

Nebraska Soybean Board
FINAL Research Report Form



11/8/2019

Note: Submit this report no later than 90 days after the NSB-funded project officially terminates.

This post-project 90-day time-frame will allow the Lead PI time to complete any final data analysis and a final technical report, plus the drafting of any articles for submission to scientific journals. Note that this completed report will be provided to the National Soybean Checkoff Research Database, (soybeanresearchdata.com).

Project # and Title: Sponsor Award Number:19R-20-1/1 #1718 Next Generation On-Farm Research Initiative

Principal Investigator: Laura Thompson

Co-PI's & Institutions: Keith Glewen and Nathan Mueller (University of Nebraska - Lincoln)

Project Date (Including Extension): 10/01/2018 **to** 09/30/2019 **(For example: mm/dd/yyyy to mm/dd/yyyy)**

Total Budget for Project: \$ 32,580.00

1. Briefly State the Rational for the Research:

The goal of the NOFRN is to provide a state-wide venue by which farmers, crop consultants, government employees, university faculty, and other ag professionals can interact and engage in transformational research. The Nebraska On-Farm Research Network (NOFRN) has been a valuable program to provide transformational learning opportunities for farmers and ag professionals. Additionally NOFRN provides an avenue by which research faculty can engage with farmers to develop research that is relevant in a "real-world" setting. This project builds on the success of the NOFRN, dating back to 1989. This project continues the impactful collaboration initiative among the Nebraska Soybean Board, Nebraska Corn Board, Nebraska Corn Growers Association and UNL Extension to enable farm research success by using contemporary technologies, tools, and a learning network. The NOFRN is being recognized throughout the U.S. and Canada as a leader in on-farm research. Continued investment in this program enables a sustained positive trajectory of growth and impact that meets the needs of producers today and in the future.

2. Research Objectives: (copy from project, but keep in a brief bullet format)

1. Soybean (and corn) producers will focus on on-farm research primarily on priorities identified by Nebraska Soybean Board and Nebraska Corn Board to enhance knowledge, implementation, and profitability of these practices. This proposal has potential to address FY18 objectives of research on seed treatments, late season soybean N applications, and in-furrow product applications. The Nebraska On-Farm Research Network will facilitate, coordinate, and publicize extension educators efforts related to these research topics across the state.
2. Soybean (and corn) producers will learn to conduct on-farm research more efficiently and prolifically using contemporary precision agriculture technologies, implementation strategies, and data management practices.
3. Soybean (and corn) producers will embrace an interactive professional learning network that facilitates a co-learning environment focused on applied research that contributes to a systems approach to solving agronomic issues at the grass-roots level whereby on-farm research becomes an important, timely, powerful part of soybean (and corn) production solutions.
4. Soybean (and corn) producers will benefit from a unified, collaborative applied research model supported by the Nebraska Soybean Board, Nebraska Corn Board, Nebraska Corn Growers Association, and University of Nebraska-Lincoln Extension.

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3. General Approach Used and (if applicable) the Nebraska Test Locations:

The location of the project is statewide in Nebraska. In 2018, research was conducted in 30 Nebraska Counties. The general approach of the NOFRN includes:

1. Develop timely and practical on-farm research protocols, many of which address NSB initiatives.
 2. Encourage farmer and crop advisor participation in the program through a variety of recruitment initiatives over the past year, including:
 - CropWatch stories: "20 Growers Sought for Soybean Yield Gap Study" <https://cropwatch.unl.edu/2019/20-growers-sought-farm-soybean-yield-gap-study> and "Study Area Expanded for Growers Interested in Participating in Soybean Yield Gap Research" <https://cropwatch.unl.edu/2019/soybean-growers-needed-for-research>
 - Email newsletter, newspaper, and winter meetings
 - Social media (Facebook, Twitter)
 - YouTube video: <https://www.youtube.com/watch?v=tEy-l43CT0E>
 - Nebraska Farmer: "Evaluating on-farm trial data" <https://www.farmprogress.com/crops/evaluating-farm-trial-data>
 3. Conduct studies and collect measurements including imagery (drone, airplane, and satellite), time lapse cameras pictures, stand counts, other relevant plant measurements, soil tests, and yield data.
 4. Analyze data and review the data analysis in a UNL faculty review day held each December.
 5. Disseminate research findings through a wide variety of venues including popular press, social media, in-person, extension publications, online publications, and scientific journals. More information about research result dissemination is in later sections of this report.
- Throughout the entire process, ag technologies are leveraged to make conducting on-farm research simpler, enable less traditional experimental designs, gather additional insights, and gain site-specific knowledge of the field response to treatments studied.

