Ademola Aina, PhD

Trait and Gene Discovery | Quantitative Genetics | Computational Biology | Genomic Selection

1575 Linden Dr, Madison, Wisconsin, USA +1 608 628 6403] | aaina@wisc.edu | https://www.linkedin.com/in/ainaademola/ | https://orcid.org/0009-0007-5207-473X | https://ademola-aina.github.io/

Professional Profile

Plant quantitative geneticist with strong research background in molecular breeding, computational biology, and genotype-phenotype interaction studies. Proven expertise in quantitative trait loci (QTL) and genome-wide association studies (GWAS), trait discovery, marker validation, marker-assisted and genomic selection, study of abiotic stress effects on crops, and the development of cost-effective and high-throughput phenotyping and genotyping methods to improve crop quality and yield. Experienced in the design and implementation of greenhouse and field experiments, conducting multi-omics data analysis, and collaborating in international research consortia.

Research Interests

- Plant Physiology and Characterization
- GWAS, QTL Mapping, and Functional Genomics
- Plant Evolution, Domestication and Breeding
- Alternative Crops and Wild Species Genetics
- Soil Health, Agroecology and Sustainable Agriculture

Education

Ph.D. in Plant Genetics
International Institute of Tropical Agriculture – University of Ibadan, Ibadan, Nigeria — 2021
*Thesis: Genetic Diversity of African Yam Bean (*Sphenostylis stenocarpa Hochst. Ex. A. Rich. Harms*) Based on Morphological and Molecular Markers*
M.Sc. in Plant Genetics
University of Ibadan, Ibadan, Nigeria — 2012
*Thesis: Survey, Collection and Characterization of Wild *Vigna* Species in Oyo State, Nigeria
B.Sc. in Agriculture (Crop Science)
Ahmadu Bello University, Zaria, Nigeria – 2009

Research Experience

Postdoctoral Research Associate – Industrial Hemp Molecular Breeding
Department of Plant and Agroecosystem Sciences,
University of Wisconsin-Madison,
Madison, United States.
2022 – Present

-Designed and led field experiments for phenotypic evaluation of 1800 feral hemp germplasm over multiple years for flowering time, seed quality, seed-nutritional composition, height and yield
-Performed genomic DNA extraction and library preparation for genotyping by sequencing
-Analyzed highly dimensional SNP genomic and phenomics datasets using *Cannabis* pangenomes for genetic mapping of flowering time and seed quality and fiber traits
-Implemented GWAS and Marker-assisted selection (MAS) to improve hemp grain and fiber traits
-Conducted PACE assay marker selection and GC-MS to analyze cannabinoids in industrial hemp germplasm (~1800 accessions) to ensure diverse and compliant germplasm (< 0.3% THC)
-Developed cost-effective phenotyping methods for quality and yield traits in hemp
-Collaborated and led a diverse team of researchers and citizen scientists to collect and document feral hemp (*Cannabis sativa* L) populations across the US
-Produced peer-reviewed publications and develop grant proposals for additional funding for research, education, and outreach publications

Research Supervisor – Plant Imaging Analyst
Sainsbury Laboratory,
University of Cambridge,
Cambridge, United Kingdom
2019 – 2020

-Designed field trial experiments for phenotypic evaluation of 100 African yam bean (AYB) accessions for flowering time, photoperiodic sensitivity, and seed quality and yield related traits
- Characterized roots and nodule architecture for assimilate partitioning and nitrogen fixation efficiency
-Dissection and image analysis of the roots and nodules to understand the mechanisms of tuber development for trait improvement
-Collected and curated data on the tuber, bean, and nodule yield
-Monitored and documented the production and flow of plant germplasm among collaborators
-Coordinated all aspects of the project from start to finish between IITA, University and Sainsbury Laboratory, Cambridge
-Mentored 5 plant breeding grad students at the Pan African University
-Reported weekly in writing on activities and work plans to the project lead

