Name: William Surname: Makaza Citizenship: Zimbabwe Date of birth: 16 July 1997 Address: Mohammed VI Polytechnic University, Lot 660, Hay Moulay Rachid Ben Guerir, 43150, Morocco Email: william.makaza@um6p.ma	Scientific articles: 13 Book Chapters: 2 Scientific Conferences Presentations: 5 Current Status: Final Year Ph.D. Candidate (Soil and Fertilizers Sciences) References: See the last Page

SUMMARY

William is an ambitious, seasoned agricultural scientist specializing in fertilizer sciences and agronomy, with a strong awareness of R4D, innovation, climate-resilient agriculture, and project administration. His research focuses on improving crop productivity and food security through scientific and technical innovations in fertilizer technology and soil/crop management. Currently a final year Ph.D. candidate in Fertilizer/Soil Sciences, he brings more than five years of applied research experience and a proven ability to lead end-to-end research projects, from design to implementation, and manage multi-stakeholder collaborations among scientists, policymakers, and industry partners. He develops adaptive solutions for complex agricultural challenges, while also monitoring and evaluating outcomes to ensure scalability and impact. By integrating technical expertise with strategic project leadership, William advances sustainable solutions for global sustainable food systems.

EDUCATION

Mohammed VI Polytechnic University (UM6P), Morocco

1. **Final Ph.D. Candidate (Joint Supervision), September 2022 to date**

Title of Thesis: Assessing the agronomic value and safe application of lime and starter fertilizer materials for sustainable agroecosystems management

2. **Masters' degree in Fertilizer Science and Technology, 2022**
   - Overall Masters Grade: 82%.
   - Received the First position in the Research Thesis, 2022.
   - Title of Thesis: "Improving Lentil (*Lens culinaris* Medik.) Tolerance to Drought and Salinity Stress Using Different Soil Amendment Applications."

University of Zimbabwe, Zimbabwe, ZWE

Bachelor of Science honours degree in Agriculture (Crop Science), 2019

- Nominated and granted the highly competitive Regional Foundation for Capacity Building in Agriculture (RUFORUM) for funding the BScresearch work through Grant RU/2018/Post Doc/11.
- Overall degree class: 1 (First division)
- Received the First Top Scholar Award degree in Crop Science.
- Nominated by the department chairperson and received a Graduate Tutoring Assistant Position in the same period.

RESEARCH AND TECHNICAL EXPERIENCE

Mohammed VI Polytechnic University (UM6P), Morocco (Final Year Ph.D Candidate)

- Experience in developing agronomic safe starter fertilizer recommendations with the aid of machine

learning, to establish critical fertilizer recommendations based on fertilizer ecotoxicological indices and mitigate fertilizer toxicity for sustainable crop productivity.

- Collaborated in the establishment of protocols for scoping, systematic, and meta-analysis studies for sustainable agriculture.
- Skilled in creating and implementing agricultural plans, reports, and strategies to optimize productivity and yield in the Starter Fertilizer Project (AN No. 119) and the DAQARA (Diagnosis of acidity, Quality of amendment and Recommendation of application) Project (AS No. 02).
- Responsible for monitoring and ensuring compliance with relevant quality and safety standards as well as regulatory requirements in non-standard laboratories.
- Have technical expertise in characterizing soil, lime, and fertilizer materials using advanced technologies to address standardization across African labs using spectroscopy (pXRF, MIR, VisNIR), laser diffraction, and X-ray diffraction (XRD) in comparison with the chemical signatures for the prediction of several parameters using machine learning.
- Proficient in developing experimental protocols for field, greenhouse, and growth chamber experiments for the starter fertilizer usage for agronomic crops.
- Explored and updated the fertilizer toxicity industrial tables through research and development for global improved productivity.
- Launched the assessment of the quality of lime materials and established the recommendation of application for promoting tailored, specific lime recommendation systems through machine learning.
- Skilled at assessing the agronomic value of lime materials by incorporating high-throughput technology, including laser diffractions, X-ray diffractions, and spectroscopy vis-à-vis chemical analyses for improved recommendation systems, especially in scarce quality control agronomic systems.
- Involved in teaching practices in Pedagogical Innovation classes, Research methods, and Agronomic/Fertilizer courses for the Pre-doctoral students.
- Proctored the examinations for the Master's and Bachelor’s candidates at the College of Agriculture and Environmental Sciences.
- Have been a Jury member for the Pre-doctoral student Ph.D. proposal defense in the Sustainable Agriculture, Soil Systems, and Waste Recycling section.

