# Manoj Sapkota

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## EDUCATION

**University of Georgia (UGA), Athens, GA**

*Ph.D.*, Plant Breeding, Genetics and Genomics, Institute of Plant Breeding, Genetics and Genomics (IPBGG),
Expected: Dec 2022
**Cumulative GPA**: 3.85/4.00
**Thesis title:** Identification and characterization of novel loci underlying fruit weight and flavor volatiles in tomato

**Tribhuvan University (TU), Nepal**

*B.S.,* Agriculture, Institute of Agriculture and Animal Sciences, Rampur, Nepal
Major in Plant Breeding, 2016
**Passed with 82.19% under Distinction Division**
**Thesis title:** Agromorphological characterization of foxtail millet (*Setaria italica* L. *Beauv*) at Rampur, Chitwan

## RESEARCH EXPERIENCE

**Graduate Research Assistant, Institute of Plant Breeding, Genetics, and Genomics, University of Georgia, Athens, Georgia, US**
August 2017 - Present
Supervisor: Dr. Esther van der Knaap

**Research Technician, International Maize and Wheat Improvement Centre (CIMMYT), Nepal**
November 2016-June 2017
Supervisor: Dr. Ajanahalli Ramaiah Sadananda

**Research Intern, Wheat Breeding Unit, Agriculture and Botany Division, Nepal Agriculture Research Council, Nepal**
April 2016 – November 2016
Supervisor: Dr. Dhruba Bahadur Thapa

## RESEARCH GRANTS & FELLOWSHIPS

- The Roger and Cindy Boerma Plant Breeding Excellence Scholarship Award 2022.
- The John Ingle Innovation in Plant Breeding Award 2021.
- Awarded research grant for *B.S.* thesis research by Local Initiatives for Biodiversity, Research and Development (Li-BIRD), Nepal, 2016
- Full scholarship to study *B.S.* Agriculture in Rampur Campus, Institute of Agriculture and Animal Sciences by Tribhuvan University in competition basis, 2012-2016

## HONORS & AWARDS

- 2nd place in the PhD poster competition at the 2022 PBGG Retreat, Jekyll Island, GA, May 2022.
- 3rd place in the PhD poster competition at the 2020 PBGG Retreat, virtual, July 2020.
- 1st place in the PhD poster at the 2019 PBGG Retreat. Dawsonville, GA, May 2019.
- Travel award to attend and present a talk at 3rd Annual University of Florida Plant Science Symposium, University of Florida, Gainesville, Florida, January 2019

## SUPERVISED UNDERGRADUATE & HIGH SCHOOL STUDENTS' PROJECTS

Jeremiah Jackson, jljackson@presby.edu, under CCGv2 REEU 2022, Candidate gene identification for tomato monoterpenoid volatiles in fruits through an automated gene screening pipeline with GWAS.

Alexander Kim Sweet, xsweet@uga.edu, Fall 2021, Developing pipeline and Graphical User Interface program to analyze and classify scanned tomato fruit images based on ripeness.

Arman Spinola-Khazami, arman.spinolakh25@uga.edu, Spring 2021 and Summer 2021, Developing pipelines for local phylogenetic tree construction to study novel loci affecting fruit weight and flavor volatiles.

Seyedparsa Torabi, seyedparsa.torabi@uga.edu, Spring 2021, Identification and study of candidate genes underlying novel loci affecting methyl salicylate biosynthesis in tomato fruits.

# Manoj Sapkota

## PUBLICATIONS

Thapa, D.B., Subedi, M., Yadav, R.P., Joshi, B.P., Adhikari, B.N., Shrestha, K.P., Magar, P.B., Pant, K.R., Gurung, S.B., Ghimire, S., Gautam, N.R., Acharya, N.R., **Sapkota, M.**, Mishra, V.K., Joshi, A.K., Singh, R.P., and Govindan, V. 2022. Variation in Grain Zinc and Iron Concentrations, Grain Yield and Associated Traits of Biofortified Wheat Genotypes in Nepal. *Frontiers in Plant Science,* 13:881965. doi: 10.3389/fpls.2022.881965

Pereira, L., Zhang, L., **Sapkota, M.**, Ramos, A., Razifard, H., Caicedo, A.L. and van der Knaap, E., 2021. Unraveling the genetics of tomato fruit weight during crop domestication and diversification. *Theoretical and Applied Genetics,* 134(10), pp.3363-3378.

