# Francis Kumi

Senior Lecturer · Department of Agric. Engineering
University of Cape Coast

ORCID 0000-0003-2815-0134 · Google Scholar scholar.google.com/citations?user=1mMyG1QAAAAJ&hl=en · Profile scholar.ucc.edu.gh/staff/805b5c53-4b7f-45af-9552-e8a551eab6ea

## RESEARCH

| | |
|---|---|
| Interests | Agricultural Mechanization · Machinery Systems · Agricultural Engineering · Circular Bioeconomy |
| Areas | Plant Science · Soil Science · Civil and Structural Engineering · Mechanical Engineering · Waste Management and Disposal · Food Science |

## RESEARCH SUMMARY

| 68 | 798 | 16 | 23 | 0.67 | 5% |
|---|---|---|---|---|---|
| Publications | Citations | h-index | i10-index | Field-weighted impact | World top 10% |

Counted from the 68 publications listed below, 2011–2026. Field-weighted impact is the mean over the 39 works scored for it; 1.00 is the world average for works of the same field, type and year. 2 of the 39 papers scored for it are among the world's most cited tenth for their field, type and year.

## POSITIONS

**University of Cape Coast**
Agricultural Engineering Department, Cape Coas, Ghana

## PUBLICATIONS

### Journal articles 65

1. **Francis Kumi** (2026). Design and evaluation of crop residues shredder. *Agricultural Engineering International: CIGR Journal*. https://cigrjournal.org/index.php/Ejounral/article/download/10031/4561/47413
2. Faruk Kwansah Nyame, Livingstone Kobina Sam Amoah, Joshua Danso Owusu-Sekyere, Ransford Opoku Darko, **Francis Kumi**, Clement Nyamekye (2026). Effect of irrigation frequency on cocoa (Theobroma cacao L.) bean quality in Ghana's major production zone. *International Journal of Agricultural Research Innovation and Technology*. https://doi.org/10.3329/ijarit.v15i2.87895
3. Randy Amuaku, **Francis Kumi**, Godwin Kwasi Amanor, Enoch Asante, Gladys Pepertual Awudi (2026). Effect of the probe diameter, cultivar and post-harvest storage on the cocoa pod firmness and deformation energy. *Research in Agricultural Engineering*. https://doi.org/10.17221/54/2026-rae
4. Seth Osei, Wei Wang, Jiaying Wang, Jiahao Yu, Deborah Nkhata, Ding QiCheng, **Francis Kumi** (2026). Improving five-axis machine tool accuracy (PIGEs) through physics-informed machine learning models. *Measurement*. https://doi.org/10.1016/j.measurement.2026.123313
5. KA Budu, WA Agyare, E Bessah, EA Asante, **Francis Kumi** (2026). Influence of tillage and mulching practices on growth, yield, and grain quality of Cowpea (Vigna Unguiculata L.). *Crop Design*. https://www.sciencedirect.com/science/article/pii/S2772899426000352
6. Hans Fumba Murangaza, **Francis Kumi**, Shadrack Kwadwo Amponsah (2026). Influence of tillage on soil penetration resistance and maize performance in Ghana's coastal savannah agro-ecological zone. *Heliyon*. https://doi.org/10.1016/j.heliyon.2026.e45246
7. Michael O. Adu, **Francis Kumi**, Peter B. Obour, Emmanuel Arthur, Eric Oppong Danso, Samuel Banafo, Kofi Atiah, Kwadwo K. Amoah, Paul A. Asare, Joel Asiedu, Donatus B. Angnuureng, Stephen E. Moore (2026). Root system architecture and shoot canopy effects drive erosion control in Napier and Vetiver