Research Fellow: Department of Research and Specialist Services, Zimbabwe (2023 – 2024)

- Funds acquisition from UM6P to Zimbabwe for the DAQARA Project funded by the OCP Africa.
- Established and developed the collaboration with the Ministry of Lands, Agriculture, and Rural Resettlement of Zimbabwe, and its stakeholders for soil mapping within the country.
- Assisted in the project administration, execution, and launch of the national field soil sampling campaign for the agricultural landscape
- Led soil sampling campaigns in the Zimbabwean agricultural landscape nationwide with the support of the Ministry of Lands, Agriculture, and Rural Resettlement of Zimbabwe, towards soil acidity mapping and diagnosis.
- Responsible for the procurement and logistics of the titration, incubation, and shipment of samples from Zimbabwe to Laval University, Canada, for further laboratory analysis
- Led the acid-base titration experiment in Zimbabwean acid soils as well as the incubation experimental runs
- Report development, presentations, workshops, conferences, and peer-reviewed manuscripts development.

Information Training and Outreach Centre for Africa (ITOCA/HAVOS.AI), South Africa, ZA
Agri-Research Consultant, Sept 2023 - Aug 2024

- Developed the methodological framework for research papers, specifically scoping and systematic reviews in the field of agriculture
- Provided expertise in information systems with specifications on the thematic subject "The Vision for Adapted Crops and Soils- VACS."
- Developed the criteria for the selection, inclusion, and/or relevancy of the manuscript, with the support of Pr. Jaron Porciello and Dr. Gracian Chimwaza
- Provided training to the team to come up with the proper information regarding the VACS thematic area for Africa.

Graduate Researcher (Intern), Agro-BioSciences Department, June 2021-July *2022*

- Led abiotic stress field screening experiments, collections, and laboratory instrumentation with deep research cruises at INRA Tessaout, Morocco, towards improving lentil crop performance.
- Valorized, developed, and optimised the potential of different amendment products for application in agronomic crop production under drought and salinity conditions for sustainable food sovereignty systems in wheat and lentils through flexible and dynamic global protocols for the applications, and the 4R nutrient stewardship with cuttlebone waste
- Guided and mentored 3 engineering intern students on field research and experimental designs, establishments, and implementations in cropimprovement, soil fertility, and plant nutrition**.**

Sustainable Development Ambassador, UM6P, February 2021-August 2022

- Developed 3 funded projects by the UM6P sustainable development office (DD-com): The decarbonisation initiative through tree plantingprograms, The 4th Food Bank Edition, and The COY16 Moroccan Youth Statement Development at UM6P.
- Influenced 138 peers and 65 staff members of UM6P in the Decarbonisation Tree Planting Initiative, more than 70 individuals with The 4thFood Bank Edition.
- Facilitated and coordinated the signature gathering for the youth statement for the successful recognition of the UM6P Youth Statement globally
- Trained and capacitated 65 individuals from UM6P and Morocco carbon farming programs as the climate hero advocate of UM6P via an onlinewebinar series.
- Influenced 50 individuals in the 'The 4th Edition: *The 2063 Academy MENA Youth Green Lab'* with the topic 'Building Green Generation: What will it take?'

Assistant Project Manager and Research Agronomist – Department of Soil Science and Agricultural Engineering, University of Zimbabwe, April 2019 – September 2020

- Coordinated and led the country project implementation entitled "Use of Micronutrient-containing fertilizers for bio-fortification of food crops and improving grain yield in different countries - HarvestZinc Fertilizer Project (Phase IV)."
- Assisted with the development of project plans, timelines, and budgets.
- Coordinated with stakeholders, including farmers, researchers, and government agencies for profitable research, development, and innovation outcomes.
- Supported the procurement and distribution of project inputs, such as seeds, fertilizers, irrigation equipment, etc.