Topcu, Y., **Sapkota, M.**, Illa-Berenguer, E., Nambeesan, S.U. and van der Knaap, E., 2021. Identification of blossom-end rot loci using joint QTL-seq and linkage-based QTL mapping in tomato. *Theoretical and Applied Genetics*, pp.1-15.

Pereira, L., **Sapkota, M.**, Alonge, M., Zheng, Y., Zhang, Y., Razifard, H., Taitano, N.K., Schatz, M., Fernie, A., Wang, Y. and Fei, Z., 2021. Natural genetic diversity in tomato flavor genes. *Frontiers in plant science*, 12, p.914.

Li Q., **Sapkota M.**, and van der Knaap E. 2020. Perspectives of CRISPR/Cas-mediated cis-engineering in horticulture: unlocking the neglected potential for crop improvement. *Horticulture research*, 7(1), 1-11.

Poudel A., Thapa D.B., and **Sapkota M.** 2017. Cluster Analysis of Wheat (*Triticum aestivum L*.) Genotypes Based Upon Response to Terminal Heat Stress. *International Journal of Applied Sciences and Biotechnology*, 5(2), 188-193. DOI: 10.3126/ijasbt.v5i2.17614

Bhattarai R.P., Ojha, B.R., Thapa D.B., Kharel R., Ojha, A., and **Sapkota M.** 2017. Evaluation of Elite Spring Wheat (*Triticum aestivum* L.) Genotypes for Yield and Yield Attributing Traits under Irrigated Condition. *International Journal of Applied Sciences and Biotechnology*, 5(2), 194-202. DOI: 10.3126/ijasbt.v5i2.17615

**Sapkota M**., Timilsina D., Yadav M.K., and Ghimire S. 2016. Agromorphological Characterisation of Foxtail millet *Setaria italica* L. Beuv. at Rampur, Chitwan. Thesis. Himalayan Crops, Official site of the Local Crop Project. http://www.himalayancrops.org/project/984/

**Sapkota M**., Pandey M.P., and Thapa D.B. 2016. Agromorphological Characterisation of Foxtail millet (*Setaria italica* L. Beauv) at Rampur, Chitwan, Nepal. *International Journal of Applied Science and Biotechnology,* 4(3), 298-307.

**Sapkota M.,** Pandey M.P., Thapa D.B., Yadav M.K., Ghimire S. and Timalsina D. 2016. Diversity Assessment of Foxtail millet (*Setaria italica L.* Beauv) Accessions Collected from Different Locations of Nepal. *International Journal of Applied Science and Biotechnology,* 4(4), 483-488. DOI: 10.3126/ijasbt.v4i4.16244.

Vitrakoti D., Aryal S., Rasaily S., Ojha B.R., Kharel R., and **M. Sapkota.** 2016. Study on Genotypic Response And Correlation Analysis Of The Yield And Yield Attributing Traits Of Different Barley (*Hordeum vulgare)* Genotypes. *International Journal of Applied Science and Biotechnology,* 4(4), 529-536, DOI: 10.3126/ijasbt.v4i4.16269.

