STATEMENT OF RESEARCH AND PROFESSIONAL WORKS

My career as a scientist and researcher has been characterised by my enthusiasm for promoting multidisciplinary cooperation, improving environmental sustainability, and comprehending microbial processes. My research applies basic findings to problems in agriculture, environmental resilience, and ecosystem functioning by bridging the fields of molecular microbiology, microbial ecology, environmental biotechnology, and bioinformatics.

1. Research Focus and Scientific Contributions

Environmental microbiology, with a focus on microbial community dynamics in terrestrial, aquatic, and agricultural settings, is my main field of expertise. I have overseen and worked with others on projects that have investigated:

- Microbial Diversity and Soil Health: examined how microbial community composition, enzymatic activity, and soil quality are affected by environmental factors like drought, contaminants, and nutrient flux. Numerous peer-reviewed publications on the impact of soil moisture on microbial diversity and function are the result of my research, which has used cutting-edge methods such as amplicon sequencing, enzymatic assays, and Community Level Physiological Profiling (CLPP) using Biolog systems.
- Microbial-Plant Interactions and Resilience: examined the advantageous connections between microorganisms and plants, emphasising processes like drought resistance, growth promotion, salt tolerance, and biostimulants. To enhance plant health under stress, this has involved conducting experiments with *Glomus* sp., *Bacillus* sp., and other bacterial consortia.
- Environmental Pollutants and Bioremediation: Using genetically modified microorganisms, studies were conducted on the fate and mitigation of pollutants such as TNT and persistent environmental contaminants. Also, examined microbial adaptation and contaminant degradation using bioinformatic pipelines, LC-MS, and flow cytometry.
- Marine and freshwater microbiology: Took part in international research expeditions (Arabian sea and Indian Ocean) investigating microbial productivity, zooplankton, phytoplankton-bacteria relationships, and ecological dynamics in estuaries and oceans. By combining taxonomic research, radiotracer experiments, and field sampling, this work advanced our knowledge on aquatic ecosystems function.

2. Interdisciplinary Leadership and Collaboration

- Across institutions in Germany, Poland, India, and the US, I have led and coordinated interdisciplinary research teams. Some of my leadership responsibilities include:
- Mentoring and instructing technical staff and graduate students in laboratory and analytical methods
- Ensuring adherence to quality and safety regulations in lab settings
- Presenting research at conferences on soil microbiology, plant resilience, and aquatic ecology worldwide, as well as publishing as a lead and co-author in international journals

3. Innovation in Methodology and Data Analysis

My expertise includes advanced bioinformatics (RStudio, QIIME2, PANDAseq, Linux), molecular techniques (PCR, amplicon sequencing, protein modelling, DNA extraction), and laboratory automation for microbial analysis. I have developed resources and curated scientific data for environmental microbiology research communities in my role as a database analyst.

4. Awards, Grants, and Professional Development

Several international research mobility grants (Erasmus+, IDUB Excellence Initiative, PROM Laureate, Grants4NCUStudents) have acknowledged my work and supported scientific research and traineeships around the world. I've given presentations at international symposia, finished advanced workshops in data analysis and genomics, and won awards for my scientific work.

Future Research Directions

I hope to further integrate basics of genomics, computational modelling, and ecosystem-scale experimentation, environmental microbiology background to students. To provide workable solutions for climate resilience, food security, and sustainable land management, I aim to expand their knowledge of the ecosystem processes driven by microbes.

Sincerely,
Dr. Kalisa Amarsingh Bogati