NDSU MICROBIOLOGICAL SCIENCES

SBARE Testimony
November 2, 2021

Personnel Updates

- Currently have 11 faculty. Of those, seven have experiment station research appointments.
- Eight research specialists to support research programs
- Hired three faculty since 2019. All were hired to support the agribiome research initiative (details below)
- Two faculty left since 2019. Both faculty had research programs in food safety
- Currently recruiting to replace one of the food safety faculty positions. We are redirecting that position to focus on the microbial valorization of agricultural residues. (i.e., enhancing the value of agricultural residues through microbial transformation).

AGRIBIOME INITIATIVE

Harnessing soil, plant, and animal microbiomes to enhance crop and livestock production

Funding through the agribiome initiative supports two experiment station scientists. A third agribiome scientist was added by redirecting an open position.

Dr. Samiran Banerjee started in August 2019. He studies plant-soil-microbe interactions in agricultural systems. His lab explores how microbiomes can be harnessed by management practices to enhance crop production. In 2020, his lab completed a major study of soil and plant microbiomes from 201 fields in 50 North Dakotan counties. Their goal is to generate a database of microbiomes and soil functionality that can be accessed by crop producers.

Dr. Samat Amat started in August 2020. He studies how livestock microbiomes can improve nutrition and health and reduce antibiotic resistance. Specific areas of research interest include manipulating the rumen microbiome to improve feed efficiency, understanding the impact of the maternal rumen microbiome on offspring development, and understanding the role of the the gut microbiome in regulation of host immune response to vaccines.

Dr. Barney Geddes started in October 2020. He studies plant-microbe interactions with a particular focus on the rhizobium-legume symbiosis that is necessary for nitrogen fixation. In one example of his research, he is collaborating with scientists in Plant Sciences and Williston REC to harness the microbiome of dry edible peas for increased adaptibility and resilience to root rot, drought, and salinity. He is also working to develop rhizobium inoculants tailored to NDSU breeding lines.

Agribiome Initiative Successes

Extramural funding $2,012,421
Number of research projects funded 14
Number of projects with collaborators from other AES units 10
Number of collaborators from other AES units 12
Collaborating AES units: Animal Sciences, Natural Resource Sciences, Plant Pathology, Plant Sciences, Carrington REC, Hettinger REC, Williston REC

AG BIOTECH INNOVATION CORE

Supporting interdisciplinary research to develop new products and solutions for ND agriculture

As we consider how Microbiological Sciences can best contribute to the advancement of ND agriculture over the next 5-10 years, two areas emerge as research priorities: the development of microbial inoculants and the microbial valorization of agricultural residues. We expect the agribiome initiative to yield inoculant candidates in the near future. For example, Dr. Geddes is identifying rhizobia with traits that are specifically adapted to ND soils, which should lead to better inoculants for producers in the region. Using microbes to valorize agricultural byproducts can add value to agriculture through the creation of new markets and industries. Research in this area is accelerating with the development of more precise tools to re-engineer microbial cells. Recent conversations with other units, inlcuding Plant Sciences and Agriculture and Biosystems Engineering, have revealed common research interests surrounding the microbial transformation of agri-food products and byproducts. Scientists engaged in this research would benefit from a core facility where they could access critical equipment and skilled technical support. They could also collaborate with other scientists from outside their discipline. Microbiological Sciences has basic facilities to support this type of research, but specialized equipment would be required. In addition to being a hub for scientists from different units to work collaboratively, outputs from the Ag Biotech Innovation Core can feed into the Peltier Complex, particularly if that complex includes a high capacity bioreactor/-fermenter that can be used for pilot or commercial scale production.

Request

Funding to purchase laboratory equiment needed to establish a core biotech facility. The main items would be:

- Bioreactors of various sizes to support high-throughput and scale-up experiments.
- Metabolomics equiment such as a GC MS/MS mass spectrometer