**Submitted Manuscripts:**

Frick, E., **Sapkota, M.**, Pereira, L., Wang, Y., van der Knaap, E., Tieman, D., and Klee, H. 2022. A family of methyl esterases convert methyl salicylate to salicylic acid in ripening tomato fruit. *Plant Physiology. Under review*

Barnett, J., Buonauro, G., Kuipers, A., **Sapkota, M.,** van der Knaap, E., & Razifard, H. 2022. Genomic characterization of a wild-like tomato accession found in Arizona; a northward migration story. *bioRxiv*. submitted to *Systematic Botany, Under review*

Zhang, B., Li, Q., Keyhaninejad, N., Taitano, N., **Sapkota, M.**, Snouffer, A. and van der Knaap, E., 2022. Combinatorial TRM-OFP module is required to fin-tune tomato fruit shape. *New Phytologist, Under review*

## ORAL PRESENTATIONS

**Sapkota M.** *Identification and characterization of novel loci underlying fruit weight and flavor volatiles in tomato*, Presentation talk at Institute of Plant Breeding, Genetics, and Genomics Departmental Retreat, Jekyll Island, May 2022

**Sapkota M.,** *Language of plants: understanding the plant vocabulary and its possible implications in crop breeding,* Presentation talk at Institute of Plant Breeding, Genetics and Genomics seminar. PBGG, UGA, February 2022

**Sapkota M.,** *Identifying novel QTLs underlying fruit weight in tomato,* Presentation talk at Plant Functional Genomics Seminar, Miller Plant Sciences, UGA, February 2020

**Sapkota M.,** *Elimination of Negative Flavor Volatiles for Breeding Tastier Tomatoes,* Presentation talk at 3rd Annual University of Florida Plant Science Symposium, University of Florida, Gainesville, Florida, January 2019

**Sapkota M.,** *How tomatoes got bland & tastier ones on the way,* Presentation talk at Institute of Plant Breeding, Genetics and Genomics seminar. PBGG, UGA, November 2018

**Sapkota M.,** *Breeding for tastier tomatoes: Eliminating negative flavor volatiles,* Presentation talk at Plant Functional Genomics Seminar, Miller Plant Sciences, UGA, October 2018

## POSTERS PRESENTATIONS

**Sapkota M.,** Pereira L., Wang Y., Tieman D., and van der Knaap E., Genetic characterization of *METHYLESTERASE* and *NON-SMOKY GLUCOSYL* TRANSFERASE1 in red-fruited tomato, Poster presentation at CROPS 2022, Huntsville, Alabama, May 2022.

**Sapkota M.,** Pereira L., Zhang L., Singh J., Topcu Y., Feng Q., Tieman D., and van der Knaap E., Genome-wide association mapping for volatiles contributing to flavor, Poster presentation at 2022 PBGG Retreat Poster Competition, May 2022.

**Sapkota M.,** Zhang L., Pereira L., Qiu Z., and van der Knaap E., *Identification of novel loci underlying fruit weight in tomato,* Virtual poster presentation at 2021 PBGG Retreat Poster Competition, May 2021.

**Sapkota M.,** Zhang L., Pereira L., Qiu Z., and van der Knaap E., *Identification of novel loci underlying fruit weight in tomato,* Virtual poster presentation at Sol International Online Meeting, November 2020

**Sapkota M.,** Zhang L., Pereira L., Qiu Z., and van der Knaap E., *Identification of novel loci underlying fruit weight in tomato.,* Virtual poster presentation at Plant Biology 2020, Worldwide summit July 2020

**Sapkota M.,** Zhang L., Pereira L., Qiu Z., and van der Knaap E., *Identification of novel loci underlying fruit weight in tomato,* Virtual poster presentation at 2020 PBGG Retreat Poster Competition, July 2020.

**Sapkota M.**, Li Q., Pereira L., Keyhaninejad N., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E., *Studying the genetics of negative flavor volatiles: propyl acetate, methyl salicylate and guaiacol for breeding tastier tomatoes,* Poster presented at Plant Center Fall Retreat. Helen, GA, October 2019.

**Sapkota M.**, Li Q., Pereira L., Keyhaninejad N., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E., Elimination *of negative flavor volatiles: propyl acetate, methyl salicylate and guaiacol for breeding tastier tomatoes,* Poster presented at National Association of Plant Breeders Annual Meeting. Callaway Gardens, GA, August 2019.