- Leveraged the experimental design, planning, and resource procurement through the Ministry of Agriculture, particularly extension officers indifferent regions of Zimbabwe, for technology transfer programs.
- Led the field research work of 15 communal farmers using farmers' field practices in different wards (12), districts (4), and provinces (3), andthree research institutes.
- Administered funds acquisitions for research and development in Zimbabwe for Zinc-biofortification promotion
- Conducted and facilitated the Zimbabwe Global Challenges Research Translation Fund (ZimGRTA) enumerators program.
- Trained 20 new enumerators on laboratory procedures and safety regulations in survey, qualitative, and quantitative data collection: survey, soil, grain, and biomass sampling within communal farmers in 10 Zimbabwean Provinces using the KobboCollect App to gather maximum data concerning soil and grain Zinc content.
- Facilitated the integration and processing of large datasets of biophysical and agronomic data from all field trials and surveys.
- Led a big soil, grain, and biomass sample preparation for exportation to Nottingham University, United Kingdom, for the dry chemistry analysis.

Research Intern, Cotton Research Institute, Zimbabwe, June 2017 - March 2018

- Experienced in Zimbabwean cotton breeding field trials and product development.
- Assisted in selection, selfing, and crossing activities in cotton breeding programs.
- Facilitated the Integrated Pest Management Program (IPM), including transboundary cotton and cereal crops key pests, and diseases at the provincial and national level with good knowledge, and focused on monitoring, early warning, and alternative ecological and integrated control strategies and approaches.
- Managed the agronomic performance of cotton evaluated at multi-environmental trials (MET) in Zimbabwe and key greenhouse and laboratory experiments and seed multiplication programs.
- Participated in the transfer and dissemination of viable, practical, and sustainable cotton production technologies to more than 100 communal cotton producers, more than 50 commercial farmers, and at least 20 corporate farmers of Zimbabwe.
- Provided research support through report writing and data analysis, consolidation, managed report submission process, edited, and commented on working papers of the agronomy and breeding sections.
- Supervised at least 65 casual experienced human capital on cotton field scouting, picking/harvesting, and monitoring the post-harvest activities at the warehouses.

SKILLS AND INTERESTS

- One Health Concept on R4D; Climate Smart Agriculture
- Crop production, improvement, and physiology.
- Crop trial management
- Functional Plant Nutrition and/or Soil Fertility Management
- Agronomic bio-fortification specialist
- Plant-Soil Relationships

- Strong scientific and verbal communications
- Statistical Analyses: R package, Genstat, Spyder-Python software
- HighScore Plus and FullProf Suite Expert

AWARDS/GRANTS AND EXTRA-CURRICULAR CERTIFICATES

- Awarded a Certificate of Completion of the Systems Dynamics Modeling through a collaborative learning for early-career research (ECR) scientists between Penn State University, Michigan State University, and UM6P.
- Awarded Certificate of
- Best Dancer at the International Plant Nutrition Colloquium 2025 (IPNC2025), Porto, Portugal.
- African Plant Nutrition Scholar Award 2024, awarded by the African Plant Nutrition Institute (APNI) -Grant of US$2000.00.
- Awarded a Certificate of Completion of the Teaching and Learning in Higher Education 2024/2025 by the College of Agriculture and Environmental Sciences, Education Department, UM6P, Morocco.
- Best Poster Presentation Award by **Elsevier** at The 9th International Symposium on Soil Organic Matter (May 2024)
- PhD Scholarship under Starter Fertilizer Project AS No. 119 (2022 – 2025), and DAQARA Project AS No. 02 (2022 – 2026) funded by OCP Group and OCP Africa, respectively.
- Master Scholarship under OCP Grant under Social Condition (BUCS) Scholarship for Master of Fertilizer Science and Technology, Morocco (2020-2022).
- Regional Foundation for Capacity Building in Agriculture (RUFORUM) highly competitive Grant RU/2018/Post Doc/11 for the BSc research work through (2018-2019).

