Nebraska Soybean Board
FINAL Research Report Form

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1/3/2019

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 curator of a national database of State, Region, and USA Soy checkoff funded projects.

Project # and Title: #1718 Next Generation On-Farm Research Initiative

Principal Investigator: Laura Thompson

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

Project Date (Including Extension): 10/01/2017 ***to*** 09/30/2018 ***(example: mm/dd/yyyy to mm/dd/yyyy)***

Total Budget for Project: $ 32,020.00

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.

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

The location of the project is statewide in Nebraska. In 2017, research was conducted in 33 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 initatives including in FY2018:
 -Nebraska Farmer articles: "7 reasons to conduct on-farm research", "Precision ag's Rubik's Cube", "Test agronomic practices on your own farm"
 -Pure Nebraska Interview
 -CropWatch stories including "Growers Share about Their On-Farm Research" https://cropwatch.unl.edu/2018/3-growers-share-about-their-farm-research-projects
 -Radio Interviews for AgAlmanac
 -HuskerVision for the spring game https://www.youtube.com/watch?v=uYJ_-r7FysE
 -SoybeaNebraska article
 -KTIC radio interviews
 -Other email, newspaper, and winter meetings in local communities
 -Social media (Facebook, Twitter, and YouTube)
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 2017, 83 on-farm research studies were conducted in 33 Nebraska counties. Data collection and processing of 2018 on-farm research studies is ongoing; it is estimated that 70 or more 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 2017 studies were shared at the 2017 Results Update Meetings in Feb. 2018 at 5 locations: Mead, Grand Island, Norfolk, Grant (first time location), and Alliance (first time location). A total of 162 attended the meetings, of which 34% were first time attendees.

Those attending the annual on-farm research results update meetings reported new knowledge gain and anticipated behavior changes:
 -80% learned new information about crop production practices
 -80% learned new information about cover crops
 -83% learned new information about ag technologies
 -94% noted the relevancy of topics was good to excellent
 -87% noted networking opportunities were good to excellent
 -68% noted they plan to use the online results finder database to view research summaries

Those attending the annual results meetings in Feb. 2018 represented over 2.1 million row crop acres. The value of knowledge gained in anticipated practices changes averaged $14.32/acre, resulting in a total program value of $31 million.

Attendees self-identified areas they planned to change based on information at the meetings. The most common responses were:
 1. Reduce soybean planting populations
 2. N management adjustments
 3. Implement cover crops
 4. Adjust soybean row spacing to narrower rows
 5. Reduce inputs that did not have an economic response

When asked what they liked best about the results update meetings, responses included the presentation style and the quality of unbiased content on specific topics. 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. Research has shown this method of delivery is highly impactful and we are proud to offer a venue that delivers information in this unique way. One farmer stated: "Good program. The on-farm research on my farm have allowed me to use less inputs & increase yields in the last 25 years. We learn a lot from each other."

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

Another 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 regional Soil Health Nexus which was initiated through startup support from the North Central Region Water Network. One of the objectives of this regional group was to compile an online toolbox of on-farm research resources. The NOFRN contributed greatly to this effort, providing many of our resources for inclusion on this site, and providing technical expertise. The site is now live at: https://soilhealthnexus.org/resources/on-farm-research-toolbox/
-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. Four research projects have been completed in the last year - two of which are soybean related. This project 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.
-Another collaborative precision ag effort is the development of the "Tech Toolshed", an online resource to help growers understand and utilize technology. The project was funded by the United Soybean Board. The NOFRN contributed to case studies and technical white papers. The entire toolshed is online: https://unitedsoybean.org/techtoolshed/. Sections with contribution from the NOFRN are "Data Integrity" which showcases on-farm research examples (https://api.unitedsoybean.org/uploads/files/58544-usda-whitepgs-dataintegrity.pdf) and "Data Utilization" (https://api.unitedsoybean.org/uploads/files/58544-usda-whitepgs-datautilization.pdf).
-NOFRN maintains connection with the Nebraska Ag Technology Association (NEATA) by attending board meetings and assisting with the annual conference. In 2018, a presentation was made about on-farm research at the NEATA Conference Management Zone Symposium. Thompson, L., Nebraska Ag Technology Association, Kearney, Nebraska, "Nebraska On-Farm Research Network: Your Farm, Your Answers", Extension, Conference. (February 7, 2018).
-Efforts continue to provide an online training program for precision ag software. An initial online course has been completed and is now live. This 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

Additionally, 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. These are reported in the following section.

