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Soybean was one of the main crops in North Dakota in 2022 in terms of harvested acres and the value of the production. In 2022, producers planted 5.70 million acres and harvested 5.67 million acres of soybeans, which positioned North Dakota as the seventh largest state for planted and harvested soybean acres and the eighth largest producer by total bushels in the nation.

Soybean was a leading crop in terms of cash receipts. According to USDA Economic Research Service, soybeans generated a cash receipt of about \$2.6 billion in 2022.

Soybean production has increased over 50 times in the state since 1980, and the acreage is projected for continued expansion. Soybeans are grown state-wide from eastern North Dakota to southwest North Dakota, creating tremendous opportunities for North Dakota farmers and ranchers.

Another area of opportunity for soybean and ND agriculture is the expansion of soybean crushing capacity in the state. Until 2023, ND has not had dedicated soybean crush processing in the state, but that is changing as the state's first crush plant came online in September at the Green Bison facility at Spiritwood. Another in Casselton is under construction and planned to operate for harvest 2024. A third soybean crushing facility is expected to begin construction in 2024 in Grand Forks. These facilities add more value to beans by providing market access and improving the profitability of this crop; helping farmers navigate markets and offering diverse marketing options. In addition, these plants can provide jobs to rural communities and promote economic development.

Despite these opportunities, producers face numerous challenges including short growing seasons, challenging weather conditions, herbicide resistance, insect, and disease pressure along with new and emerging threats. For example, common tough-to-control weeds such as kochia, water hemp, and palmer amaranth are continuing to develop resistance to multiple herbicide modes of action. Soybean cyst nematode continues to be a problem in soybean production. Soil acidification is a challenge for western North Dakota soybean production.

Soybean research is one of the main drivers that played a pivotal role in soybean expansion, sustainability, and yield improvements in our state. North Dakota Soybean Council (NDSC) has been supporting soybean producers with efforts in research, market development, education, and outreach. We partner with NDSU, UND, and other organizations on various projects and programs to move the industry forward.

To further support soybean producers and strengthen the capacity of research and development in the state, NDSC has identified the needs of soybean producers and research partners that can benefit from the state funding.

What are the needs?

1. North Dakota Soybean Industry

Western North Dakota Soybean Specialist

NDSC supports the addition of a Western North Dakota Soybean Specialist within Extension to address soybean farmers' growing needs with the increased soybean acres in the west. Soybean is a relatively new crop for many producers in the West, and they need resources and dedicated Soybean Specialists to help them overcome soybean production challenges.

The Soybean Specialist will conduct research in weed management, cropping systems, fertility management, disease, and insect management. This Specialist will also monitor new and emerging soybean production issues and develop science-based management practices for soybean farmers. Focusing on extension to bring the latest soybean production practices to farmers and extension agents will also be part of soybean specialist's responsibilities.

2. North Dakota Soybean Industry

A state-funded soybean breeding technician to support NDSU's public soybean breeding program.

The NDSU has a large public soybean breeding program led by Dr. Carrie Miranda. This program provides valuable varieties to soybean producers. NDSC has been providing funding for public soybean breeding staff (5-6 staff) and the breeding program at NDSU for years. Having access to a state-funded full-time technician not only improves the productivity of the soybean breeding program, but also allows this program to redirect some of NDSC's funding to expand breeding efforts to develop and release locally adapted, new, and high-yielding varieties.

3. School of Natural Resource at NDSU

Agriculture Scientist Faculty position and research funding to support this position.

Building resiliency in cropping systems is key to continued success in our northern crop-growing region. There is little room for error in producing a crop during a "typical" North Dakota growing season as we face many challenges such as short growing seasons, extreme weather, drought, flooding, and pest pressure. The Agriculture Scientist in this position will specialize in sustainable cropping systems, nutrient management, nutrient use efficiency, and soil and water management to help deal with such problems. The research scientist will also conduct research in resilient cropping systems to mitigate the risk of growing crops in challenging conditions in our state. Training the next generation of scientists and collaborating with existing scientists will also be part of Agriculture Scientist's responsibilities.

4. Center for Agriculture Policy and Trade Studies (CAPTS)

Establishment of a dedicated team of three FTEs to address the demand side of the issues for North Dakota crops including soybeans:

- 1) Agriculture Policy Analyst
- 2) Markets and Trade Analyst
- 3) Economic Impact/Contribution Specialist

In North Dakota, addressing crop production issues is important, but these issues have been addressed with more resources by many organizations over the years. However, the demand issues such as commodity prices, trade, and transportation have not been addressed well, leaving research gaps that need to be filled. Issues related to demand also include volatile commodity prices we have seen in the past few years and their impact on farmers' bottom line. Relying on a single buyer as the main customer of North Dakota crops such as corn and soybean also creates risk. It is important to understand multiple factors that impact the demand and have a better risk mitigation plan for farmers. We have seen a significant impact on commodity prices when Chinese imports of US crops significantly decreased. The NDSU Center for Agricultural Policy and Trade Studies is uniquely positioned to address demand issues that are common for many crops in the state. Therefore, funding to support establishing a team of experts to address the demand side of the issues is the top priority.

