Anthony Assibi Mahama

Lecturer, Plant Breeding
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Education

B.Sc. - Crop Science - Department of Crop Science, University of Ghana, 1986
M.S. - Plant Breeding and Genetics - Department of Agronomy, University of Nebraska, Lincoln, 1993
Ph.D. - Plant Breeding and Genetics - Department of Agronomy, Iowa State University, 1998

Area of Specialization

Plant Breeding

Professional Experience

Lecturer, 100% Teaching, Iowa State University, Department of Agronomy	2016 - present
Program Assistant, Iowa State University, Department of Agronomy	2014 – 2015
Senior Research Associate/Consultant, Pioneer Hi-Bred Intl, Inc. Johnston, Iowa	2008 – 2014
Research Associate, Iowa State University, Department of Agronomy	2005 - 2008
Postdoctoral Associate, Iowa State University, Department of Agronomy	1999 - 2004
Graduate Research Assistant, Iowa State University, Department of Agronomy	1994 - 1998
Graduate Research Assistant, University of Nebraska, Department of Agronomy	1990 – 1993

Teaching

Agronomy 528 – Quantitative Genetics for Plant Breeding – Spring 2016
Agronomy 523 – Molecular Plant Breeding – Spring 2017 and 2018
Agronomy 537X – Quantitative Analytics for Plant Breeding – Fall 2018
Agronomy 542X – Organic Plant Breeding – Spring 2020

Services

- *Guest lecture* on Molecular Markers during 2018 Genetic Testing Super Workshop for SCST Registered Genetic Technologists, Seed Science Center, Iowa State University, Ames, Iowa, December 2, 2018.

- *Guest lecturing* on breeding strategies for clonally propagated species, using a dioecious tree genus *Populus* as an example in Agronomy 522 – Field Methods in Plant Breeding.

- *Curriculum pedagogy and plant breeding Core Concepts* - identifying and assembling plant breeding core concepts to facilitate appropriate sequencing of courses, identifying gaps in concepts to ensure smooth transitioning from course to course, and to better serve the talent needs of stakeholders employing graduates from the program.

- *Major Professor:* Advising MS Plant Breeding students on their Creative Component research.

- *Reviewer* for Plant Breeding Journal.

International Efforts

- Coordinated all e-curriculum course content and ALAs into a repository for the Bill and Melinda Gates Foundation funded Improved Master of Science in Cultivar Development in Africa (IMCDA) program in Africa through the Plant Breeding E-Learning in Africa (PBEA) component at ISU.

- Managing PBEA project budget and writing quarterly reports on project activities and progress for the Bill and Melinda Gates Foundation.

- Revising e-modules of core courses for the IMCDA program to recommend content modules linking to bridge gaps, as well as development of additional modules to fill gaps for a comprehensive curriculum matrix for the program, with the eventual goal of identifying the competencies students need to know entering the program and be able to master and apply in their jobs after completing the program.

- Writing modules for missing experimental designs for Quantitative Methods course (on incomplete block, lattice, split-plot).

- Developed an e-module on how to teach use Breeding Management System software (BMS) for the IMCDA program partners.

- Testing and implementing feedback instrument for assessing impact of e-curriculum for the program participants.

- Organizing visits by faculty from participating universities in Africa to ISU to work on course materials and to participate in conferences/symposia/workshops on effective use of materials and teaching approaches, as well as ISU faculty to visit colleagues in respective universities to help with accessing and using material online and to participate in conferences about feedback on course material improvement needs.

Commercial Industry Experience

- Almost six years of liaising between programmers and breeders/agronomists in the development and use of software tools with enhanced/desired functionality to facilitate research operations from experimental design through data collection and analysis.

- Management of multi-stage phenotypic and genotypic data analysis processes and reporting of corporate research data from breeding and agronomic trials spanning multiple crops.

- Troubleshooting and modifying analysis models for appropriate analysis and reliable interpretation and decision making.

- Writing documentation, user manuals for software and teaching/training breeders/agronomists and supporting staff on software use via live demonstrations and PowerPoint presentations, alongside consulting through telephone and instant messaging during software use by Pioneer researchers at corporate locations around the globe.

