

PROFILE: Dr. Arthur Kajungu Tugume (B.Sc., M.Sc., PhD), Email: aktugume@cns.mak.ac.ug, aktugume@gmail.com: Tel. +256772514841, +256704514841



Dr. Arthur K. Tugume is a Ugandan scientist, born on 10th March 1975. He is currently a Senior Lecturer whose main subject area of specialization is Plant Pathology at the Department of Plant Sciences, Microbiology and Biotechnology, College of Natural Sciences (CoNAS), Makerere University (Mak, Uganda) (<http://cns.mak.ac.ug/>). He received his PhD (Plant Pathology) in 2010 from the University of Helsinki (Finland). Prior to that, he was awarded a Master of Science in Crop Science [Plant Breeding and Genetics] (2002), and a Bachelor of Science [Botany and Biochemistry] (1999), both from Makerere University (Uganda). He is married and has four children.

Academic services at Makerere University: Dr. Tugume joined Makerere University service as an Assistant Lecturer in October 1999, raising through the ranks of Lecturer (2010), and Senior Lecturer (2013). He has served the University in various academic, leadership, and management capacities: He has been a member of Biosciences programs restructuring sub-committee (2010-2012) charged with the re-structuring of academic programs in the domain of Biological Sciences at Makerere University to align with the University's collegiate system of governance. He has tripled as Chairman, College of Natural Sciences' Norwegian Higher Education Development (NORHED) capacity building program (2012-2013), Chairman School of Biosciences research groups (2012-2014), and Chairman College of Natural Sciences (CONAS) Research and Grants Initiative (2012-to-date). He has attended several international scientific fora in relation to plant pathology, biotechnology, capacity building and leadership in general.

Other tasks at Makerere University: Dr. Tugume was appointed to a two term-contract (2011-2014, and then 2014-2017) by parliament of the Republic of Uganda to serve as a member the public procurement and disposal (sub-contracts) committee of the CoNAS, Makerere University, a committee that oversees and vets all public procurement and disposal needs of the College. He also served as a Head of Department of Botany (2012-2015) in the College of Natural Sciences (CoNAS). During his Headship of Botany, he championed a series of successful human resource and institutional capacity developments that saw the Department's academic staff establishment rise from 40% in 2012 to over 95% in 2015. Catalysed by his leadership, the research and academic growth of the Department of Botany ignited the process of re-defining the Department's academic and research focus, mandate, and unique identity. This led to a re-branding of the Departmental old name 'Botany' that had existed since 1957, to the current Department of 'Plant Sciences, Microbiology and Biotechnology', and later approved by the Makerere University council in October 2015.

Research Projects and International collaboration: Since 2010-todate, he has been a Principal Investigator, Co-investigator, Coordinator, or Champion of various projects in the budget ranges of US\$60,000 to US\$3,250,000 for scientific research and/or institutional infrastructural development. He has been a Chairman of the Technical advisory committee (TAC) for a five-year (2012-2016) US\$5.7million project operating in five countries (Uganda, Kenya, Tanzania, Malawi, and Mozambique). This project aims at germplasm exchange of elite cassava genotypes and accelerated development of cassava varieties with dual resistance to the two most destructive virus diseases of Cassava in the region: Cassava mosaic disease (CMD) and Cassava brown streak disease (CBSD). He is the Coordinator and Team Leader for a 5-year (2016-2020) Memorandum of understanding (MoU) between Makerere University (Mak), Uganda, and Okayama University (OU), Japan. This MoU opened windows of collaborative activities between the two institutions in the areas of: Exchange of students, Exchange of faculty/staff, collaborative research, instructional and cultural programs, and Exchange of research information. Currently, Dr. Tugume is the PI of an on-going Banana BXW recovery project (2016-2020; budget US\$500,000, supported by the Bill & Melinda Gates Foundation), aimed at deciphering the underlying mechanisms of banana recovery from *Xanthomonas* wilt infestation. This is part of a larger banana project (US\$5.7million) on improving scalable banana agronomy for small scale farmers in highland banana cropping systems in East Africa, implemented by a consortium of six organisations in East Africa.

