**Understanding Environmental and Climatic Drivers of Microbiome Diversity in Soybean Rhizosphere in Nigeria**

Muhammad Rabiu Kabiru1,2, Alfred Balenor Buernor1, Mohamed Hafidi1,3, Jibrin Mohammed Jibrin2, and Martin Jemo1

1 AgroBiosciences Program, College of Sustainable Agriculture and Environmental Sciences, Mohammed VI Polytechnic University (UM6P), Lot 660, Hay Moulay Rachid, 43150, Benguerir, Morocco

2 Centre for Dryland Agriculture, Bayero University, Kano, Nigeria

3 Laboratory of Microbial Biotechnologies, Agrosciences and Environment (BioMAgE), Labeled Research Unit-CNRST N°4, Faculty of Sciences Semlalia, University Cadi Ayyad

Corresponding author email: kabir.rabiu@um6p.ma

**Abstract**

Soil microbiomes are among the most vital soil natural resources that play an important role in soil health, ensuring plant health and growth, and access to vital nutrients for better yield. However, their survival and optimum contributions to soil and plant health are consistently threatened due to the continued application of hazardous chemicals. Soybean (*Glycine max,* L), is an important soil-enhancing legume that positively interacts with a wide array of nitrogen-fixing bacteria. However, very little research exists to fully unravel the microbial communities inhabiting soybean-growing soils and the different environmental and climatic parameters driving their distributions in Nigeria. To fully understand the microbial composition within soybean farms, we sequenced the 16S rRNA gene from rhizosphere soil to analyze the diversity of the soil microbiome in broadly, two major agroecological zones in Nigeria, viz: Sudan (SS) and Guinea (GS) savannas. Integrating the analyzed soil properties and site-specific climatic variables, we determined the main drivers shaping the native microbiome composition across the different soybean growing fields in Nigeria. Our preliminary results showed the presence of a wide range of qualitative microbes, widely distributed across the different soybean growing fields, including the important Actinobacteria and Proteobacteria groups. We also found the most important environmental factors shaping the microbial community structure across the Soybean growing areas to be temperature, altitude, and Zinc. This study highlights the rich diversity of the soybean-growing soils in Nigeria and validates the potential of the soil as a reservoir to isolate beneficial rhizobia capable of enhancing soybean yield for the ever-increasing soybean farmers in Nigeria and sub-Saharan Africa in general.

**Keywords:** Microbiomes, Agroecological zones, Nigeria, Proteobacteria, and environmental factors