Highlights of Achievements

- Reviewed for Plant Breeding Journal.
- Successfully instructed Quantitative Genetics Course during Spring Semester, 2016.
- Organized a one-week workshop at ISU that brought in participants from Africa and out of state within the US to work on devising a strategy for reviewing and adapting e-curriculum to meet the near term and long term teaching needs for training industry ready MS level plant breeders for Africa, February 29-March 4, 2016.
- Coordinated the development, e-learning format packaging and delivery of e-curriculum content to Gates Foundation and African University Counterparts.
- Successfully tested and recommended production release of different breeding/agronomic corporate software, provided yearly training sessions, continued support during use of software by researchers at corporate locations around the globe, and wrote documentations for software.
- Queried relational databases to identify problem data and recommend desired changes to maintain data integrity, and also recommend software application updates to provide functionality needed by researchers to view data in easier to manage format.
- Successfully isolated plant genomic DNA and used simple sequence repeat molecular markers to genotype and map quantitative trait locus (QTLs) in maize recombinant inbred line populations.
- Successfully trained and coached graduate students to isolate and manipulate DNA and to use molecular markers to complete thesis projects.
- Successfully cloned and delivered novel maize genes for functional analysis following quantitative-RT-PCR and Northern Blot validation of microarray results.
- Successfully transferred a bacterial gene via particle bombardment into soybean, and identified disease resistant plants with single copy of the transgene using Southern Blot analysis.
- Isolated and processed Taq polymerase for in-house laboratory use.
- Used artificial inoculation to classify rice deletion mutant lines and determined that two closely related rice pathogens, *Xanthomonas* pathovas *oryzae* and *oryzicola*, colonize different tissues of the same host plant.
- Identified viable pollen for use in cottonwood (*Populus*) breeding by hand-crossing, using the tetrazolium staining technique.
- Evaluated and identified planting technique to speed up seedling growth in the greenhouse to eliminate a one-year delay before field planting.

- Coordinated and led conduction of multilocation progeny tests and selection of improved cottonwood clones for large scale testing and eventual release.
- Verified and confirmed that the source of inoculum of cottonwood leaf rust pathogen was local rather than from surrounding regions by genotyping pathogen samples from different origins in the North Central USA with simple sequence repeat molecular markers.
- Derived new mathematical equations and successfully analyzed genetic data involving seedling lethal mutants and chromosomal translocations.
- Proved that two genetic linkage groups previously thought as different were the same linkage group.
- Definitively established the correct order of genes on soybean chromosomes.
- Used genetic techniques to verify and confirm that seedling vigor was controlled by a single dominant gene, and that additive genetic effects were the most important in the inheritance of that trait.
- Managed F2 population and F3 families of grain sorghum, identified desirable plants and families for further advancement/improvement and/or breeding.

Skills in Molecular Biology Techniques:

DNA, RNA and protein isolation and manipulation, including:

- Southern blotting for determination of stable transformation and copy number
- Simple sequence repeat DNA markers for QTL mapping in maize populations
- PCR, isolating, and cloning genomic and cDNA for novel gene identification
- Construction of gene expression vectors for *in planta* expression studies involving β-glucuronidase (GUS) and Luciferase reporter genes
- Artificial inoculation of mutagenized and transgenic rice plants with bacterial pathogens and analysis of plant responses
- Gene transfer by Particle gun bombardment

Special Computer Skills:

- Mapping software: LINKAGE-1, MapMaker/QTL, QTL Cartographer
- Statistical software: Statistical Analysis System, Hyperion and Aqua Data Studio database querying software
- Cooperate relational database management
- Cooperate software applications testing and production release

Iowa State University **October 2014 to Present**
Program Assistant
Plant Breeding E-Learning in Africa Program