grasses. *Ecological Engineering*. https://doi.org/10.1016/j.ecoleng.2026.108126

8. Shadrack Kwadwo Amponsah, **Francis Kumi**, Gilbert Akolgo, Divine Dogbeda Azumah (2025). A Review of Transforming Rice Harvesting in Sub-Saharan Africa: Addressing Constraints, Leveraging Mechanization, and Enhancing Productivity. *Advances in Agriculture*. https://doi.org/10.1155/aia/5523207
9. Isaac Mbir Bryant, **Francis Kumi**, Christina Fobir (2025). Assessment of performance mesophilic single-stage biogas digester for treating agricultural wastes. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://doi.org/10.56049/jghie.v25i3.356
10. AK Sarpong, **F Kumi**, DD Sewu, VA Opoku, Kwame Agyei Frimpong (2025). Biochar production, yield and quality characterization from different feedstocks and kilns. *Journal of Analytical and Applied Pyrolysis*. https://www.sciencedirect.com/science/article/pii/S0165237025004541
11. Joseph Kofi Conduah, **Francis Kumi**, Hans Fumba Murangaza, Seth Osei (2025). Biodegradable seedling pots from sawdust and spent mushroom compost. *Research in Agricultural Engineering*. https://doi.org/10.17221/116/2025-rae
12. **Francis Kumi** (2025). Development and evaluation of a semi-automatic pepper seedling transplanter. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://ghiejournal.com/index.php/jghie/article/view/250
13. Seth Osei, Joseph Kofi Condua, Frank Osei, **Francis Kumi**, Lorrina Dwomor Kissiwaa (2025). Effect of mixed feed substrates on the growth rate performance, waste reduction efficiency and nutritional content of black soldier fly larvae. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://doi.org/10.56049/jghie.v25i3.355
14. Ordan CUKALIEV, **Francis KUMI**, Vjekoslav TANSKOVIK, Wisdom Eyram Kwame AGBESI, Sai Trinath SURYADEVARA, Svetoslav MALCHEV, Jan SIERING, Hossein AZADI, Stojanche NECHKOVSKI, Zvezda BOGEVSKA, Margarita DAVITKOVSKA (2025). FIELD EVALUATION OF TOMATO CROP PRODUCTION UNDER SLECI IRRIGATION. *The Journal Agriculture and Forestry*. https://doi.org/10.17707/agricultforest.71.4.09
15. Kwabena A. Sanleri, **Francis Kumi**, Kwadwo K. Amoah, Solomon Amamu, Igor Luketina, Michael O. Adu (2025). Identifying and Evaluating Salt-Tolerant Halophytes Along a Tropical Coastal Zone: Growth Response and Desalination Potential. *Plant-Environment Interactions*. https://doi.org/10.1002/pei3.70072
16. Wisdom Eyram Kwame Agbesi, Livingstone Kobina Sam-Amoah, Ransford Opoku Darko, **Francis Kumi**, George Boafo (2025). Numerical Models for Predicting Water Flow Characteristics and Optimising a Subsurface Self-Regulating, Low-Energy, Clay-Based Irrigation (SLECI) System in Sandy Loam Soil. *Water*. https://doi.org/10.3390/w17142058
17. Wisdom Eyram Kwame Agbesi, Livingstone Kobina Sam-Amoah, **Francis Kumi**, Ransford Opoku Darko, George Boafo (2025). Optimal operating parameters for a subsurface self-regulating, low energy, clay-based irrigation (SLECI) system in sandy loam soil across multiple rooting depths. *Multiscale and Multidisciplinary Modeling Experiments and Design*. https://doi.org/10.1007/s41939-025-01108-3
18. Faruk Kwansah Nyame, Livingstone Kobina Sam-Amoah, Joshua Danso Owusu-Sekyere, Ransford Opoku Darko, **Francis Kumi**, Clement Nyamekye (2025). Optimizing Irrigation and Tree Age for Enhanced Cherelle Retention in Cocoa (Theobroma cacao L.) Production in Ghana. *Applied Fruit Science*. https://doi.org/10.1007/s10341-025-01687-y
19. Gilbert Osei, Livingstone K. Sam-Amoah, Joshua Owusu-Sekyere, Harald Hansmann, **Francis Kumi**, Kezia Mensah (2025). Performance characteristics of self-regulating low energy clay-based irrigation system in different soil types. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://doi.org/10.56049/jghie.v25i1.212
20. Michael O. Adu, Peter B. Obour, **Francis Kumi**, Emmanuel Arthur, Paul A. Asare, Eric Oppong Danso, Samuel A. Banafo, Kwabena A. Sanleri, Hygienus Godswill, Kofi Atiah, Kwadwo K. Amoah, Joel B.K. Asiedu, Stephen E. Moore, Donatus B. Angnuureng (2025). Soil reinforcement potential of multifunctional crop plants on arable and non-arable tropical soils. *Geoderma*. https://doi.org/10.1016/j.geoderma.2025.117470
21. Isaac Mbir Bryant, **Francis Kumi**, Richard Arthur, Christina Fobir, Nancy Baka, Adwoba Edjah, Ernest Kofi

