

**Nebraska Soybean Board
FINAL Research Report Form**



11/5/2018

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: #1724: Benchmarking Soybean Production Systems in Nebraska

Principal Investigator: Patricio Grassini

Co-PI's & Institutions: UNL–Department of Agronomy.

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

Total Budget for Project: \$ 7,500.00

1. Briefly State the Rational for the Research:

The primary goal of the proposed project is to “benchmark” current yield and management practices in soybean producer fields. That “benchmark data” will help to identify those KEY management factors in NE (and across the NC USA region) that can be used by individual producers to increase soybean yield on their farms, and do that with an input-use efficiency that will improve bottom-line net profit.

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

The primary goal of the proposed project is to “benchmark” current yield and management practices in producer fields. This project is a sub-component of a larger, regional 10-state benchmarking project led by PI Grassini and supported by the North Central Soybean Research Program (NCSRP). NSB funding contributed to data collection in Nebraska.

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

We collected data from fields planted with soybean in NE in 2017, including irrigated and dryland yields. To collect the data, we partnered with UNL Extension Educators. Each Extension Educator was requested to interview soybean producers located in his/her local area and each of the producers will be asked to provide data from fields planted with soybean. There is a total of 15 Extension Educators participating in the project: Jenny Rees, Amy Timmerman, Randy Pryor, Gary Lesoing, Ron Seymour, Todd Whitney, Strahinja Stepanovic, Tyler Williams, Keith Glewen, Nathan Mueller, Steve Tonn, Aaron Nygren, Allan Vyhnalek, Keith Jarvi, and John Wilson.

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

We partnered with 15 UNL Extension Educators and NE Natural Resources Districts (NRDs) to collect the data. The number of filled surveys collected by UNL Extension Educators, together with the surveys filled out by NRD soybean producers, sum up to 841 fields. Note that the number of surveyed soybean fields is almost three times larger than the target number (300 fields) set at the beginning of the project. Relative to other states that participate in the NCSRP-funded project, the largest number of survey forms was collected from Nebraska thanks to the help of Nebraska Extension and NRDs and the support from the NSB. So, we are very happy on how well the collaboration with UNL extension and NRD worked out!

We have compiled the most extensive, detailed, and agronomically-relevant database on soybean production systems in USA and worldwide. The core team at UNL have inputted, quality control, and archived the data collected by Extension Educators, NRDs, etc. in a digital database. Weather and soil data were retrieved for each individual field, which allowed us proper contextualization of the collected data. For first time, it is possible to examine spatial variation (across and within states) in soybean yield and management practices. This information is very useful at determining the factors that can help increase soybean yield, input-use efficiency, or both in producer fields in Nebraska and the rest of the US north-central region and, in doing so, increase on-farm net profit.

Interesting findings based on collected data are:

- Nebraska average dryland and irrigated yields were 56 bu/ac and 67 bu/ac respectively, both above the average soybean yield in the north-central region (54 bu/ac). Only a small proportion of producers (2%) attained soybean yields near or above 80 bu/ac.
- Half of the soybean area in the north-central region is no-till. Adoption of no-till in Nebraska is greater in dryland (77% of fields) than in irrigated fields (51% of fields).
- About 25% of soybean fields in this region are planted during the first week of May or earlier. This figure rises to 45% in Nebraska.
- Seeding rates used by producers are well above economically optimal soybean seeding rates, which, in the case of Nebraska, is 120,000 seeds/acre.
- Most producers in the region grow soybean at a 15-inch row spacing, except for Nebraska and eastern Iowa where 30-inch spacing still prevails.
- Across the entire north-central region, 8%, 19% and 24% of soybean fields are treated with foliar fungicide only, insecticide only, and both fungicide and insecticide, respectively. In Nebraska, these figures are lower at 6%, 3% and 17%.
- About 15%, 54% and 54% of fields in the north-central region received N starter, phosphorous, and potassium fertilizer, respectively. In Nebraska, these figures are 15%, 70%, and 54%.

Finally, the NSB funding helped us to secure funding from North Central Soybean Research Program (NCSRP) to fund a new project over three years, at a total level of 1.5 million (total for the 3 years). Patricio Grassini is the co-PI of the funded NCSRP project, together with Shawn Conley from Wisconsin.

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

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

- Three scientific publications:

i) Mourtzinis S, Rattalino Edreira JI, Grassini P, Roth A, Ciampitti IA, Licht MA , Kandel H, Kyveryga PM , Lindsey LE , Mueller DS, Naeve SL, Nafziger E, Specht JE, Stanley J, Staton MJ, Conley SP (2018) Sifting and winnowing: Analysis of farmer field data for soybean in the US North-Central region. *Field Crops Res.* 221, 130-141.

ii) Rattalino Edreira JI, Mourtzinis S, Conley SP, Roth A, Ciampitti IA, Licht MA , Kandel H, Kyveryga PM , Lindsey LE , Mueller DS, Naeve SL, Nafziger E, Specht JE, Stanley J, Staton MJ, Grassini P (2017) Assessing causes of yield gaps in agricultural areas with diversity in climate and soils. *Agric. For. Meteorol.* 247, 170-180.

(iii) Andrade JF, Rattalino Edreira JI, Mourtzinis S, Conley SP, Ciampitti IA, Dunphy JE, Gaska JM, Glewen K, Holshouser DL, Kandel HJ, Kyveryga P, Lee CD, Licht MA, Lindsey LE, McClure MA, Naeve S, Nafziger ED, Orlowsky JM, Rosso J, Staton MJ, Thompson L, Specht JE, Grassini P (2018). Assessing the influence of row spacing on soybean yield using experimental and producer survey data. *Field Crops Research* (accepted).

-Two more scientific publications, one under final revision (Azzaro et al, *Journal of Remote Sensing*) and another to be submitted soon (Rattalino Edreira et al). A summary report was prepared and posted in the North Central Soybean Research Program website (<http://www.soybeanresearchinfo.com/index.php?id=57> -- SEE) and also published as a UNL CropWatch article (<http://cropwatch.unl.edu/2016/help-us-identify-limiting-factors-nebraska-soybean-fields>) and made accessible to all NE soybean producers. The report was also shared with educators, NRDs, NSB members, etc.

Likewise, Patricio Grassini (Project PI) gave presentations at the 2018 winter UNL Crop Production Clinics at 8 locations in NE. Also, Juan Ignacio Rattalino Edreira (Post-Doctoral Research Associate working on this project) presented results from this project at the 2018 Annual ASA/CSSA/SSSA Meetings and will present again at the 2019 meetings at Baltimore and Tampa.

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.