Graduate Research Fellow – Miscellaneous Legumes Project
International Institute of Tropical Agriculture, HQ
Ibadan, Oyo State,
Nigeria
2015– 2020

-Designed field evaluation trials of 96 AYB germplasm across multiple locations for two years
-Collected and managed high-quality phenotypic data from multilocational trials using Field-book Apps
-Maintained legume identity through entire breeding stages by tracking samples from screen house/field to lab using Simple Sequence Repeat (SSR) markers
-Performed regular molecular biology procedures (plant genomic DNA/RNA extraction, PCR, gel electrophoresis, and fragment analysis)
-Trained undergrads, interns, and staff on basic molecular techniques and field experimental designs
-Performed statistical analysis of RAD-Seq generated Single Nucleotide Polymorphism (SNPs) markers for genotype-phenotype analysis and developed manuscripts for publication

Visiting Research Scholar– Bioinformatics
Sainsbury Laboratory,
University of Cambridge,
Cambridge, United Kingdom
2018– 2018

-Performed plant RNA extraction and RT-PCR for detection of plant viruses
-Conducted immunodiagnostic test to identify plants infected with CMV
-Conducted marker-trait association in determining pungency in chili pepper
-Performed association mapping analysis for QTL with R/QTL

Visiting Research Scholar– Computational Biology
Genome, and Biomedical Sciences Facility**,**
University of California,
Davis, United States
2016– 2017

-Coordinated research projects between IITA Genetic Resources Centre and UC-Davis Genome Centre
-Established and maintained 93 accessions of AYB seedlings in germination chambers and the greenhouse of the UC-Davis Vegetable and Crop Research Station
-Performed leaf tissue sample collection, DNA extraction, quality and quantity check

-Performed DNA library preparation, quantification, and optimization of double digest restriction-site associated DNA sequencing protocol for high throughput genotyping
-Performed genome sequencing (RAD-seq) using the Illumina Hi-Seq 4000 machine
-Conducted statistical analysis in R using several packages for large genotypic NGS-SNP data analysis
-Developed manuscript for publication

Research Technician – Yam and Cocoa Breeding Project
International Institute of Tropical Agriculture, HQ
Ibadan, Oyo State,
Nigeria
2014-2014

-Designed and established a multi-locational yam (100 clones) breeding trials in Nigeria
-Maintained germplasm resources both *ex situ* and *in situ* conservation
-Conducted phenotypic data collection using digital field apps
-Performed DNA extraction, PCR, PAGE, Gel electrophoresis, and preliminary data analysis
-Performed sample preparation and validation for genotyping by sequencing (DArTseq analysis)
-Maintained laboratory equipment and proper record-keeping
-Other responsibilities as assigned by my supervisor

Technical Skills

• Genomics & Bioinformatics: GWAS, QTL mapping, RNA-seq, DNA/RNA extraction, genome annotation
• Software: R, Python, Unix/Linux Programming, TASSEL, GAPIT, PLINK, FieldBook, Genstat, JBrowse, Persephone
• Wet Lab: library quantification, PCR, qPCR, marker genotyping
• Greenhouse/Field: Experimental design, trait phenotyping, companion/cover crop management

Publications

1. **Ademola Aina**, Jonathan P.W, Joseph S, Eliot S, Chandrani G.M, Mahmoud ElSohly, George D.W, Shelby E (2024) Genetic diversity, population structure, and chemical variation in American hemp (Cannabis sativa L.) germplasm from the United States. bioRxiv 24206372 [Preprint] **doi:** https://doi.org/10.1101/2025.03.10.642411.
2. Ford, Tori, **Ademola Aina**, Shelby Ellison, Tyler Gordon, and Zachary Stansell. "Utilizing digitized occurrence records of Midwestern feral Cannabis sativa to develop ecological niche models." *Ecology and Evolution* 14, no. 7 (2024): e11325.
3. **Ademola Aina**, Jillian Abendroth, Shelby Ellison (2024) Association mapping in industrial hemp (*Cannabis sativa*) identifies loci associated with agronomic and grain nutritional traits. BMC Genomics (In prep).

