



Isaac Newton Alou - Ph.D. (University of Pretoria), M.Sc. (Mak), B.Sc. (Mak)

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About/Introductory statement

Isaac Newton Alou serves as a lecturer in the School of Agricultural Sciences. Newton is a scholar in soil science with a bias in crop modelling. He is lead instructor in course units related to soil physics for undergraduate and graduate students. Newton also co-instructs hydrological processes and modelling among other course units. He has a passion in environmental biophysics. Currently Newton is responsible for the soil physics laboratory in the soil science laboratories. He aspires to advance improvements in agricultural production and environmental quality through innovative and demand driven technologies in water management and plant nutrition. He has keen interest in developing adaptive instruments and or tools to aid decisions of the average African farmer. His research has been in the fields of soil fertility, irrigation, agronomy and crop modelling where some students are now involved on topics related to irrigation, soil water dynamics and site-specific nutrient management. Newton's early career has been at research and development institutions like IITA-Uganda, NARO groups e.g. AgMIP.org on low input maize systems. He is engaged in training, research and outreach projects with these institutions: Iowa State University (ISU), University of Pretoria (UP), University of Sheffield, and University of Ghana.

- Ph.D. in Soil Science, University of Pretoria, 2019
- M.Sc. in Soil Science, University, 2009

Qualifications

- B.Sc. in Agriculture (Hons), Makerere University, 2005
- Certificate in Environmental aspects of oil and gas exploration and production focussing on management of exploration and petroleum wastes, Louisiana State University, 2010
- Certificate in Modern Agribusiness and Entrepreneurship by Israel Experts, Makerere University, 2006

Biography

I graduated with a first class B.Sc. degree in Agriculture from Makerere University. I worked on maize response to fallow residues and inorganic nitrogen on a Kandiudalf. I did my M.Sc. Soil Science at Makerere University and my research focussed on biophysical and crop management gradients driving within farm variability highland bananas yields. I did my Ph.D. in soil science at University of Pretoria on strategies to bridge yields gaps of upland rice production systems in an African equatorial zone. Towards the end of my Ph.D. training program, I worked with a team of modellers across the globe in the AgMIP.org on maize, where I contributed to key recommendations to guide future research agenda on coping with climate change in African agriculture. I was a co-principal investigator on improving automated irrigation systems to alleviate salt and water stresses for enhanced greenhouse tomato production at the Rural Development Administration in South Korea. At present, I am involved in building a research team for a project adaptive water and nitrogen management in upland rice under the Worldwide Universities Network (WUN). I have some students interested in soil-plant water relations, some have completed research projects on managing water in vegetables and highland bananas while others are embarking similar areas for other high value crops.

Other Activities

Member of the academic programmes and Library committee, School of Agricultural Sciences, 2023 – Present.

Coordination committee member for the Iowa State University-Makerere service Learning programme, 2022 – Present.

Coordinator for B.Sc. Agriculture programme, Makerere University, 2023 – Present.
Secretary Soil Science Laboratories committee, Makerere University, 2022 – Present.

Member of the Greenpeace Africa on protection and conservation of forests in DR Congo, Pretoria, 2016 – 2019.

Teaching

- B.Sc. Agriculture: SOS2101 Soil physics and chemistry
- B.Sc. Agricultural Land use and Management: SOS2101 Soil physics and chemistry
- B.Sc. Agricultural Land use and Management: SSL3115 Tropical soils and their management

- B.Sc. Water and Irrigation Engineering: SOS1105 Soil science for engineers
- B.Sc. Agricultural Engineering: AEN1124 Applied agronomy
- B.Sc. Agriculture: SOS4201 Applied soil physics
- B.Sc. Agricultural Land use and Management: SOS3201 Soil conservation and land reclamation
- M.Sc. Soil Science: SOS7201 Advanced soil physics
- M.Sc. Integrated Watershed Management: IWM7120 Hydrological processes and modelling

