

Dr Alexandre Mahougnon Aurel ZOUMMAN

Plant & Microbial Biotechnologist | Soil Microbiology & Microbial Biofertilisers | Agroecology

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Plant and microbial biotechnologist (Ph.D., 2026) specializing in plant–microorganism interactions, soil microbial ecology and microbial biofertilizers for degraded and salt-affected soils. Six years of experimental research at CIRAD and IRD, from strain isolation and molecular characterization to greenhouse and field trials, with two peer-reviewed publications and a third manuscript in preparation. Combines bench research with hands-on experience designing, funding and reporting internationally supported projects, and transferring results to farmers, students and institutional partners.

DOCTORAL RESEARCH

Ph.D. in Plant Biology: Plant and Microbial Biotechnology and Plant Breeding

Defended 24 June 2026

Cheikh Anta Diop University (UCAD), Dakar, Senegal

Hosted at LEMSAT / LMI IESol, IRD–ISRA Bel-Air campus, Dakar, DAAD doctoral fellow

Thesis: Characteristics and agronomic potential of beneficial indigenous microorganisms in Senegal: a contribution to salt-stress adaptation in cultivated tomato (*Solanum lycopersicum* L.)

- Produced and characterized 15 fermented forest-litter bioproducts from litter and crop residues collected across three agroecological zones of Senegal.
- Characterized bacterial and fungal communities by 16S rDNA sequencing, linking community composition to substrate formulation.
- Isolated and characterized of halotolerant plant growth-promoting strains (colony PCR, PCR-RFLP grouping, 16S sequencing); sequences deposited in GenBank.
- Screened isolates for IAA biosynthesis, siderophore production and phosphate solubilization.
- Designed and ran two-stage greenhouse trials, measuring chlorophyll content, biomass and root architecture.
- Statistical analysis and figure production in R; site mapping in QGIS and Python.

RESEARCH EXPERIENCE

CIRAD: French Agricultural Research Centre for International Development, Dakar

Research Assistant

Oct 2020 – Dec 2024

- Managed the molecular component of research projects on tropical soils and agroecosystems.
- Led research on nature-based solutions (MAB bioproducts) for adaptation to soil salinization.
- Designed research protocols, planned experimental trials and ran laboratory, greenhouse and field experiments.
- Collected and analysed data, authored activity reports and contributed to scientific publications.
- Conducted literature reviews and presented findings at scientific events.
- Contributed to several projects on microbial bioproducts: ACCEPT MABs, VALID MABs and FSPI AGRECOCARIBE.

IRD: French National Research Institute for Sustainable Development, Dakar

Research Assistant

Aug 2020– Oct 2020

- Contributed to the development of research protocols within the ANR SymEffectors project.
- Conducted in vitro and in vivo experiments on legume–rhizobacteria symbiosis.
- Analyzed and interpreted data, contributing to the writing and publication of scientific articles.

Research Assistant (Internship)

Jan 2019–July 2020

- Contributed to the development of research protocols within the ANR SymEffectors project.
- Conducted in vitro and in vivo experiments on legume–rhizobacteria symbiosis.
- Analyzed and interpreted data, contributing to the writing and publication of scientific articles.
- Authored and defended a master’s thesis based on a subset of the SymEffectors dataset.

PUBLICATIONS

Peer-reviewed articles

Exploring microbial diversity in forest litter-based fermented bioproducts and their effects on tomato (*Solanum lycopersicum* L.) growth in Senegal. *International Journal of Plant Biology*, 16(2), 55.
<https://doi.org/10.3390/ijpb16020055>

Identification of type III effectors influencing the symbiotic properties of *Bradyrhizobium vignae* strain ORS3257 with various *Vigna* species. *Scientific Reports*, 11, 4874. <https://doi.org/10.1038/s41598-021-84205-w>

Manuscript in preparation

Halotolerant plant growth-promoting bacteria isolated from fermented forest-litter bioproducts: diversity, PGP traits and effects on tomato under salt stress. Target journal: *Frontiers*.

