

**Nebraska Soybean Board**  
**Year-End Research Findings Report**



11/3/2017

*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 impact soybean production.*

**Project Title:** Enhancing soybean germplasm through biotechnology

**Contractor & Principal Investigator:** University of Nebraska-Lincoln/Tom Clemente

**Please check/fill in appropriate box:**  **XX Continuation research project**  
 **Year \_\_ of \_\_ research project (for example: Year 1 of 2)**

**1. What was the focus of the research project or educational activity?**

This program is introducing novel genetic variation in to soybean via plant transformation. The introduced genetic elements are designed to investigate strategies to **1)** boost photosynthetic capacity in the crop; **2)** evaluate novel approaches to combat nematode predation in the crop, and **3)** develop a soybean oil high in stearic acid, standard palmitic and elevated in oleic acid to provide a vegetable oil that has functionality similar to margarine for baking applications.

**2. What are the major findings of the research or impacts of the educational activity?**

The outcomes of this program to date have demonstrated the transgenic approaches tested are capable of boosting photosynthesis in the crop, which translated to an increase in above ground biomass at V5 through R3 stage of development. However, the observed increase in biomass did not translate to harvest or seed weight changes. We are now stacking the soybean events that carry transgenes to increase photosynthesis with additional transgenic elements designed to “pull” carbon from biomass during reproduction towards oil synthesis in seed.

Additionally, we are testing an induced cell death strategy as a means to combat nematode predation. Data gathered to date has revealed some level of protection, but not a superior protection. We are continuing to screen transgenic events.

We have created an oil that contains saturated fatty acids at app 25% of the oil, with over 18% consisting of stearic acid, coupled with app. 55% oleic acid. This oil remains a semisolid at room temperature. We recently harvested the 2017 field plantings with this soybean and will be securing additional functionality testing with outside collaborators.

**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.**

The impacts of this research program will have translational outcomes in yield and protection of yield in soybean, in addition to increasing the value of the oil co-product

**\*\*This form must be completed and submitted with the fourth quarter report.**

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***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.***

Preliminary outcomes of the photosynthesis studies were communicated in the Journal of Plant Physiology in 2017 volume 212 pages 58-68. The oil modification outcomes have been communicated at the Feb 2017 Soybean Breeders workshop in St. Louis.

***5. Did the NE soybean checkoff funding support for your project leverage any additional state or Federal funding support? (Please list sources and dollars approved.)***

The stacking of the photosynthesis transgenes with oil “sink” strength transgenes is being supported through funding from the United Soybean Board and a provisional patent has been applied.