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

-The 2017 growing season results book was published as a peer reviewed extension circular.
Thompson, L., Glewen, K., Ingram, T., Krienke, B., Lesoing, G., Melvin, S., Mueller, N., Nygren, A., Ohnesorg, W., Proctor, C., Pryor, R., Rees, J., Rethwisch, M., Seymour, R., Sivits, S., Stepanovic, S., Thomas, J., Whitney, T., Williams, T., Zoubek, G., Blanco, H., Drewnoski, M., Elmore, R., Ferguson, R., Luck, J., Irmak, S., MacDonald, J., Mieno, T., McMechan, J., Nemala, H., Shapiro, C., Areson, N., Arnold, R., Dunbar, C., Krull, D., Pittman, D., Spicka, S., Stansell, J. (2018). Nebraska On-Farm Research Network: 2017 Growing Season Results. (pp. 180). Lincoln, Nebraska: Nebraska On-Farm Research Network: 2017 Growing Season Results. Nebraska Extension. https://cropwatch.unl.edu/OnFarmResearch/2017GrowingSeasonResults.pdf

-Research study reports are available in our new interactive online database: http://resultsfinder.unl.edu/ During FY2018 there were 2,244 pageviews of research studies on this site.

-Research results were also presented at several other winter meetings and venues: York Ag Expo, Ag Almanac radio interview, NEATA, Wilbur Crop Clinic, KTIC radio interview, and Corn Growers Association PRIME class.

-Numerous CropWatch articles drew on research from the on-farm research network, with authors utilizing the Results Finder to synthesize research data.
1. Alternative Nutrient Supply Products: Highlights of On-Farm Research Results https://cropwatch.unl.edu/2018/alternative-nutrient-supply-products-highlights-results-farm-research
2. What On-Farm Research has taught us about Soybean Seeding Rates https://cropwatch.unl.edu/2018/what-farm-research-has-taught-us-about-soybean-seeding-rates
3. Using Drones for Early Season Stand Assessment, Weed Scouting https://cropwatch.unl.edu/2018/using-drones-early-season-stand-assessment-weed-scouting
4. How Row Spacing Affects Irrigated Soybean in Southwest Nebraska
5. Impacts of Torque on Corn Yield (https://cropwatch.unl.edu/2018/farm-research-results-impact-torque-corn-yield).

-Research and extension work was published in national/international journals:
1. Andrade, J., Edreira, J. R., Mourtzinis, S., Conley, S., Ciampitti, I., Dunphy, J., Gaska, J., Holshouser, D., Kandel, H., Kyveryga, 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.
2. Thompson, L., Krienke, B., Ferguson, R., Luck, J. (2018). Using 360-Degree Video for Immersive Learner Engagement. Journal of Extension Using 360-Degree Video for Immersive Learner Engagement, 56(5).
3. Thompson, L. (2018). Using Short, Silent 'Data Story' Videos to Engage Contemporary Extension Audiences. Journal of Extension Using Short, Silent 'Data Story' Videos to Engage Contemporary Extension Audiences, 56(3).

-Research and extension work was presented at national/international professional and scientific conferences:
1. Thompson, L., Glewen, K., Mueller, N., Luck, J., 14th International Conference on Precision Agriculture, International Society of Precision Agriculture, Montreal, Quebec, Canada, "From Data to Decisions - Ag Technologies Provide New Opportunities and Challenges with On-Farm Research", Conference, International, peer-reviewed/refereed, published in proceedings, https://www.ispag.org/proceedings/?action=abstract&id=4779, Accepted. (June 27, 2018).
2. Evans, J., Stevens, R., Luck, J., Thompson, L., The InfoAg Conference, St. Louis, Missouri, "Data Benchmarking for Deploying and Assessing Multi-Hybrid Planting Applications", Conference, Accepted. (July 18, 2018).

Note: The above boxes will automatically accomodate 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.