Amankwa Afrifa (2025). The use of solar-heated biogas digester for treating agricultural wastes: a review. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://doi.org/10.56049/jghie.v25i3.354

22. Gilbert Osei, Joshua Owusu-Sekyere, Livingstone Sam-Amoah, **Francis Kumi**, Harald Hansmann, Vincent Agyemang, Ransford Darko, Kezia Mensah, Delwyn Okhumai (2024). Bell pepper (Capsicum annuum) response to self-regulating low energy clay-based irrigation (SLECI) system, burying depth and fertilizer application dosage. *Journal of Central European Agriculture*. https://doi.org/10.5513/jcea01/25.4.4462
23. **Francis Kumi** (2024). DEVELOPMENT AND TESTING OF AN AUTOMATED CHICKEN EGG INCUBATOR. *IMAGINING AFRICAN AGRIFOOD SYSTEMS: LOOKING FORWARD*.
24. Luhua Han, Haorui Ma, Menghan Mo, **Francis Kumi**, Jianping Hu, Hanping Mao (2024). Design and test of an efficient seedling pick-up device with a combination of air jet ejection and mechanical action. *Journal of Agricultural Engineering*. https://doi.org/10.4081/jae.2024.1575
25. **F KUMI** (2024). PERFORMANCE EVALUATION OF MANUAL MAIZE SEEDING TECHNIQUES UNDER MINIMUM TILLAGE FIELD CONDITIONS. *Ghana Journal of Science*. https://openurl.ebsco.com/contentitem/gcd:186697091?sid=ebsco:plink:crawler-gcd&id=ebsco:gcd:186697091&crl=c&jrnl=00169544
26. Ransford Darko, Clement Sagoe, Livingstone Sam-Amoah, **Francis Kumi**, Mark Nyameche (2023). Assessment of Irrigation water quality and selected soil parameters at Mankessim irrigation scheme, Ghana. *Poljoprivredna tehnika*. https://doi.org/10.5937/poljteh2302034d
27. **Francis Kumi** (2023). Design and test of a lateral-approaching and horizontal-pushing transplanting manipulator for greenhouse seedlings. *Applied Engineering in Agriculture*. https://elibrary.asabe.org/abstract.asp?aid=54023
28. **Francis Kumi** (2023). Development and Evaluation of a Walking type Two-row Semi-automatic Transplanter for Vegetable Plug Seedlings. *Agricultural Mechanization in Asia, Africa and Latin America*. https://doi.org/10.5555/20240124852
29. Gilbert Ayine Akolgo, Felix Uba, Edward A. Awafo, Killian Asampana Asosega, Francis Kemausuor, **Francis Kumi**, Kofi Asamoah Adu-Poku (2023). Energy analysis for efficient mechanisation of palm oil extraction in Ghana: Targeting circular economy. *Energy Reports*. https://doi.org/10.1016/j.egyr.2023.11.018
30. E.K. Amewode, B. Sefa-Ntiri, A. Owusu, M. K. Vowotor, S. S. Sackey, **F. Kumi**, C. L. Y Amuah (2023). Investigation of Amended Sandy Soil's Water Retention Characteristics. *African Journal Of Applied Research*. https://doi.org/10.26437/ajar.v9i2.563
31. **Francis Kumi**, Peter B. Obour, Emmanuel Arthur, Stephen E. Moore, Paul A. Asare, Joel Asiedu, Donatus B. Angnuureng, Kofi Atiah, Kwadwo K. Amoah, Shadrack K. Amponsah, Selorm Y. Dorvlo, Samuel Banafo, Michael O. Adu (2023). Quantifying root-induced soil strength, measured as soil penetration resistance, from different crop plants and soil types. *Soil and Tillage Research*. https://doi.org/10.1016/j.still.2023.105811
32. Boffah Owusu Akyeaw, **Francis Kumi**, Richard Adade, Bernard Ekumah, Gilbert Osei (2023). UAV-based plant height estimation of maize cultivated using different varieties and sowing spacing. *Journal of the Ghana Institution of Engineering (JGhIE)*. https://doi.org/10.56049/jghie.v23i4.112
33. **Francis Kumi** (2022). Computational fluid dynamics and performance evaluation of a chimney solar dryer for chilli pepper. *Agricultural Engineering International: CIGR Journal*. https://cigrjournal.org/index.php/Ejounral/article/view/7005
34. Samuel Younge, Robert Sarpong Amoah, Ernest Ekow Abano, **Francis Kumi**, George Anyebuno (2022). Physico-nutritional characterization of composite cassava and orange-fleshed sweet potato flours and sensory evaluation of “fufu” prepared from the flour blends. *Journal of Food Processing and Preservation*. https://doi.org/10.1111/jfpp.17254
35. **F Kumi**, R Adade, Ransford Opoku Darko (2021). Estimating okra leaf area index using unmanned aerial vehicle imagery. *Agricultural Engineering International: CIGR Journal*. https://cigrjournal.org/index.php/Ejounral/article/view/6031
36. Jonathan Ampah, Joseph Xavier Francisco Ribeiro, Kwabena Asiedu Bugyei, **Francis Kumi**, Joseph Oppong Akowuah, Hayford Ofori, Catherine Otchere (2021). Status, challenges and prospects of food processing