Research

I would love my research to grow in the field of crop modelling. We have started a building a team on a project on 'towards adaptive nitrogen management' in upland rice (*Oryza sativa* L.) in rainfed conditions. This piece of work is at level of team building and is supported by the Worldwide Universities Network United Kingdom. The collaboration is part of the long-term contributions to addressing N and water stresses in rainfed crops. Pilot studies with support of a B.Sc. degree student on special project were completed in one site in Eastern Uganda. After slightly over a decade of research with National Agricultural Research Organisation, I joined Makerere University. Earlier, I was co-principal investigator on vegetable farming project on automated irrigation systems at the Rural Development Administration South Korea. I contributed to design of a better automated irrigation system in greenhouses which showed much reduction in water application in tomato production. We improved the leaching water requirement in this temperate area where flooding of beds is done to wash down salts. I was a team leader on developing and dissemination of upland rice technologies for the mid-western agroecological zone with support from the Japanese International Cooperation (JICA). In addition, we revised fertilizer recommendations of major crops in Uganda and supported decision making of households on soil suitability in Hoima and Masindi districts using local-technical soil maps. My Ph.D. research at the University of Pretoria entailed developing, calibrating and validating a crop simulation and applying it to the climatic zone. The pioneer work on upland rice was significant for crop modelling – a database for parameterization for other modelling frameworks was built aside from modelling growth and yield under water stress for this cereal. I later collaborated with the Agricultural Model Intercomparison and Improvement Project (AgMIP.org) maize team on low input systems where we assembled crop models to understand the impact of climate change (extremes of carbon dioxide, rainfall and temperatures) on maize growth and yields in sub-Saharan Africa.

Research groups and Centres

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<http://scholar.google.com/citations?user=Lr0mtGcAAAAJ&hl=en>

Community based work

- Greenpeace Africa monthly supporter, Johannesburg, South Africa Chapter. Monthly donations 2014– 2016 for the cause of supporting the NGO's activities of protecting rainforests in Central African sub-region from massive destruction.

Awards or special recognitions received

- Non-Research Development Fund for team building on adaptive management of nitrogen in rainfed upland rice, 2021, Worldwide Universities Network (WUN) United Kingdom.
- Young Scientist (YS) 2020 Research and Training Award Holder, 2020, Korea-African Food and Agricultural Cooperative Initiative (KAFACI) South Korea.
- Recognised for the best research output and capacity among all Zonal Agricultural Research Institutes (ZARDIs) in NARO, 2020 by PRiDe II project group under Japanese International Cooperation Agency.
- Best presentation from a Ph.D. student Award, September 2015, Department of Plant and Soil Sciences Symposium University of Pretoria South Africa.
- Best paper Certificate in recognition of quality, originality and significance in modeling, 2014, Trans Stellar Journal Publications (TJPRC), listed top 30 publishers by the American Standards for Journals and Research.

Publications

- **Isaac Newton Alou**, Joachim Martin Steyn, John George Annandale, Michael Van der Laan. 2020. Water and nitrogen (N) use efficiency of upland rice (*Oryza sativa* L. x *Oryza glaberima* Steud) under varying N application rates. *Nitrogen* 1, 151–166.
- Falconnier G., Corbeels M., Boote K., Adam M., Basso B., Ruane A., Affholder F., Ahuja L.R., **Alou I.N.**, Amouzou K.A., Chen Y., Deryng D., Elsayed ML., Faye B., Folorunso A., Gaiser T., Galdos M., Gayler S., Gerardeaux E., Giner M., Grant M., Hoogenboom G., Ibrahim E.S., Jones C.D., Justes E., Kamali B., Kersebaum K.C., Kim S.H., Kumar S.N., van der Laan M., et al. 2020. Modelling climate change impacts on maize yields under low N conditions in sub-Saharan Africa. *Global Change Biology* 00, 1–23.
- **I.N. Alou**, J.M. Steyn, J.G. Annandale, M. Van der Laan. 2018. Growth, phenological, and yield response of upland rice (*Oryza sativa* L. cv. Nerica 4®) to water stress during different growth stages. *Agricultural Water Management* 198, 39–52.