5. Department of Microbiological Sciences at NDSU

Microbiome Extension Specialist position to serve as a bridge between existing faculty research in basic microbiome science and the applied research needs of growers, processors, and the agricultural industry in the region.

The NDSU agribiome research initiative at the Department of Microbiological Sciences at NDSU is producing outcomes that need to be translated into actionable knowledge and practical solutions to assist farmers and the agriculture industry. At the same time, the market for beneficial microbes is growing exponentially and farmers are being inundated with new products that have yet to be validated in North Dakota fields. Therefore, there is a critical need for an Extension Specialist to provide educational programming and guidance on agribiome research and the use of biologicals in crop production. Focus areas will include soil, microbe and root interactions, root or foliar symbionts, plant agricultural productivity, and commercial treatment of seed with beneficial microbes to improve field performance.

6. Department of Animal Science at NDSU

Precision Livestock Extension Specialist Position, infrastructure, and equipment to support Precision Livestock Farming.

With the recent expansion of soybean crushing capacity, opportunity exists in developing animal agriculture in ND. Animal agriculture has always been the No. 1 consumer of soy meal. Soybean crushing plants in state can provide locally sourced feed ingredients for livestock producers and result in the cost savings for livestock producers with direct access to soybean meal.

Precision Livestock Farming (PLF) is an innovative approach that utilizes technology and data-driven solutions to optimize livestock production and management.

PLF is not well developed in the state. Efforts have begun to initiate the development of PLF including:

- Fundraising to build a smart swine facility. We believe that the swine industry is very well positioned to increase the number of animals and barns in the next few years.
- Funding for construction of a "smart sheep feedlot" at the Hettinger REC and "smart beef facilities" at Carrington REC were recently approved and construction is underway.

Additional funding is needed to further support the development of precision agriculture for livestock to equip livestock producers with precision tools to improve productivity and make livestock production less stressful and time consuming. The Department of Animal Sciences will redirect a faculty position to become a Research Faculty in Precision Livestock Farming. The department needs the support for an Extension Specialist in the same area. This Extension Specialist will work with all ag commodities and develop outreach programs to train producers in the implementation and use of precision tools.

7. Department of Plant Pathology at NDSU

Equipment and equipment storage: one small plot planter and one plot combine and storage facility for new equipment to support plant pathology research.

Plant Pathologists at NDSU are increasing applied field research in response to emerging and increasing diseases of soybeans. However, these research teams don't have dedicated planting and harvesting equipment to support plant pathology research. Historically, plant pathology researchers relied on soybean breeding teams and others to plant and harvest their plots. This may not be a long-term viable solution since it limits the amount and locations of on-farm research pathologists can conduct and has a higher potential of introducing and spreading invasive pathogens to new areas which creates production risk. Also, as the soybean breeding program and other programs grow, they may not be able to seed or harvest plant pathology research plots on time due to workload. Therefore, there is a need for a dedicated small plot planter, a plot combine, and a storage facility to support plant pathology research and stay ahead of new and emerging diseases in the state.

8. Department of Agricultural and Biosystems Engineering

Research Specialist/Technician

Unlike other departments at NDSU, the Department of Agricultural and Biosystems Engineering (ABEN) does not have enough Research Specialists/Technicians to support all faculty. ABEN currently only has one 75% state-funded Research Technician shared among 3-4 researchers. The lack of support from the research specialist/technician is one of the major factors that hinder the researchers' ability to execute projects and start addressing issues that impact farmers' bottom line. Having access to a Research Specialist/Technician can bring efficiency and allow researchers to focus on important topics.

9. NDSU Research Extension Centers

Technician and operating fund to support the Plant Pathology research program led by Dr. Michael Wunsch at the Carrington REC.

Dr. Wunsch has a strong plant pathology research program at the Carrington REC that serves central ND farmers and collaborates with plant pathologists across the state on multiple disease research projects. Dr. Wunsch currently supports three soft-funded positions to conduct research and carry out his duties, but the team is not enough to support the large plant pathology program. Having a technician not only provides Dr. Wunsch with the technical

assistance needed but also frees up some time for Dr. Wunsch to focus on research activities and address new disease issues in the state.

Funding for a research technician at the Hettinger REC to support animal science precision agriculture livestock.

With the expansion of soybean-crushing plants in the state, soybean meal will become readily available in the state. Strengthening animal agriculture and developing smart livestock farming will enable ND farmers to further develop animal agriculture in the state and maximize the benefits of soybean-crushing plants.

On behalf of the NDSC, thank you for your support for ND Agriculture. I appreciate your service to ND and to farmers and their families.

We look forward to working with you to help make your SBARE priorities a reality for the benefit of all the ND agricultural community.

If you have questions or need additional information or comments, please feel free to contact me.

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