equipment fabricators in Ghana. *Scientific African*. https://doi.org/10.1016/j.sciaf.2021.e00843

37. B. Sefa-Ntiri, B. Kwakye-Awuah, R. Edziah, B. Anderson, F. A. Armah, P. Mensah-Amoah, S. S. Sackey, F. Sam, A. G. Akyea, S. Yunus, E. Tatchie, B. K. Nkansah, **F. Kumi** (2020). Dissolved organic matter in hand-dug well water as groundwater quality indicator: assessment using laser-induced fluorescence spectroscopy and multivariate statistical techniques. *SN Applied Sciences*. https://doi.org/10.1007/s42452-020-2446-4

38. **Francis Kumi**, Faith Korkpoe, Gilbert Osei (2020). Influence of plug cell volume and substrate type on the development of cucumber seedlings for transplanting. *International Journal of Technology and Management Research*. https://doi.org/10.47127/ijtmr.v4i1.76

39. **Francis Kumi**, J Ampah, RS Amoah, HA Andoh-Odoom, M Kodua (2020). Performance evaluation of a chimney solar dryer for habanero pepper (Capsicum chinense Jacq). *African Journal of Food Agriculture Nutrition and Development*. https://doi.org/10.18697/ajfand.92.18740

40. LK Sam-Amoah, K Agyei Frimpong, **F Kumi** (2020). Role of higher education and science, technology and innovation in capacity development in Ghana. *African Journal of Rural Development*. https://afjrdev.org/index.php/jos/article/download/600/443