4. Ndenum Shitta, Abebe Abush, Eliot Stanton **Ademola Aina** (2024) Genome wide association mapping of nutritional traits for developing improved African yan bean varieties. *Scientific reports* (In prep).
5. Eric Agoye, John Atoyebi, Ukoabasi Ekanem, **Ademola Aina** (2024) Genomics aided research for the improvement of Bambara and Kersting's groundnut. *Frontiers in Plant Science, section Genomics of plants and the Phtyoecosystem* (In prep)
6. Oluwole, O. O., Aworunse, O. S., **Aina, A. I**., Oyesola, O. L., Popoola, J. O., Oyatomi, O. A., ... & Obembe, O. O. (2021). A review of biotechnological approaches towards crop improvement in African yam bean (Sphenostylis stenocarpa Hochst. Ex A. Rich.). *Heliyon*, *7*(11), e08481. https://doi.org/10.1016/j.heliyon.2021.e08481.
7. **Aina, A**., Garcia-Oliveira, A.L., Ilori, C. *et al*. Predictive genotype-phenotype relations using genetic diversity in African Yam Bean (*Sphenostylis stenocarpa* (Hochst. ex. A. Rich) Harms). *BMC Plant Biol* 21, 547 (2021). https://doi.org/10.1186/s12870-021-03302-0.
8. **Aina, A.I.,** Ilori, C.O., Ekanem, U.O**.** *et al*. Morphological Characterisation and Variability Analysis of African Yam Bean (Sphenostylis stenocarpa Hochst. ex. A. Rich) Harms. *International Journal of Plant Research*. 2020; doi:10.5923/j.plant.20201003.01.
9. **A. Aina**, C. Ilori, D. Potter, N. Carrasquilla-Garcia, P. Chang, M. Abberton. (2017). Next generation sequencing of African yam bean accessions: *In the proceeding of the book of abstracts of the 3rd International Conference on Global Food Security*. Cape Town, South Africa.
10. **A. Aina**, C. Ilori, M. Abberton, D. Potter, O. Oyatomi, N.S. Shitta. (2018). Genetic diversity study of African yam bean using Cowpea-derived SSR markers. *In the book of proceedings of the Society for underutilized legumes, Covenant University and International Institute of Tropical Agriculture*. Ogun, Nigeria.

Fellowships & Grants

-£80,000 Global Challenges Research Fund: *Peas'n Chips: Enhancing Nigeria's Food Resilience and Soil Health Through Rehabilitating African Yam Bean.* (CO-I) (2019-2021). Initiated the Collaboration through the results of my Ph.D. research for this grant between three Institutes (UI, IITA, and the University of Cambridge)

-£20,000 Cambridge-Africa ALBORADA: *'Peas'n Chips Entrepreneurs: Rehabilitating African Yam Bean for Food Resilience and Soil Health in Nigeria (Bean_preneurs)' and* "*Characterizing tuber development of an underutilized Legume Crop, The African Yam bean*". (CO-I) (2018 – 2019). Initiated the Collaboration through the results of my Ph.D. research for this grant between three Institutes (UI, IITA, and the University of Cambridge)

-£5,000 Research Fellowship: Sainsbury Laboratory, University of Cambridge, England. (2018)

-$5,000 UC-Davis travel grants to Global Food Security Conference, Cape Town, South Africa. (2018)

-$35,000 Norman E. Borlaug Leadership Enhancement in Agriculture Program: USAID through UC- Davis, USA (2016-2017)

-$5,000 UC-Davis travel grants to the World Food Prize, Des Moines, Iowa (2017)

-$150,000 Global Trust Crop for a Ph.D. research fellowship, Genetic Resources Centre, International Institute of Tropical Agriculture, headquarters, Ibadan. Nigeria (2015-2018)