Publications and Mentorship: Dr. Tugume has published 18 scientific research articles in international peer-reviewed journals or a book chapter, and supervised 13 graduate and 13 undergraduate students in subject areas of plant pathology, virology, genetics and plant breeding. He has examined 4 M.Sc and 1 PhD dissertations/Theses. He is a reviewer for several international journals, and a subject editor of an International peer-reviewed Journal, *Annals of Applied Biology*. His research career is punctuated by activities on three major vegetatively propagated staple crops (i.e., sweetpotato, cassava, and banana) all of which are food security 'giants' in East and Central Africa. Recently, he has picked interest in introductions and increased cultivation of watermelon and associated diseases and those of other cucurbit crops in East Africa. His major subject areas of research interests include plant virology especially virus ecology, evolution, diagnostics, vector transmission biology, role of natural wild host plants in plant virus disease dynamics, and plant virus disease resistance. In addition, understanding the mechanisms of recovery of banana plantations from bacterial wilt disease, pathways for the generation of doubled haploid cassava, and banana's pollination biology are recent additions in his research agenda.

Pedagogy: With a policy-driven time allocation to teaching of 30% versus 70% in research, Dr. Tugume has participated in teaching the following course units/modules since 1999 (of which he still teaches about 20% to-date) to graduate and undergraduate students: Principles of Plant Pathology; Advanced Plant Virology; Molecular plant-microbe interactions; Molecular defence mechanisms in plants; Microbiology, Plant pathology and virology; Introductory Microbiology and Virology; Advanced Plant Molecular Biology; Cell and Molecular Genetics; Population and Evolutionary Genetics; Molecular structure and functions of macromolecules; Research Methods; Genetics and Plant breeding; Basic Genetics; Introductory Crop Improvement and Plant Genetic Resources; Conservation Genetics; Biotechnology and Conservation; Advanced Genetics and Molecular Biology; Crop Improvement Methods and Plant Biotechnology; Evolutionary Biology; Molecular Evolution; Genomics and Bioinformatics; Introduction to Plant Functions; Principles of plant physiology; Advanced Plant Physiology; Herbarium Techniques and Botanic Gardens Management.

List of Peer-reviewed Scientific Publications by Dr. Arthur Tugume

- (1) Masika FB, Kisekka R, Alicai T, **Tugume AK** (2017) Incidence of viruses and virus-like diseases of watermelons and pumpkins in Uganda, a hitherto none-investigated pathosystem. *African Journal of Agricultural Research*, 12(3): 177-191. doi: 10.5897/AJAR2016.11463.
- (2) **Tugume AK**, Mukasa SB, Valkonen JPT (2016) Mixed Infections of Four Viruses, the Incidence and Phylogenetic Relationships of Sweet Potato Chlorotic Fleck Virus (Betaflexiviridae) Isolates in Wild Species and Sweetpotatoes in Uganda and Evidence of Distinct Isolates in East Africa. *PLoS ONE* 11(12): e0167769. doi:10.1371/journal.pone.0167769
- (3) **Tugume AK**, Mukasa SB, Valkonen JPT (2016) Transmission of viruses from Sweetpotatoes and Wild Species of Convolvulaceae in East Africa: Many Gaps to Fill. In: *Vector-Mediated Transmission of Plant Pathogens*. J.K. Brown (ed.). APS Press, American Phytopathological Society, USA. pp. 447-452
- (4) Buttibwa M, Kawuki RS, **Tugume AK**, Akol J, Magambo S, Apio H, Heberle-Bors E, Wedzony M, Ceballos H, Hershey C, Baguma Y (2015). In vitro embryo rescue and plant regeneration following self-pollination with irradiated pollen in Cassava (*Manihot esculenta* Crantz). *African Journal of Biotechnology*, 14(27): 2191-2201, doi: 10.5897/AJB2015.14577.
- (5) Mbanzibwa DR, **Tugume AK**, Chiunga E, Mark D, Tairo FD (2014) Small RNA deep sequencing-based detection and further evidence of DNA viruses infecting sweetpotato plants in Tanzania. *Annals of Applied Biology*, 165(3): 329-339, doi: 10.1111/aab.12136.
- (6) **Tugume AK**, Amayo R, Weinheimer I, Mukasa SB, Rubaihayo PR, Valkonen JPT (2013) Genetic variability and evolutionary implications of RNA silencing suppressor genes in RNA1 of

Sweet potato chlorotic stunt virus isolates infecting sweetpotato and related wild species. *PLoS ONE* 8(11): e81479. doi:10.1371/journal.pone.0081479.