Department of Agronomy

- Substituted to teaching courses as wells developed new courses for teaching in the MS Plant Breeding Distance program
- Lead development of core concepts/core competencies for plant breeding curriculum targeting M.S./Ph.D. level students
- Coordinate and advise on working budget of the program, organizing meetings for participating faculty and staff members in ISU and for management team at ISU with counterparts in the Gates Foundation funded Improved Master of Science in Cultivar Development in Africa (IMCDA) program in Africa
- Coordinate development and delivery of e-modules for the various courses of the IMCDA program to the development laboratory for electronic conversion and successful first round delivery of modules to Foundation and African counterparts for review, revision, and use in their resident M.Sc in Plant breeding programs
- Coordinate creation of a repository of e-modules and applied learning activities for the five courses in CyBox for access and use by the Foundation, and by participating ISU and African faculty and students.
- Work closely with the development laboratory to test and fix to improve functionality issues with the electronic delivery tool for playing e-modules
- Review all modules (both converted and MS Word drafts) for content and errors and making linkages among modules within and among courses to facilitate student learning and to identify gaps in terms of competencies for enriching the curriculum matrix with additional e-modules or courses
- Develop e-module to teach how to use the Breeding Management System software for managing breeding programs
- Coordinate domestic and international travel arrangements for faculty and staff and personally traveled to attend annual conferences and for face-to-face meetings at participating institutions in Africa to gather feedback on e-modules delivered to them and gain firsthand information on capacity at institutions for furthering and sustaining the program
- Present posters on program activities and accomplishments at the Plant and Animal Genome Conferences in San Diego, California, (PAGXXIII) on January 10-14, 2015, PAGXXIV on January 9-13, 2016, and also at the Global Food Security Consortium and the Leroy and Barbara Everson Seed and Biosafety Symposia in Ames, on April 14-15, 2015, and April 13-14, 2016.

Pioneer Hi-Bred Int'l Inc. **November 2008 to July 2014**
Senior Research Associate
Field Research Information Management

- Lead support effort for several North America research centers on breeding/agronomy software applications use and database features in order to ensure data integrity and facilitate consistent use of software tools

- Lead field research data analysis processes, identify improvement requirements for further development for enhanced performance
- Test and release software bug fixes along with enhancements and new features
- Train and teach clients company-wide and team members on analysis processes/systems and software tools in order to ensure correct use and facilitate decision making process
- Develop process documentation and user manuals for hardware and software applications as well as provide live demos on how to use software and manuals
- Proactively check experimental designs/assignment options to identify and rectify problems before data entry and analysis to ensure data integrity.
- Check automated and user initiated data analysis processes, and recommend appropriate corrective measures to clients to ensure desired results are obtained.
- Reactively identify and correct data analysis problems and work with developers to correct problems and remediate software.
- Work in a team with statisticians to test and verify new models and more appropriate calculations of statistics to address data integrity issues.
- Coordinate and support implementation of corporate image analysis system for yield and other trait estimation for corn and multiple other uses across crops, from initiation of hardware design modification and purchase, to training of clients on image capture and analysis software, and image and data reporting applications.

Iowa State University, Ames, Iowa **January 1994 to November 2008**
Laboratory Manager/Research Associate
Department of Agronomy

- Oversee the day-to-day operation of a molecular genetics laboratory to ensure equipment are in working order, purchasing equipment, laboratory supplies, performing EPA safety procedures, and training student workers and visiting scientist working in the laboratories.
- Isolate and prepare Taq polymerase for laboratory use
- Plan and conduct laboratory and field experiments, collect molecular marker and phenotypic data, statistically analyze, and report results.
- Conduct experiments in a gene discovery project in a molecular genetics/biology laboratory, and delivered final products to funding organization.

