

Nebraska Soybean Board Year-End Summary Research Report Form for Multi-Year Projects

Please use this form to summarize the practical benefits of your research project and what has been accomplished. Your answers need to convey why the project is important and how the results will impact soybean production.

Note that this form must be submitted with the 4th Quarter Report in all multi-year projects.

Project # and Title: #704 Winter Nursery Support for Soybean Breeding & Genetics **Principal Investigator:** George Graef

Year of Multi Year: ___ of ___ (example: Year 1 of 3, Year 2 of 2)

1. What was the focus of the research project?

- 1) Conduct generation advance for soybean breeding and genetics studies to obtain 2 additional generations per year
- (2) Crossing for development of new populations for breeding and genetics objectives
- (3) Evaluate progeny rows for selection and advancement to multi-location yield tests
- (4) Conduct small-scale seed increases for research studies and for specific lines to hasten development and commercial production when appropriate,
- (5) Yield test advanced high-yield lines from the Nebraska program for response to limited irrigation using precise water treatments and specific developmental stages to identify lines, plant traits, and genes related to yield under drought stress and response to water.

2. What are the major findings of the research?

We maintained a full program at our Puerto Rico nursery during the October 2021-September 2022 season. At the Puerto Rico nursery, the lighted F1 plant nursery was planted the first week of October and we grew more than 900 F1 plants from our Lincoln 2021 crossing block to obtain F2 seeds for generation advance. The crosses involved our research and development objectives for (1) yield and SCN resistance, (2) long-term programs for increasing seed protein concentration, (3) yield+protein to produce high-protein lines for special uses, (4) yield and improved seed compositional balance of protein, oil, and carbohydrates, (5) IDC and yield, and (6) unique developmental trait combinations with high yield.

We also grew and harvested over 1,500 population rows for the 2-season generation advance populations from November to May. For the crossing block area from January to May, we obtained more than 1,200 seeds from over 120 cross combinations for yield, SCN, protein and seed compositional quality, IDC, and other research and development objectives.

Our operations at the Chile nurseries during the 2021-22 season were reduced due to impacts and restrictions from the pandemic. The university did not allow international travel, and we weren't certain how things would progress. We grew 2,800 progeny rows, mostly related to excellent SCN resistance and superior yield, at one nursery location. Those were returned to Nebraska and grown in multi-location yield tests during 2022. In addition, we grew 15 populations of F4 plants from crosses for improvement of yield and seed composition traits. That returned about 2,800 plants to Nebraska for additional progeny rows in the 2022 summer season. Our total progeny row numbers for 2022 in Nebraska was 15,000.

3. Briefly summarize, in lay terms, the impact your findings have had, or will have, on improving the productivity of soybeans in Nebraska and the U.S.

We continue to make steady and significant progress in yield and compositional quality in our breeding program. The winter nurseries are integral to that success. With the Puerto Rico and Chile nurseries, in one year we obtain an additional crossing season, two additional generation advance seasons, and another yield test and progeny row evaluation season for all of our objectives. The impact is shown in our continued outputs of high-yielding soybean cultivars well adapted to Nebraska production environments and the north central US.

4. Describe how your findings have been (or soon will be) distributed to (a) farmers and (b) public researchers. List specific publications, websites, press releases, etc.

The winter nursery program supports the breeding and genetics project. Information on publications and other communication and dissemination of results is available in that project summary.

5. Did the NE soybean checkoff funding of your project, leverage additional State or Federal funding support? Please list sources and dollars approved.

Please submit this completed form to the Agriculture Research Division, jmcmahon10@unl.edu, based on the reporting schedule given to you. If you have any questions, please call Jen McMahon at the Agricultural Research Division (402) 472-7082.

Please check your information before submitting the form.

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