CONFERENCES

- Poster Presentation at the VII Eurosoil 2025, held in Seville, Spain, from 8 to 12 September 2025, titled "AGRONOMIC VALUE OF LIME MATERIALS IN THE 21ST CENTURY ON SOIL
- PROPERTIES AND CROP PRODUCTIVITY - META ANALYSIS."
- Poster Presentation at the International Plant Nutrition Colloquium 2025 in Porto, Portugal.
- Poster Presentation at The 9th International Symposium on Soil Organic Matter (SOM2024) at Mohammed VI Polytechnic University, Morocco: “Optimising starter fertilizer rates in the pop-up In furrow and sub-surface on cereals in low organic matter soils”
- Attended the African Precision Agricultural Conference 2024, Morocco.
- Oral presentation: “In vitro and in vivo performance studies of groundnut genotypes under *Alectra vogelii* infestations. July 2019.
- University of Zimbabwe (UZ) Biennial Research Week, Harare, Zimbabwe: Poster presentation: “Do groundnuts have resistance against yellow witchweed infection? July, 2019.

PUBLICATIONS

- **Makaza W**., Khiari L. and El Achaby M., 2025. Optimizing safe rates of pop-up inorganic starter nitrogen and potassium fertilizers for maize. Front. Agron. 7:1543564. https://doi/org/10.3389/fagro.2025.1543564.
- **Makaza W.,** Khiari, L. Lakrari Z. and El Achaby, M., 2024. Optimising co-application of starter ammoniacal-N and K-containing fertilizers for barley in the seed-furrow. Journal of Plant Nutrition, 1-23. https://doi.org/10.1080/01904167.2024.2391544.
- Chimwaza, G., Egbadzor, K.F., El-Graoui, M., Bwerazuva, T., **Makaza, W.,** Kamutando, C.N., Nyakapene, N., Mabhula, M., Moyo, M., Tchokponhoué, D.A. and Houdegbe, A.C., 2024. How do

neglected and underutilised crops (NUCS) in Africa contribute to food security, nutrition and climate change outcomes: a scoping review protocol. *agriRxiv*, (2024), p.20240532999.

- **Makaza**, W. and Khiari, L., 2023. Too Salty or Toxic for Use: A Tale of Starter Fertilizers in Agronomic Cropping Systems. Agronomy, 13, 2690. https://doi.org/10.3390/agronomy13112690.
- **Makaza, W.,** En-nahli, Y. and Amri, M., 2023. Harnessing plant resistance against Striga spp. parasitism in major cereal crops for enhanced crop production and food security in Sub-Saharan Africa: a review. Food Security, 15. 1127-1149. https://doi.org/10.1007/s12571-023-01345-9.
- En-Nahli, Y., Abbes, Z., Trabelsi, I., **Makaza, W.,** Kharrat, M., Ghanem, M.E., Es-Safi, N.E. and Amri, M., 2023. Host–Parasitic Plant Interaction: The Key Role of Strigolactones. In Strigolactones, Alkamides and Karrikins in Plants (pp. 87-99). CRC Press.
- **Makaza, W**., Gasura, E., Nyakurwa, C.S. and Masekesa, R.T., 2022. "Prospects in cultivation and utilization of spiderplant (*Cleome gynandra* L.) in sub-Saharan Africa: A review" *African Journal of Food, Agriculture, Nutrition and Development*. 22(1): 19370-19385. https://doi.org/10.18697/ajfand.106.20040.
- Musango, R., Pasipanodya, J.T., Tamado, T., Mabasa, S. and **Makaza, W**. (2022). *Alectra vogelii*: A Threat to Bambara Groundnut Production under Climate Change: A Review Paper. *Journal of Agricultural Chemistry and Environment,* 11, 83-105. https://doi.org/10.4236/jacen.2022.112006.
- Nawu, T., Gwatidzo, O. V., Rugare, J.T., Gasura Edmore., **Makaza, W.** and Ngadze, E. 2022. Efficacy of *Trichoderma harzianum* as a Biological Control against *Fusarium oxysporum* in Tomatoes (*Solanum esculentum* L.). *Food and Agrieconomics Review*.(FAER) 2(1) (2022): 13-17 DOI: http://doi.org/10.26480/faer.01.2022.13.17.
- **Makaza, W**. and Kamutando, C.N., 2021. "Harnessing beneficial plant-microbe interactions for enhanced plant adaptation to abiotic stresses" in Plant Defense Mechanisms, IntechOpen. https://doi.org/10.5772/intechopen.101433.
- **Makaza, W.,** Rugare, J. T., Mabasa, S., Gasura, E., Gwatidzo, O. V., and Mandumbu, R., 2021. In vivo and in vitro performance studies on groundnut (*Acharis hypogea* L.) genotypes for yellow witchweed (*Alectra vogelii* Benth.) resistance. *Journal of Current Opinion in Crop Science*, 2(2), 165-177.
- Choga, T., Rugare, J. T., Ngadze, E., Mabasa, S., **Makaza, W.,** Gwatidzo, O. V., Chikuta, A. and Karubanga, G., 2021. Effect of Botanical Extracts on Late Blight (*Phytopthora infestans*) and Productivity of Tomato (*Solanum esculentum*). *International Journal of Agronomy* (2021). https://doi.org/10.1155/2021/8858818.
- Chofamba, A., **Makaza, W.** and Masunda, B.V., 2021. Preharvest abiotic conditions on the accumulation of bioactive compounds and antioxidant capacities of sweet bell pepper (*Capsicum Annum* L.) cultivars in the low and high veld regions of Zimbabwe. *Acta Scientifica Malaysia (ASM)* 5(2): 47-52. http://doi.org/10.26480/asm.02.2021.47.52.
- Matengu, T., **Makaza, W**., Ngadze, E., Rugare, T.J., Mazarura, U. and Gasura, E., 2021. Role of salicylic acid in disease resistance against A*lternaria spp* in tomatoes (*Lycopersicon esculentum* L.). *Journal of Current Opinion in Crop Science*, 2(4), pp.391-401.
- Makani, K.W., Rugare, J. T., Mabasa, S., Gasura, E., **Makaza, W.**, Gwatidzo, O.V. Moyo, R. and Mandumbu., R. 2020. Screening finger millet (*Eleusine coracana* L. Gaertn) genotypes for pre- and post-attachment resistance to witchweed (*Striga asiatica* L. Kuntze) infection under controlled environments. African Journal of Rural Development 5 (2): 125-139.