4. Describe Deliverables & Significance Attained for Each Research Objective:

In 2018, 71 on-farm research studies were conducted in 30 Nebraska counties. Data collection and processing of 2019 on-farm research studies is ongoing; it is estimated that over 100 studies will be successfully completed, analyzed, and reported. Topics include cover crops, seeding rate, seeding date, relative maturity groups, growth promoters, seed treatments, row spacing, and more. Those participating in the on-farm research network were able to work with Extension Educators to learn the process and gain skills to conduct research on their own farms.

Results of the 2018 studies were shared at the 2018 Results Update Meetings in Feb. 2019 at 5 locations: Grand Island, Norfolk, North Platte, Alliance, and Beatrice (new location). A total of 160 attended the meetings.

Those attending the annual on-farm research results update meetings reported new knowledge gain and anticipated behavior changes:

- 93% learned new information about how to set up an on-farm research plot
- 91% had a better understanding of cover crop management as a result of the programming
- 93% learned new information about crop production practices
- 82% (east) and 94% (west) plan to make changes to their planting population as a result of the programming
- 89% have a better understanding of how ag technologies can be used to conduct on-farm research
- 92% noted they plan to use the "results finder" database to review research information

Those attending the annual results meetings in February 2019 represented over 3.5 million row crop acres. The value of the knowledge gained in anticipated practice changes averaged \$8.00/acre, resulting in a total program value of \$27 million.

Attendees identified areas they planned to change based on information at the meetings. The most common responses were:

1. Soybean planting population and planting date adjustments
2. N management (adjust rate and/or timing, utilize sensor technology)
3. Implement cover crops
4. Adjust soybean row spacing to narrower rows
5. Reduce inputs that did not show economic results or use selectively on fields where they are more likely to show economic results

When asked what they liked best about the results update meetings, responses included "seeing what other Nebraska farmers are testing and how", "seeing what's done and having producers' opinions and thoughts", and "farmers sharing experiences". This is a unique program as the farmers participating in the research play a large role in delivering the research information. This is well received by the other farmers in attendance and is often a highlight for attendees.

Other attendees noted: "Very relevant, honest, reliable information" and "Good data to base decisions on"

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4. Describe Deliverables & Significance Attained for Each Research Objective *(continued)*

Results of the long-term impact study of Nebraska On-Farm Research participants was published in Agronomy Journal article "Farmers as Researchers: In-depth Interviews to Discern Participant Motivation and Impact" available open-access at <https://dl.sciencesocieties.org/publications/aj/articles/0/0/agronj2018.09.0626?highlight=&search-result=1>. An accompanying popular press article was released by the Agronomy Society. This article featuring the study findings and the Nebraska On-Farm Research Network was picked up by 25 different media outlets. The story is available at: <https://www.newswise.com/articles/farmer-researchers-reap-more-benefits-than-just-increased-crop-production>

An objective of the on-farm research network is to establish partnerships with others interested in conducting and using on-farm research data. To this end, numerous research collaborations with multi-state efforts, UNL researchers, UNL teaching faculty, and the NRCS, resulted in high quality work and expanded program reach.

-One such project was the manure and mulch management project which was initiated through support from NET. This group, led by Amy Schmidt, is conducting on-farm research on implementation of manure and mulch, and developing resources for conducting on-farm research related to manure.

-A continued collaborative effort is with the USDA-Natural Resource Conservation Service (NRCS). The NRCS developed a 5-year proposal to establish 12 soil health demonstration farms. The NOFRN assisted with development of the demonstration farm protocols, and research result dissemination.

-Another continued collaborative effort is with Humberto Blanco, an Associate Professor of Soil Management and Applied Soil Physics. The NOFRN partnered with Dr. Blanco to identify on-farm research sites and farmer collaborators for cover crop research. The research is being disseminated through the NOFRN.

The on-farm research network also seeks to both make use of precision ag technologies for conducting on-farm research and also educate farmers and agronomists about these technologies. Several key activities focus on this objective.

-The NOFRN is participating in the Data Intensive Farm Management (DIFM) project, a multi-state effort which is lead by researchers at the University of Illinois at Urbana Champaign. This project makes use of precision agriculture technologies for conducting on-farm research. Several of these research projects are focused on variable rate soybean planting. This project also demonstrates how precision ag technology can be utilized to develop research plot prescriptions which can then be implemented with the farmer's equipment. Yield data can be extracted and analyzed spatially across the field to determine site-specific management strategies. In addition to the data that is collected on these studies, these projects will serve as educational datasets for training in precision ag.