- Falconnier G., Corbeels M., Boote K., Adam M., Basso B., Ruane A., Affholder F., Ahuja L.R., **Alou I.N.**, Amouzou K.A., Chen Y., Deryng D., Elsayed M.L., Faye B., Folorunso A., Gaiser T., Galdos M., Gayler S., Gerardeaux E., Giner M., Grant M., Hoogenboom G., Ibrahim E.S., Jones C.D., Justes E., Kamali B., Kersebaum K.C., Kim S.H., Kumar S.N., van der Laan M., et. al. 2019. Model intercomparison of maize response to climate change in low-input smallholder cropping systems. Poster presented at the 3rd Agriculture and Climate Change Conference Budapest, 24th to 26th March 2019.
- **Isaac Newton Alou**, Joachim Martin Steyn, John George Annandale, Michael Van der Laan. (Unpubl). Crop model parameters for upland rice (*Oryza sativa* L.) to simulate growth, phenological development and water uptake under well-watered and stress conditions. Manuscript revised for submission in July 2023 to *Agricultural Water Management*.
- Kayuki C. K., J. Byalebekaa, O. Semalulua, **I. N. Alou**, W. Zimwanguyizza, A. Nansamba, E. Odama, C.S. Wortmann. 2014. Upland rice response to nutrient application in Uganda. *African Journal of Plant Science* 8 (9), 416–425.
- **I.N. Alou**, B. Mudde, J. Musinguzi, O. William, D.L.N. Hafashimana, R.C. Kanzikwera, M. Mwebaze. 2014. Inherent soil fertility and weed pressure explain tuber bitterness of improved cassava varieties on farms in Uganda. *Scholarly Journal of Agricultural Science* 4(7), 420–426.
- **Isaac Newton Alou**, Piet J.A van Asten, Moses Makooma Tenywa 2014. Biophysical and crop management gradients limiting yields of East African Highland Banana (*Musa* spp. AAA-EA) within farms in low input cropping systems. *International Journal of Agricultural Science and Research* 4 (3), 27–44.
- Kayuki C. Kaizzi, John Byalebekaa, Onesmus Semalulua, **Isaac Newton Alou**, Williams Zimwanguyizza, Angella Nansamba, Emmanuel Odama, Patrick Musinguzi, Peter Ebanyat, Theodore Hyuha, Appollo K. Kasharu, Charles S. Wortmann. 2012. Optimizing smallholder returns to fertilizer use: Bean, soybean and groundnut. *Field Crops Research* 127, 109–119.
- **Alou I.N.**, Kakeeto, R. and G. Akio. 2012. Effect of weeding regimes on yields of NERICA 4 rice in an acidic ferralsol in Lake Albertine Crescent. *Proceedings*

of Minia International Conference for Agriculture and Irrigation in the Nile Basin Countries, El-Minia, Egypt. 1309–1313.

- Kayuki C. Kaizzi, John Byalebeka, Onesmus Semalulu, **Isaac Alou**, Williams Zimwanguyizza, Angella Nansamba, Patrick Musinguzi, Peter Ebanyat, Theodore Hyuha and Charles S. Wortmann 2011. Fertilizer Use in Uganda: Allocating Scarce Monetary Resources of Smallholders for High Investment Returns. *Fundamental for Life: Soil, Crop, and Environmental Sciences*.
- Kayuki C. Kaizzi, John Byalebeka, Onesmus Semalulu, **Isaac Alou**, Williams Zimwanguyizza, Angella Nansamba, Patrick Musinguzi, Peter Ebanyat, Theodore Hyuha, and Charles S. Wortmann. 2012. Sorghum Response to Fertilizer and Nitrogen Use Efficiency in Uganda. *Agronomy Journal* 104: 83–90.
- Kayuki C. Kaizzi, John Byalebeka, Onesmus Semalulu, **Isaac Alou**, Williams Zimwanguyizza, Angella Nansamba, Patrick Musinguzi, Peter Ebanyat, Theodore Hyuha, and Charles S. Wortmann. 2012. Maize Response to Fertilizer and Nitrogen Use Efficiency in Uganda. *Agronomy Journal*, 104: 73–82
- **Alou, I. N.** 2009. Biophysical and crop management gradients driving within farm variability of highland banana yields in Butare Valley (SW Uganda). M.Sc. thesis, Makerere University.
- Birabwa, R., van Asten, P.J.A., **Alou, I.N** and Taulya, G. 2010. Got Matooke (*Musa spp.*) for Christmas? *Proceedings of International Conference on Banana and Plantain in Africa*. Eds. Dubois et al. *Acta Horticulture*, 879 pp. 113-122.
- VanAsten, P.J.A., **Alou, I.N.**, Vanlauwe, B., Mubiru, D.N and Mugaaga, T.K.W. 2008. Resource availability and yield differences between farms in a banana producing valley in Southwest Uganda. *Proceedings of International Conference on Banana and Plantain in Africa*. Harnessing International partnerships to increase research impact. P-AG-39, 141–142.
- Tumuhairwe, J and **Alou, I.N.** 2006. Maize response to nitrogen and grass fallow residues on a Kandiudalf, Uganda. Accepted paper presented at the

23rd Soil Science Society of East Africa Conference, Masaka, Uganda, 22nd
November 2006.