**Sapkota M.**, Li Q., Pereira L., Keyhaninejad N., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E., Elimination *of negative flavor volatiles: propyl acetate, methyl salicylate and guaiacol for breeding tastier tomatoes,* Poster presented at CROPS 2019. Huntsville, AL: June 2019.

**Sapkota M.**, Li Q., Pereira L., Keyhaninejad N., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E., Elimination *of negative flavor volatiles: propyl acetate, methyl salicylate and guaiacol for breeding tastier tomatoes.,* Poster presented at Institute of Plant Breeding, Genetics and Genomics Retreat, Dawsonville, GA, May 2019. Achieved 1st position in the poster competition.

**Sapkota M.**, Li Q., Pereira L., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E. *Breeding for tastier tomatoes: Eliminating negative flavor volatiles.* Poster presented at Plant Center Retreat. Helen, GA: September 2018

**Sapkota M.**, Li Q., Pereira L., Tieman D., Frick E., Razifard H., Caicedo A., and van der Knaap E. *Breeding for tastier tomatoes: Eliminating negative flavor volatiles.* Poster presented at Institute of Plant Breeding, Genetics and Genomics Retreat. Callaway Garden, GA: May 2018

## CAMPUS & COMMUNITY INVOLVEMENT

**UGA Plant Breeding, Genetics and Genomics Graduate Student Association**

- Journal club chair, May 2021 – May 2022
- Webmaster, May 2018 – May 2021
- Managed and handled following social handles:
    - https://www.facebook.com/PBGGatUGA
    - https://twitter.com/PBGGatUGA
- Designed IPBGG Graduate Student Handbook
- Volunteered for several student recruitment events for the department as a host and greenhouse/lab tour guide

**UGA Plant Center Symposium Organizing Committee**

- Member, Social media manager, 2018 – present
- Manage and update following social handles:
    - http://plantsymposium.uga.edu/
    - https://www.facebook.com/PlantCenterUGA
    - https://twitter.com/PlantCenterUGA
- Invite speakers, communicate and host the speakers during symposium

**UGA Integrated Plant Sciences (IPS)**

- Hosted and assisted recruits during the recruitment week every year
- Volunteered as a tour guide for UGA greenhouses and lab buildings

**Nepalese Students Association at UGA**

- President, 2018- 2020
- Secretary, 2017-2018
- Organized and managed different cultural events (Street festival in downtown Athens, picnic, welcome and farewells)

**van der Knaap Lab**

- Maintain, repair, and troubleshoot the lab workstation and server
- Help the lab members with several bioinformatic analysis (GWAS, GBS, QTLseq, RNAseq, and others) for different projects in the lab

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## COMPUTATIONAL SKILLS

- Linux shell script programming and several Bioinformatics analyses
    - Bulk segregant and QTLseq analysis
    - RNAseq, differential expression and GO term analysis
    - Genetic map construction and QTL mapping
    - Genome-wide Association Study (GWAS)
    - Genotyping by Sequencing (GBS)
    - Genetic diversity and haplotype analysis
    - Big data and whole genome sequencing analysis
- Graphic designing: Adobe Illustrator and Photoshop
- Programming: R, bash, Python, Perl, Matlab
- Cloud computing: Globus, Cyverse
- Website designing and management
- Gas Chromatography chromatograms analysis
- Proficient in using Microsoft Office package (Word, Excel and PowerPoint)

## MOLECULAR BIOLOGY SKILLS

- Marker assisted selection and assays
    - Developing and using molecular markers (CAPS, dCAPS, KASP)
    - PCR, RT-qPCR, KASP-PCR
    - DNA and RNA extraction
- Gene editing and cloning
    - CRIPSR/Cas9 gRNA designing
    - Plasmid preparation, transformation, and cloning
    - Tissue culture (tomato)
- Microscopy, imaging and image analysis

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# Summary of courses completed

The courses that I have completed are listed in Table 1 below.