-$200,000 USDA NIFA-SAC grant awarded for 3 years of funding

Awards

-2018 - Promising African Ph.D. student, JR Biotek Foundation, UK
-2017 - Excellence in communicating scientific research, Borlaug LEAP, UC-Davis, USA
-2016 - Promising African student in the field of Agriculture, Borlaug LEAP, USAID – USA

Teaching Experience

-Advanced Genetics I&II (CPE 741 & 742) - Graduate course
-Cytogenetics (CPE 744) – Graduate course
-Applied Genetics (CPE 510) – Undergraduate course
Taught the above courses, experimental demonstrations, exam supervision, marking and grading assignments, quizzes, and exam scripts. Also served as a course advisor to a few students
-Guest Lecturer, Tropical Horticultural Systems (Hort 376), Department of Plant and Agroecosystems Sciences, University of Wisconsin -Madison, USA

Courses, Trainings and Workshops

-2025 – Plant Breeding Training Workshop - Genomic Selection Workshop
-2025 – Certificate Course - Implementing Genomic Selection: From Theory to Practice
-2024 – UW-Madison Genetics and Biotech Center - Linux Essentials (bash) v.5.1
-2024 - UW-Madison Genetics and Biotech Center – Next Generation Sequence Analysis
-2024 – BIOLEARN - Real World Bioinformatics Analysis in R
-2024 – BIOLEARN – Cell_Line_to_Command_Line Bioinformatics
-2024 – DIYTranscriptomics – Open-Source Tools to Analyze RNA-Seq Data
-2023 – UW-Madison OSG Summer School – High-throughput Computing
-2023 - University of Minnesota, St.Paul – PCR Allele Competitive Assay (PACE) Genotyping
-2022 – Transmitting Science ForBio – Research School in Biosystematics, Barcelona, Spain
*Phylogenetic Analysis Using R
-2022 – Makerere University Regional Centre for Crop Improvement (MaRCCI), Uganda
*Statistical Data Analysis for Post-Graduate Students and Staff Using R programming language
-2018 - JR Biotek/University of Cambridge; Hands-on Molecular Training Workshop (For African-based Agricultural Scientists)

Conferences Attended

-2025 – American Society of Plant Biologist Conference "Plant Biology '25 Poster Presentation, Milwaukee, Wisconsin. July 26-30
-2024 – Botany 2024 Invited Speaker on the topic "Research Priorities for Traditional African Crops" Grand Rapids, MI
-2024 – Plant and Animal Genome Conference, gave a presentation on "Genotypic and Chemotypic Diversity of American Feral Germplasm" Town and Country Resorts, San Diego, California
-2020 - Cambridge Science Festival, University of Cambridge, UK
*Poster presentation and showcase of the African yam bean crop
-2018 – 21st Annual Symposium of the International Association of Research Scholars and Fellows, International Institute of Tropical Agriculture, Ibadan, Nigeria
*Oral presentation: Next-generation sequencing of African yam bean using Restriction-associated DNA sequencing

-2018 – Annual Conference and Stakeholders Forum on African yam bean and other Underutilized legumes. Biotechnology Center, Covenant University, Nigeria**.**
*Presentation: Genetic Diversity of African Yam Bean Accessions using Cowpea-derived Simple Sequence Repeat Markers
-2018 - UK-Africa Food Security Symposium. Sainsbury Laboratory, University of Cambridge
*Presentation: Bio-innovation for Africa pitching Competition; e-science molecular hub for connecting students with potential supervisors in the field of molecular biology
-2017 - 3rd International Conference on Global Food Security. Cape Town, South- Africa
*Poster presentation: Next Generation Sequencing of African yam bean Accessions
-2017 - World Food Prize delegate as a Borlaug LEAP Fellow. Des Moines, Iowa, USA
*Presentation: Next-Generation of African yam bean accessions

International Experience

- Lived and worked abroad for over 24 months in the last 3 years (e.g., Nigeria, United Kingdom and United States)

- Collaborated on multinational research projects (IITA-CGIAR, Cambridge ALBORADA and Global Crop Trust)

Languages

- English (Fluent – written and spoken)

References

On request