations

Member, American Society of Plant Biologists (ASPB)	2019-present
Member, National Association of Plant Breeders (NAPB)	2017-present
Member, Crop Science Society of America (CSSA), Agronomy Society of America (ASA)	2015-present

References

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