Under Review

- **Makaza W.,** Khiari, L. and El Achaby, M. Starter fertilizer toxicity mitigation by maximizing starter nitrogen and potassium fertilizer rates in subsurface placement for enhanced early development of maize (*Zea mays* L.). Archives of Agronomy and Soil Sciences.
- **Makaza W.,** Khiari, L., Ibnyasser, A., Khouloud, M. and El Achaby, M. Development and application of effects-based ecotoxicological index for fertilizer materials application on barley (*Hordeum vulgare* L.) early establishment.

Supervisions

Supervised two Masters students:

1. MacDonald Makombe (MSc Crop Science). Title of Thesis: Preliminary study on the agronomic performance of quinoa genotypes evaluated under moisture stress conditions. University of Zimbabwe, Faculty of Agriculture, Department of Crop Science. 2023

2. Doreen Kapawu (MSc Agronomy). Title of Thesis: Evaluation of quinoa seed genotypes for tolerance to PEG (polyethyl glycol) induced drought at germination and early seedling growth. Faculty of Agriculture, Department of Crop Science. 2023.

REFERENCES

1. Pr. Mounir El Achaby. Materials Science and Nanoengineering (MSN), Mohammed VI Polytechnic University (UM6P), Benguerir, Morocco. Mounir.elachaby@um6p.ma
2. Pr. Evelyn Chiyevo Garwe. Associate Dean, College of Agriculture and Environmental Sciences. UM6P, Benguerir, Morocco. evelyn.garwe@um6p.ma
3. Pr. Lotfi Khiari. Department of Soil Science and Agrifood Engineering, Laval University, Quebec, Canada. Lotfi.Khiari@fsaa.ulaval.ca.
4. Pr. Ngonidzashe Chirinda. Agricultural Innovation and Technology Transfer Center (AITTC), Mohammed VI Polytechnic University, Lot 660, Hay Moulay Rachid, Ben Guerir 43150, Morocco. Ngonidzashe.chirinda@um6p.ma
5. Dr. Pauline Chivenge. Senior Scientist, International Rice Research Institute. p.chivenge@irri.org