SBARE Priorities for the

North Dakota Agricultural Experiment Station

Final Ranking by SBARE – March 2, 2022

NDSU NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION


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CRITICAL PRIORITY – Hiring and retaining diverse candidates strengthens our ability to expand on critical needs in research, teaching, and extension. **Building attractive compensation packages for employees will be crucial in the recruitment and retainment of top talent.**

1 Plant Production and Protection Initiative

Crops and cropping systems account for more than 80% of the gross agricultural receipts in North Dakota. Each year, new challenges and research questions emerge, especially related to crop rotations, agronomic practices, varietal selection and disease. Crop rotations in North Dakota are diverse and complex, and new and emerging diseases continually arise. To maintain the success of the state's agricultural operations, the need for specialized research is critical for a wide variety of crops and cropping systems, and for new bacterial and viral diseases. Research that addresses many of the most challenging problems in cropping systems generates almost immediate return on investment by improving agricultural productivity.

Research that addresses agronomic conditions in western North Dakota at the Dickinson Research Extension Center (REC) is critical to helping farmers address issues related to crop rotations, drought concerns and other issues specific to southwest North Dakota.

In addition, more emphasis on plant breeding, especially with pulse crops, is needed as pulses have become an increasingly important part of crop rotations throughout the state.

Plant diseases are a constant concern for producers. Over the past twenty years, over twenty new diseases have arrived in North Dakota. Several of these are caused by bacterial plant pathogens that are now major diseases on the crops they affect. Examples include Goss' wilt of corn, bacterial leaf streak of wheat and barley, and Dickeya soft rot of potatoes, all of which can cause tens of millions in damage in the state. Other, longer-established bacterial diseases in the state, such as common blight of dry bean and ring rot of potato, reduce producer profitability and can limit seed production in the state. New virus diseases in the state, such as pea seedborne mosaic virus, and new variants of existing viral diseases, such as potato virus Y, have emerged and hamper efforts to breed new crop varieties and reduce producer profitability. Expertise in these new and emerging diseases caused by bacteria and viruses are needed to reduce the risk associated with these diseases, ensure farm profitability, and reduce expense.

Request: Seven FTEs total. One agronomist at the Dickinson REC, one plant bacteriologist and one plant bacteriologist technician, one plant virologist and one plant virologist technician, one pulse breeding technician, and one technician for clubroot fungus at the Langdon REC. $120,000 in operating support.

Total: $1,580,000

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2. Operating Support

Operating support is requested for the Oakes Irrigation Research Site (OIRS), which provides important research on irrigation strategies, farming practices in the southeast part of the state and high value crops. The additional operating support will ensure the OIRS maintains its critical research activities.

Additionally, operating support to enhance collaborative opportunities between the Main Station and REC network is vital to bringing additional scientific collaboration to key projects, facilitate collection of preliminary data and enhance competitiveness for grant funds.

Scientists have become progressively more reliant on grant funds to conduct research, and consequently their time spent on administering the grant process has greatly increased. The complexity of many grant applications has expanded significantly and scientists find themselves spending increasing amounts of time on administrative functions related to grant applications. Administrative support staff dedicated to assisting scientists to identify sources of grant funds, navigate complex submission requirements and gather paperwork would improve efficiency and increase the ability of our scientists to identify, submit and compete successfully for grant funds.

Graduate students enhance research programs by providing key labor to complete research activities, collect field data and conduct various analyses associated with research projects. Graduate students also enhance collaborations between the main campus and the REC network by providing a vital link between scientists. These same graduate students are the next generation of scientists that will be hired into important roles in the public and private sector in the future.

Request: Three FTEs total. Three FTEs will provide administrative support for grant development work, $594,000. Graduate student funding to hire graduate research assistants (no FTEs), $720,000. Operating support for Main Station and RECs, $480,000. Operating support for the Oakes Irrigation Research Site, $400,000.

Total: $2,194,000

3. Big Data Initiative

Agricultural research activities have become much more data intensive. Advances in UAVs, agricultural sensors, computational speeds and networking technologies produce massive volumes of data, and advances in precision agriculture will only increase data production at a rapid pace. The demand for data storage, management and analysis within agriculture and food production is greatly needed to provide the producer with meaningful management outputs that will improve their operations. Large volumes of data are part of every conceivable field of agricultural research, including plant varietal selection, soils, livestock production, weather and climate, economics and agribusiness, and food production.

In addition, weather is the primary factor that impacts all fields of agriculture, and the ability to monitor, process and analyze weather data is essential to improve producer management and reduce risk. The North Dakota Agricultural Weather Network (NDAWN) is a mesonet of more than 150 stations and generates a tremendous amount of data multiple times per hour. The value of this data and its uses can greatly improve agricultural operations through more timely applications of crop inputs, determining planting and harvesting dates, minimizing risk, etc.

Request: Three FTEs total. One-and-a-half FTEs to support research related to data analytics, management and curation; one-and-a-half FTEs to support enhancements to NDAWN. $200,000 in operating.

Total: $838,000

4. Climate Smart Agriculture

There is little room for error in producing a crop during a "typical" North Dakotan growing season, and extreme variability exasperates this challenge of producing a successful crop. For example, the harvest of 2019 was the wettest autumn since 1895 and resulted in prevent plant enrollment of 3.7 million acres in 2020. This record wetness was then followed by one of the worst droughts experienced in North Dakota during the growing season of 2021. Climate Smart Agricultural (CSA) practices provide land management strategies to help deal with such problems, and research is needed to implement CSA strategies that enhance resiliency for North Dakota producers.

Climate Smart Agricultural practices include water- and soil-conservation practices such as strip- or no-till, cover crops, rotation diversity and livestock integration, all of which increase carbon levels in the soil. Additionally, producers are increasingly being offered contracts to enter private sector carbon markets if they implement CSA practices. Producers need science-based information that helps them realize the benefits of CSA practices and the potential economic benefit from private sector carbon markets.

Request: Two FTEs total. One climate smart agricultural scientist, and one climate smart agricultural technician. $40,000 in operating.

Total: $458,200

5. (Tie) Bee and Apiary Research

North Dakota is the number one producer of honey in the United States. As a state, the total number of bee colonies is 495,000 or 18% of all colonies in the United States. These colonies contribute to 26% of all honey produced nationally, which is valued at approximately $67 million. Although North Dakota produces more honey than any other state, we have no research program supporting beekeepers.

North Dakota honey producers need apiary research to address pressing issues such as colony collapse and improve honey production by developing greater winter hardiness, improved mite resistance, and increased hygiene. Additionally, research can improve interactions with other agricultural systems of the state while benefiting native pollinator populations and ecosystem services through improved land use.

Request: Two FTEs total at the Hettinger REC. One bee and apiary scientist, and one bee and apiary research technician. $40,000 in operating.

Total: $458,200

5. (Tie) Precision Agriculture

The need for intelligent systems, such as sensors, artificial intelligence, robotics and automation, is greatly increasing across all aspects of agriculture, from farm to plate. Additional resources can provide researchers with equipment and tools needed to build capacity and incorporate advanced agriculture applications for improving cropping systems and livestock operations of the state.

Request: $600,000 in operating.

Total: $600,000

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