-NOFRN maintains connection with the Nebraska Ag Technology Association (NEATA) by attending board meetings and assisting with the annual conference.

-The first phase of courses in the online training in digital agriculture was launched. One course is titled "Designing and Setting Up an On-Farm Research Experiment Using Precision Ag Data Management Software". The course is available for CCA credits. <https://cropwatch.unl.edu/PrecAg/Lesson1/intro> Additional courses help with data management and yield post-processing for on-farm research studies.

5. List where the Project Research Results/Findings were Publicized:

Consistent with objectives to be a national leader in on-farm research, numerous national level publications and presentations have raised the national prominence of the NOFRN and disseminated research results to extension and researcher professionals.

-The 2018 growing season results were published as a peer reviewed extension circular: Thompson et al., 2018. Nebraska On-Farm Research Network: 2018 Growing Season Results (pp. 142). Lincoln, Nebraska: Nebraska Extension. https://cropwatch.unl.edu/OnFarmResearch/2018GrowingSeasonResults_postconference_EC3041.pdf

-Research reports are available in our interactive online database: <http://resultsfinder.unl.edu/> During FY2019, there were 3,543 page views of research studies on this site.

-Numerous CropWatch articles drew on research from the on-farm research network, with authors frequently using the Results Finder to synthesize research data.

1. Soybean Seeding Rates (April 18, 2019)
2. Study Highlights Motivations and Impact of Participating in an On-Farm Research Network (May 31, 2019)
3. Why Growers are Adopting Practices to Build Soil Health (July 11, 2019)
4. Farmers Find Solutions Through Nebraska Soil Health Initiative (July 11, 2019)

-Research was published in international journals:

1. Thompson, L., Glewen, K., Elmore, R., Rees, J., Pokal, S., Hitt, B. (2019). Farmers as Researchers: In-depth Interviews to Discern Participant Motivation and Impact. *Agronomy Journal*, 111(4) doi:10.2134/agronj2018.09.0626
2. Andrade, J., Edreira, J. R., Mourtzinis, S., Conley, S., Ciampitti, I., Dunphy, J., Gaska, J., Holshouser, D., Kandel, H., Kyvergya, P., Licht, M., Lindsey, L., McClure, A., Naeve, S., Nafzinger, E. D., Orlowsky, J., Ross, J., Glewen, K., Thompson, L., Staton, M., Specht, J., Grassini, P. (2019). Assessing the influence of row spacing on US soybean yield using experimental and producer survey data. *Elsevier Field Crops Research*.

-Research and extension work was presented at regional/national/international professional and scientific conferences:

1. Thompson, L., Mueller, N., Glewen, K., Luck, J., Ferguson, R. "Data to Decisions: Experiences, guidelines, and technologies for establishing and maintaining a successful and innovative extension on-farm research program", Agronomy Society of America and Crop Science Society of America, Baltimore, MD, Conference, International, Invited. (November 6, 2018).
2. Stevens, R., Luck, J., Ferguson, R., Giesler, L. J., Pitta, S., Thompson, L., Mueller, N., "Assessment of Spatial Data Layers and Zone Delineation of Multi-Hybrid Placement of Corn Hybrids and Soybean Seed Treatments", Agronomy Society of America and Crop Science Society of America, Baltimore, MD, Conference, International, Invited. (November 7, 2018).
3. Thompson, L. "On-Farm Research to Evaluate Drones & Sensors for Nutrient Management." Northwest Missouri Certified Crop Advisors Conference, St. Joseph, MO, Conference, Regional, Invited. (January 2019).

-Research and the program were published in popular press magazines:

1. Newground publication. "From Experimental to Experiential: On-Farm Research Helps Make Results More Relevant to Producers" Spring 2019.
2. University of Nebraska Agronomy and Horticulture Pots, Plants, and Plots. "From Data to Decisions: Nebraska On-Farm Research Network" Annual Newsletter 2018

Note: The above boxes will automatically accommodate for your text inputs; HOWEVER, the Final Report comprised of the above listed items must be kept to THREE PAGES. A Technical Report of no more than TEN PAGES (preferably fewer) can be appended to this report.

Submit both reports as a single PDF with this file name format: #XXX > FINAL > Project Title > PI last name

Please email this completed form to the Agriculture Research Division (jmonaghan2@unl.edu) based on the reporting schedule given to you. If you have any questions, please call the ARD at 2-2045 or Victor Bohuslavsky at the Nebraska Soybean Board Office at (402) 432-5720.