41. Shadrack Kwadwo Amponsah, Ahmad Addo, Enoch Bessah, **Francis Kumi** (2020). Techno-economic assessment of mechanised reaping and sickle cutting options for smallholder rice farmers. *Cogent Food & Agriculture*. https://doi.org/10.1080/23311932.2020.1847888

42. **F Kumi** (2019). Design and tests of a multi-pin flexible seedling pick-up gripper for automatic transplanting. *Applied engineering in agriculture*. https://doi.org/10.5555/20203073606

43. Luhua Han, Hanping Mao, Jianping Hu, **Francis Kumi** (2019). Development of a riding-type fully automatic transplanter for vegetable plug seedlings. *Spanish Journal of Agricultural Research*. https://doi.org/10.5424/sjar/2019173-15358

44. Ransford Opoku Darko, Shouqi Yuan, **F Kumi**, Junping Liu (2019). Effect of Deficit Irrigation on Yield and Quality of Eggplant. *International Journal of Environment Agriculture and Biotechnology*. https://doi.org/10.22161/ijeab.45.5

45. Shemmira Yunus, Baah Sefa-Ntiri, Benjamin Anderson, **Francis Kumi**, Patrick Mensah-Amoah, Samuel Sonko Sackey (2019). Quantitative Pore Characterization of Polyurethane Foam with Cost-Effective Imaging Tools and Image Analysis: A Proof-Of-Principle Study. *Polymers*. https://doi.org/10.3390/polym11111879

46. **F Kumi** (2018). Development of a multi-task robotic transplanting workcell for greenhouse seedlings. *Applied Engineering in Agriculture*. https://doi.org/10.5555/20193097582

47. **FRANCIS KUMI** (2017). Response of okra based on electrophysiological modeling under salt stress and re-watering. *Growth*. https://seer.ufu.br/index.php/biosciencejournal/article/download/37178/20826/165095

48. **Francis Kumi** (2016). Assessment of tomato seedling substrate-root quality using X-ray computed tomography and scanning electron microscopy. *Applied Engineering in Agriculture*. https://elibrary.asabe.org/abstract.asp?aid=47414

49. Junping Liu and Francis Kumi %00 Ransford Opoku Darko, **F Kumi** (2016). Constraints encountered in teaching practical agriculture in selected senior high schools in the sekondi-takoradi metropolis. *International Journal of Information Research and Review*.

50. Yongzong Lu, Yongguang Hu, Eric Amoah Asante, **Francis Kumi**, Pingping Li (2016). Design of capacitance measurement module for determining critical cold temperature of tea leaves. *Sensing and Bio-Sensing Research*. https://doi.org/10.1016/j.sbsr.2016.09.005

51. Hanping Mao, **Francis Kumi**, Qingli Li, Luhua Han (2015). Combining X-ray computed tomography with relevant techniques for analyzing soil–root dynamics – an overview. *Acta Agriculturae Scandinavica Section B - Soil & Plant Science*. https://doi.org/10.1080/09064710.2015.1067711

52. **F Kumi** (2015). Nondestructive measurement of total nitrogen in lettuce by integrating spectroscopy and computer vision. *Scientia Horticulturae*. https://doi.org/10.5555/20153121698

53. **Francis Kumi** (2015). Review of applying X-ray computed tomography for imaging soil-root physical and biological processes. *International Journal of Agricultural and Biological Engineering*. https://doi.org/10.3965/j.ijabe.20150805.1490

54. **Francis Kumi** (2014). Constraints to agricultural mechanization in sub-Saharan Africa. *International Journal of Applied Agriculture and Apiculture Research*. https://www.ajol.info/index.php/ijaaar/article/view/141511

55. **F Kumi** (2014). Development of a pincette-type pick-up device for automatic transplanting of greenhouse seedlings. *Applied engineering in agriculture*. https://doi.org/10.5555/20143386236