Graduate Student Laboratory Research Associate

- Hand crossing in soybean to generate all starting planting materials for population development, design, carry out, and analyze experimental results in classical and molecular genetics to verify gene order and correct assignment of linkage groups.
- Teach sections of introductory genetics class as a teaching assistant

Laboratory Research Associate

Department of Plant Pathology

- Perform experiments in a molecular biology/molecular plant pathology laboratory to understand

the molecular basis of disease resistance

- Artificial delivery of bacterial genes to determine copy number and study soybean blight disease resistance
- Train student interns/hourlies to perform laboratory procedures

Department of Forestry

- Oversee successful conduction of experiments in breeding and genetics laboratory to evaluate the stability of engineered cottonwood plants to insect pests and diseases
- Test and identify viable pollen for greenhouse controlled cross breeding in cottonwood
- Ensure use of appropriate experimental design, data collection and analysis to evaluate clonal performance

University of Nebraska, Lincoln, Nebraska **December 1990 to December 1993**
Graduate Student Research Associate
Department of Agronomy

- Use hand crossing to generate required amount of seed for field, greenhouse and growth chamber studies to determine the genetics and breeding of seedling vigor in grain sorghum.

Peer Reviewed Publications

Teshale Assefa, **A. Assibi Mahama**, Jean Claude Rubyogo, Matthew W. Blair, Ethalinda K.S. Cannon, Annie V. Brown and Steven B. Cannon. *Under Review*. A Review of Breeding and Genomics Resources for Common Bean (Phaseolus vulgaris L.)

A. Assibi Mahama, Richard B. Hall, Ronald Zalesny Jr. 2011. Differential Interspecific Incompatibility among Populus Hybrids in Sections Aigeiros Duby and Tacamahaca Spach. The Forestry Chronicle 87(06): 790-796, 10.5558/tfc2011-096.

Zalesny, R. S. Jr., A. H.Wiese, E. O. Bauer, W. L. Headlee, Jr., R. B. Hall, **A. A. Mahama**, and J. A. Zalesny. 2007. An Inexpensive and Reliable Monitoring Station Design for Use with Lightweight, Compact Data Loggers. Tree Planters' Notes 52 (1):32-35.

Renyi Liu, Clémentine Vitte, Jianxin Ma, **A. Assibi Mahama**, Thanda Dhliwayo, Michael Lee, and Jeffrey L. Bennetzen. 2007. A GeneTrek analysis of the maize genome. PNAS 104(28):11844–11849. (www.pnas.org_cgi_doi_10.1073_pnas.0704258104).

Mahama, A. A. and R. G. Palmer. 2003. Translocation breakpoints in soybean classical genetic linkage groups 6 and 8. Crop Sci. 43:1602-1609.

Mahama, A. A., K. S. Lewers, and R. G. Palmer. 2002. Genetic linkage in soybean: Classical genetic linkage groups 6 and 8. Crop Sci. 42:1459-1464.

Mahama, A. A., L. M. Deaderick, K. Sadanaga, K. E. Newhouse, and R. G. Palmer. 1999. Cytogenetic analysis of translocations in soybean. J. Hered 90 (6):648-653.

Newsletter Articles:

Palmer, R. G. and **A. A. Mahama**. 2004. Two New Necrotic Root Mutants. Soybean Genet Newsl 31 (http://www.soygenetics.org).

Mahama, A. A. and R. G. Palmer. 1998. Genetic Linkage in Soybean: Classical Linkage Groups 6 and 8 and 'Clark' Translocation. Soybean Genet Newsl 25:139-140

Mahama, A. A., T. D. Couch, R. G. Palmer, and K. S. Haack. 1995. A modified starch gel electrophoresis procedure for resolving soybean alcohol dehydrogenase band 1. Soybean Genet Newsl 22:173-180

Book Chapter:

Wang, L., **Mahama, A.**, Darnielle, L., Eggengerger, A., Hill, J., and Bogdanove, A.J. (2005) Recognition of the bacterial effector protein AvrPto in soybean- a case of HR-independent resistance, pp. 103-114 in Genomic and Genetic Analysis of Plant Parasitism and Defense, Proceedings of the 9th Japan-US Seminar on Plant-Pathogen Interactions, Shizuoka, Japan, November 1-7, 2003, APS Press, St. Paul.

