Current Personnel

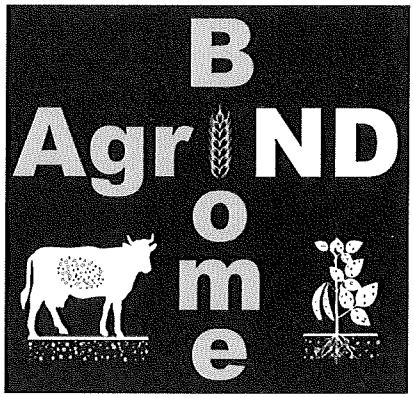
- Nine research faculty
- Three teaching faculty - a Professor of Practice, an instructor, and a lecturer
- Nine support staff, of which two are soft money positions

One faculty member accepted a VSIP in 2019. Another faculty member is currently serving as interim VP for Research and Creative Activities, which is a full-time appointment.

Samiran Banerjee, an Assistant Professor of Soil Microbial Ecology, started in September 2019. The focus of his research is the impact of soil microbial communities on crop productivity.

We are currently recruiting two faculty positions to focus on microbiomes in crop and livestock production (Agribiome). We also are recruiting two research specialists to support microbiome research. Funding was appropriated for these positions in the last legislative session.

Major Research Programs in Microbiological Sciences



Microbiomes in Agriculture and Health

This is a new research program. In addition to recruiting two Agribiome faculty positions, we redirected one position (Samiran Banerjee hire) to this program. Peter Bergholz is also contributing to Agribiome research and Glenn Dorsam is focusing on microbiomes in human health. Current Agribiome research includes a collaboration of scientists from Microbiological Sciences (Banerjee and Bergholz), Soil Science, Plant Sciences, and Williston REC that seeks to determine the responses of the soil microbiome to conservation practices to sustain agriculture in semi-arid regions. The study is based on a long-term field trial to test the effects of various crop rotations on yield and plant disease incidence.

Food Safety and Security

Three faculty (Teresa Bergholz, Peter Bergholz, and Birgit Pruess) contribute to this research program. Their research is focused on controlling microbial pathogens in meat, grains, and produce. An example of this research is a collaboration between Teresa Bergholz and Senay Simsek (Plant Sciences) aimed at using vacuum steam pasteurization to address food safety issues on wheat. This work has shown that vacuum steam (i.e. steam produced at lower temperatures) can effectively kill foodborne pathogens on wheat while not impacting the functional properties of flour post milling.

Livestock Vaccines and Diagnostics

Sheela Ramamoorthy's program is focused on developing novel technologies for rapid-response livestock vaccines and diagnostics that can form part of national pandemic preparedness plans.

Challenge – Retaining successful mid-career faculty

We are fortunate to have excellent faculty, who have proven their value by developing successful and productive careers at NDSU. Facing possible cuts to the university budget, and with several competing institutions in a growth phase, our ability to retain our best faculty will be tested. Retaining our successful mid-career faculty will be critical to our continued success.

Opportunities

We are grateful to SBARE for their strong support of the Agribiome initiative in the last legislative cycle, and we are busy working to fully establish that research program. We support the initiatives proposed by other units in this cycle. In particular, big data analytics, translation of big data into usable tools for stakeholders, and restoration of agricultural land impacted by oil industry activities are initiatives that will impact the Agribiome research program.

We value interdisciplinary research and we would support an initiative to incentivize interdisciplinary collaborations. One approach would be to provide research assistantships to graduate students working across disciplines.

Looking down the track, perhaps in the next legislative cycle, we see great potential for synthetic biology research in microbiology and agriculture. Synthetic biology combines knowledge of genomes (the blueprint for organisms) with innovative tools to construct new biological systems or re-engineer systems with desired functions. Examples of synthetic biology research in microbiology include:

- Reengineering microbes to produce high-value plant and animal products.
- Improving photosynthesis in plants by incorporating genes from photosynthetic microbes.
- Reengineering plants to secrete metabolites in their root system that select for a particular microbial community (engineering the plant root microbiome).

Examples of synthetic biology research in agriculture, more broadly, include:

- Modifying plants to improve the nutritional value of foods by boosting levels of carotenoids, omega-3s, and other desirable metabolites.
- Improved land use by modifying plants to grow in more extreme conditions.
- Precision breeding to develop polled cattle.
- Developing plant biosensors that can detect and respond to environmental conditions in novel ways.