RESEARCH SKILLS

- **Microbiology & molecular biology** : strain isolation and cultivation, colony PCR, 16S rDNA sequencing, PCR-RFLP community grouping, metabarcoding, *in vitro* PGP assays (IAA, siderophores, phosphate solubilisation), phylogenetic reconstruction, GenBank submission.
- **Experimental design & trials**: greenhouse and field trial design, soil sampling across agroecological gradients, root architecture and biomass measurement, SPAD/chlorophyll assessment.
- **Data analysis**: R, QGIS, Python, Excel, Power BI, KoboCollect.
- **Research management & transfer**: proposal writing for national and international calls, budget management and donor reporting, bilingual (FR/EN) training design and delivery, monitoring and evaluation.

PROJECT DESIGN, FUNDRAISING AND MANAGEMENT

Project Manager: BMZ-funded climate resilience project

Aug 2025 – Nov 2025

- Authored and coordinated a climate resilience project in Africa fostering youth engagement in environmental action.
- Secured €9,000 from the German Federal Ministry for Economic Cooperation and Development (BMZ).
- Delivered the project with the German Embassy, OXFAM and the Delegation of the European Union; produced financial and management reports.

Project Manager: European Union communication project

Mar 2025 – Jun 2025

- Designed and implemented a project promoting EU initiatives, including Global Gateway and Erasmus+ scholarships.
- Secured approximately €12,000 from the European Union and oversaw execution, financial management and reporting.
- Prepared technical and financial reports in compliance with donor requirements.

TEACHING AND TRAINING EXPERIENCE

Training Facilitator: ASAF & MDF West Africa

Jun 2024 – Dec 2024

Abuja, Nigeria

- Co-designed training agendas and content with regional and international partners.
- Facilitated bilingual sessions and ensured English–French interpretation during meetings and workshops.
- Developed training materials and conducted monitoring, evaluation and reporting of training impact.

Teacher: Life and Earth Sciences

Oct 2017 – Jul 2018

Ministry of Secondary Education, Benin (high school and middle school)

- Taught biology, geology and environmental sciences, including practical demonstrations and laboratory activities.
- Designed lessons aligned with the national curriculum and assessed student progress.

EDUCATION

Ph.D. in Plant Biology: Plant and Microbial Biotechnology and Plant Breeding

2022 – 2026

Cheikh Anta Diop University, Dakar, Senegal

M.Sc. in Plant Biology: Plant and Microbial Biotechnology

2018 – 2022

Cheikh Anta Diop University, Dakar, Senegal

B.Sc. in Natural Sciences: Genetics, Biotechnology and Natural Resources

2012 – 2015

University of Abomey-Calavi, Benin

ADDITIONAL TRAINING AND CERTIFICATIONS

- Climate change: transitions to sustainability (The Open University online)
- Climate change adaptation (ITT, Technische Hochschule Köln)
- Climate finance, climate advocacy and sustainable development (Jacob's Ladder Africa, Africa Youth Climate Finance Fellow, cohort 2025)
- Monitoring and evaluation of a development project (Campus Groupe AFD)

- Project Financial management ; Project management Fundamentals (DisasterReady)
- Networking and stakeholder management; Board management; Storytelling (ASAF)
- Diploma in Environmental Management (Alison online)

LEADERSHIP AND VOLUNTARY ENGAGEMENT

Co-founder and President

Nov 2024 – present

YAAC (Youth Alliance for Agroecology and Climate)

- General coordinator of a youth network active across more than twenty African countries.
- Leads the mangrove protection initiative, training design and climate education programmes.

ASAF (African Students and Alumni Forum)

Liaison Officer, Internal Affairs Task Force

Dec 2024 – present

Vice-President, Regional Coordination and Integration

Oct 2022 – Dec 2024

REFERENCES

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