- (7) Sun B.-J, Sun L.-Y, **Tugume AK**, Adams MJ, Yang J, Xie L.-H, Chen J.-P (2013) Selection pressure and founder effects constrain genetic variation in differentiated populations of a soilborne bymovirus Wheat yellow mosaic virus (Potyviridae) in China. *Phytopathology* 103: 949–959. doi:10.1094/PHYTO-01-13-0013-R.
- (8) Kashif M, Pietilä S, Artola K, Jones RAC, **Tugume AK**, Mäkinen V, Valkonen JPT (2012). Detection of Viruses in Sweetpotatoes from Honduras and Guatemala Augmented by Deep-Sequencing of small-RNAs. *Plant Disease* 96:1430–1437. doi: 10.1094/PDIS-03-12-0268-RE.
- (9) Bi Y, **Tugume AK**, Valkonen JPT (2012). Small-RNA Deep-sequencing reveals *Arctium tomentosum* as a natural host of *Alstroemeria virus X* and a new putative Emaravirus. *PLoS ONE* 7(8): e42758. doi:10.1371/journal.pone.0042758.
- (10) Clark CA, Davis JA, Abad JA, Cuellar W, Fuentes S, Kreuze J, Gibson R, Mukasa SB, **Tugume AK**, Tairo F, Valkonen JPT (2012). Sweetpotato viruses: 15 years of progress on understanding and managing complex diseases. *Plant Disease* 96:168–185. doi:10.1094/PDIS-07-11-0550.
- (11) Mbanzibwa DR, Tian YP, **Tugume AK**, Patil BL, Yadav JS, Bagewadi B, Abarshi MM, Alicai T, Changadeya W, Mkumbira J, Muli MB, Mukasa SB, Tairo F, Baguma Y, Kyamanywa S, Kullaya A, Maruthi MN, Fauquet CM, Valkonen JPT (2011). Evolution of cassava brown streak disease-associated viruses. *Journal of General Virology* 92:974–987. doi: 10.1099/vir.0.026922-0.
- (12) Mbanzibwa DR, Tian YP, **Tugume AK**, Mukasa SB, Tairo F, Kyamanywa S, Kullaya A, Valkonen JPT (2011). Simultaneous virus-specific detection of the two cassava brown streak-associated viruses by RT-PCR reveals wide distribution in East Africa, mixed infections, and infections in *Manihot glaziovii*. *Journal of Virological Methods* 171:394–400. doi:10.1016/j.jviromet.2010.09.024.
- (13) **Tugume AK**, Cuéllar WJ, Mukasa SB, Valkonen JPT (2010). Molecular genetic analysis of virus isolates from wild and cultivated plants demonstrates that East Africa is a hotspot for the evolution and diversification of Sweet potato feathery mottle virus. *Molecular Ecology* 19:3139–3156. doi: 10.1111/j.1365-294X.2010.04682.x.
- (14) **Tugume AK**, Mukasa SB, Kalkkinen N, Valkonen JPT (2010). Recombination and selection pressure in the ipomovirus Sweet potato mild mottle virus (Potyviridae) in wild species and cultivated sweetpotato in the centre of evolution in East Africa. *Journal of General Virology* 91:1092–1108. doi:10.1099/vir.0.016089-0.
- (15) Mbanzibwa DR, Tian YP, **Tugume AK**, Mukasa SB, Tairo F, Kyamanywa S, Kullaya A, Valkonen JPT (2009). Genetically distinct strains of Cassava brown streak virus in the Lake Victoria basin and the Indian Ocean coastal areas of East Africa. *Archives of Virology* 154:353–359. doi:10.1007/s00705-008-0301-9.
- (16) Kallinen AK, Lindberg IL, **Tugume AK**, Valkonen JPT (2009). Detection, distribution, and genetic variability of European mountain ash ringspot-associated virus. *Phytopathology* 99:344–352. doi:10.1094/PHYTO-99-4-0344.
- (17) **Tugume AK**, Mukasa SB, Valkonen JPT (2008). Natural wild hosts of Sweet potato feathery mottle virus show spatial differences in virus incidence and virus-like diseases in Uganda. *Phytopathology* 98:640–652. doi:10.1094/PHYTO-98-6-0640.
- (18) **Tugume AK**, Lubega GW, Rubaihayo PR (2002). Genetic diversity of East African Highland bananas using AFLP. *INFOMUSA* 11(2):28–32.