Cultivar Registration:

Nigam, S. N., K. O. Marfo, **M. A. Assibi**, S. L. Dwivedi, Y. L. C. Rao, and R. W. Gibbons. 1993. 'Sinkarzei' Peanut. Crop Sci. 33:212

Meeting Abstracts:

A. A. Mahama, Laura Merrick, Jessica Barb, William D. Beavis, Shui-zhang Fei, Thomas Lubberstedt, Arti Singh, Asheesh K. Singh, Ana-Paula Correia, Michael Retallick, Lizhi Wang, Gaylan Scofield, Gretchen Anderson, Kendall Lamkey, Iowa State University, Ames, IA, Eric (Rick) Mills, Rick Mills Consulting LLC, Ames, IA, Walter P. Suza, Iowa State University, Ames, IA. 2016. Plant Breeding E-Learning in Africa – A Collaborative Effort to Develop and Deliver State-of-the-Art Curriculum for the Next Generation of Plant Breeders. Plant & Animal Genome Conference XXIV January 9-13, 2016, San Diego, CA, USA; https://pag.confex.com/pag/xxiv/webprogram/Session3483.html

A. A. Mahama, Laura Merrick, Jessica Barb, William D. Beavis, Shui-zhang Fei, Thomas Lubberstedt, Arti Singh, Asheesh K. Singh, Ana-Paula Correia, Michael Retallick, Lizhi Wang, Gaylan Scofield, Gretchen Anderson, Kendall Lamkey, Iowa State University, Ames, IA, Eric (Rick) Mills, Rick Mills Consulting LLC, Ames, IA, Walter P. Suza, Iowa State University, Ames, IA. 2015. Plant Breeding Graduate Education in Africa via an Innovative e-learning Partnership. Plant & Animal Genome Conference XXIII January 10-14, 2015, San Diego, CA, USA; https://pag.confex.com/pag/xxiii/webprogram/Paper16892.html

A. A. Mahama, Brian Sparks, Ronald S. Zalesny Jr., and Richard B. Hall. 2006. Successful grafting in poplar species (Populus ssp.) breeding. P. 22 In 7th Biennial Conference of the SRWC Production Systems for Wood Production, Bioenergy and Environmental Services, Pasco, Washington, USA, September 25-28.

A. A. Mahama, Ronald S. Zalesny Jr., and Richard B. Hall. 2006. Differential interspecific incompatibility in Populus breeding. P. 23 In 7th Biennial Conference of the SRWC Production Systems

for Wood Production, Bioenergy and Environmental Services, Pasco, Washington, USA, September 25-28.

Hall, R., **Mahama, A**., Ruigu, S., and Zalesny, R. 2006. Matings between relatives to support clonal improvement and gene mapping. In: Fourth International Poplar Symposium of the Nanjing Forestry University and the International Union of Forest Research Organisation's Poplar and Willow Genetics Working Unit 2.08.04: Meeting the needs of a growing world through poplar and willow science: combining traditional and novel approaches in the genomic era; June 5-9, 2006; Nanjing, China. p 3.

L. Wang, **A. Assibi Mahama**, Alan L. Eggenberger, John Hill, and Adam J. Bogdanove. 2003. AvrPto triggers resistance to bacterial blight in soybean without HR yet as a viral transgene in soybean mosaic virus enhances viral virulence. In XI International Congress on Molecular Plant-Microbe Interaction. St. Petersburg, Russia, July 18-26.

Mahama, A. A. and R. G. Palmer. 2001. Genetic linkage between soybean mutants and translocation breakpoints. In Annual Meetings Abstracts [CD-ROM]. ASA, CSSA, SSSA, Madison, WI.

Hall, R.B., **A. A. Mahama**, E. R. Hart, T. C. Harrington, and H. S. McNabb. 1999. Progress and problems in using pure Populus deltoides germplasm in developing clones for biomass plantations. Paper presented at the Second International Poplar Symposium, Orleans, France, September 17, 1999.

Mahama, A. A. and D. J. Andrews. 1995. Variation in seedling vigor and correlated traits in grain sorghum. P. 78 In Agronomy Abstracts. ASA, Madison WI.

Assibi, A. Mahama., D. J. Andrews, and J. H. Harris. 1991. Relation of seedling vigor in sorghum [Sorghum bicolor (L.) Moench] inbreds to seed size and mobilization of seed reserves. P. 85 In Agronomy Abstracts. ASA, Madison, WI.