Table 1: List of courses that I have completed, respective credit hours and the semester I took them. The courses in bold are the required courses for our department for graduation.

| Subject | Course | Level | Title | Credit hours | Semester | Year |
|---|---|---|---|---|---|---|
| BINF | 6550 | Masters | Bioinformatics Applications | 3 | Fall | 2017 |
| **FANR** | **6750** | **Masters** | **Experiment Methods Forest and Natural Resources** | 4 | Fall | 2017 |
| **PBGG** | **6140** | **Masters** | **Plant Breeding** | 3 | Fall | 2017 |
| BINF | 8950 | PhD | Systems Biology | 3 | Spring | 2018 |
| HORT | 8104 | PhD | Advanced Plant Physiology | 4 | Spring | 2018 |
| PBGG | 8880 | PhD | Quantitative Plant Breeding | 3 | Spring | 2018 |
| STAT | 8090 | PhD | Statist Genetics | 3 | Spring | 2018 |
| **PBGG** | **6000** | **Masters** | **Plant Breeding Practicum** | 3 | Summer | 2018 |
| **PBGG** | **8010** | **PhD** | **Research Methods Crops** | 3 | Fall | 2018 |
| **PBGG** | **8861** | **PhD** | **PBGG Research Seminar** | 1 | Fall | 2018 |
| **PBIO** | **8100** | **PhD** | **Plant Genetics** | 4 | Fall | 2018 |
| PBIO | 8980 | PhD | Special Topics Plant Biology | 1 | Fall | 2018 |
| PBGG | 8874 | PhD | Genomic Selection | 1 | Spring | 2019 |
| PBGG | 8875 | PhD | Genome-Wide Association Plants | 1 | Spring | 2019 |
| PBGG | 8900 | PhD | PBGG Emerging Topic | 1 | Spring | 2019 |
| PBIO | 8980 | PhD | Special Topics Plant Biology | 2 | Spring | 2019 |
| STAT | 8460 | PhD | Advanced Computational Biology and Bioinformatic | 3 | Spring | 2019 |
| **PBGG** | **8140** | **PhD** | **Advanced Plant Breeding** | 3 | Fall | 2019 |
| PBIO | 8980 | PhD | Special Topics Plant Biology | 2 | Spring | 2020 |
| PBIO | 8980 | PhD | Special Topics Plant Biology | 2 | Spring | 2021 |
| PBIO | 8980 | PhD | Special Topics Plant Biology | 2 | Fall | 2021 |
| **PBGG** | **8860** | **PhD** | **PBGG Communication Seminar** | 1 | Spring | 2022 |

The following Table 2 are from the unofficial transcripts from Athena (athena.uga.edu), MS and PhD separately. The credit hours in these tables include all the Doctoral Research hours (PBGG 9000) and Doctoral Dissertation writing (PBGG 9300) hours. The average GPA from both MS and PhD come to be 3.85

Table 2: Unofficial Transcript from Athena (athena.uga.edu)

| Transcript Totals - (Doctoral) | Attempt Hours | Passed Hours | Earned Hours | GPA Hours | Quality Points | GPA |
|---|---|---|---|---|---|---|
| Total Institution | 199 | 199 | 199 | 37 | 139.8 | 3.77 |
| Total Transfer | 0 | 0 | 0 | 0 | 0 | 0 |
| Overall | 199 | 199 | 199 | 37 | 139.8 | 3.77 |

| Transcript Totals - (Masters) | Attempt Hours | Passed Hours | Earned Hours | GPA Hours | Quality Points | GPA |
|---|---|---|---|---|---|---|
| Total Institution | 13 | 13 | 13 | 13 | 51.1 | 3.93 |
| Total Transfer | 0 | 0 | 0 | 0 | 0 | 0 |
| Overall | 13 | 13 | 13 | 13 | 51.1 | 3.93 |

**Average GPA from Masters and PhD: 3.85**