56. Ernest Teye, Xingyi Huang, Livingstone K. Sam-Amoah, Jemmy Takrama, Daniel Boison, Francis Botchway, **Francis Kumi** (2014). Estimating cocoa bean parameters by FT-NIRS and chemometrics analysis. *Food Chemistry*. https://doi.org/10.1016/j.foodchem.2014.12.042

57. Zhong Tang, Yaoming Li, Lizhang Xu, **Francis Kumi** (2014). Modeling and design of a combined transverse and axial flow threshing unit for rice harvesters. *Spanish Journal of Agricultural Research*. https://doi.org/10.5424/sjar/2014124-6077

58. Adewunmi Taiwo, **Francis Kumi** (2013). An Appraisal of Road Condition Effect on Rural Transportation in Sekyere Central District of the Ashanti Region of Ghana. *Journal of Transportation Technologies*. https://doi.org/10.4236/jtts.2013.34028

59. EYH Bobobee, **F Kumi** (2013). Development and Performance Evaluation of an Abrasive Wear Testing Equipment for Tillage Tools. *Journal of Science and Technology (Ghana)*. https://doi.org/10.4314/just.v33i1.6

60. **F Kumi** (2013). Effects of different light-emitting diode (LEDs) on fruit yield of greenhouse cucumber. *Afr. J. Agric. Res*. https://doi.org/10.5555/20133385155

61. **FRANCIS KUMI** (2012). Potential and Constraints of Agricultural Mechanisation in Ghana-A Review (Extracts). *AGRICULTURAL ENGINEERING*. http://www.d1ae.com/en/article/id/20120823

62. **F Kumi** (2012). Potential and constraints of agricultural mechanisation in Ghana—A review. *International Agricultural Engineering Journal*. https://www.researchgate.net/profile/Shadrack-Amponsah/publication/272480234_Potential_and_constraints_of_agricultural_mechanisation_in_Ghana-a_review/links/54e4ef6d0cf29865c335932c/Potential-and-constraints-of-agricultural-mechanisation-in-Ghana-a-review.pdf

63. A Bart-Plange, A Addo, **Francis Kumi** (2012). Some moisture dependent thermal properties of Cashew kernel ('Anarcardium occidentale'L.). *Australian journal of agricultural engineering*. https://doi.org/10.3316/informit.722874361701218

64. **Francis Kumi** (2012). 加纳农业机械化发展潜力及制约因素 (摘选). *农业工程*. http://www.d1ae.com/cn/article/id/20120823

65. A Bart-Plange, A Addo, E Teye, **F Kumi** (2011). A comparative study of some physical properties of large and medium size cocoa beans from Ghana. *Small (Category G)*. https://www.researchgate.net/profile/Ahmad-Addo/publication/266389602_A_comparative_study_of_some_physical_properties_of_large_and_medium_size_cocoa_beans_from_Ghana/links/543001fb0cf29bbc12738626/A-comparative-study-of-some-physical-properties-of-large-and-medium-size-cocoa-beans-from-Ghana.pdf

### Conference papers 1

1. **Francis Kumi** (2014). Mathematical modeling of vegetable seedling root lump under pick-up force. *2014 Montreal, Quebec Canada July 13–July 16, 2014*. https://elibrary.asabe.org/abstract.asp?aid=44466

### Reports 1

1. A Addo, E Teye, **F Kumi** (2012). A comparative study of some physical properties of large and medium size cocoa beans from Ghana. *University of Cape Coast*. https://ir.ucc.edu.gh/items/7ba130a5-1033-4f17-9d46-f8caecb8a7bf

### Theses 1

1. **Francis Kumi** (2011). Development and evaluation of an abrasive wear test equipment. *Mphil Thesis, KNUST, Kumasi*. https://scholar.google.com/scholar?cluster=8867727820949534302&hl=en&oi=scholarr