**Iowa State University – Iowa Soybean Association – Termination Report**

**Title**: Soybean breeding project for increasing seed yield and introgression of defensive traits

**Principal Investigator**: Silvia R. Cianzio

**Termination report**

The Iowa State Project has been operation under Cianzio’s leadership for 44 years. It has been generously and continuously supported by the Iowa Soybean Association, and the agencies: United Soybean Board; NIFA-AFRI, and the USDA competitive grants, to fulfill:

Goal. Protecting Iowa farmers’ income and livelihood, by maintaining and increasing soybean production in the state of Iowa. Iowa has a primary role within the country in soybean production in acreage and in seed yields per acre.

Objective: Increase seed yield, introgressed defensive traits and expand the genetic base of the soybean commodity to protect soybean production in Iowa.

Organization. The project managed two labs, one in Iowa and the other one in Puerto Rico as off-site research and production location.

Collaborators: The project was interdisciplinary and multi-institutional, and benefitted Iowa farmers, the soybean commodity at the national level, Iowa State University at the national and international levels, graduate and undergraduate students.

Financial operation related to the Iowa Soybean Association. The last year the project was funded by the Iowa Soybean Association was 2018. Since that year and during 2019 and 2020 the PI has been finalizing the ongoing work, and releasing all varieties for public use.

**Research accomplishments during 2019-2020**

1. **Releases: 11**. For each pathogen, the approach was to increase variety releases.

During 2019-2020, **11 new varieties** with high yield and resistance to pathogens of economic importance in Iowa hve been disclosed to ISURF, and if approved by the CALS Germplasm Committee will be produced by the Committee for agricultural Development (CAD) and certified by the Iowa Crop Improvement Association (ICIA) for general public use.

**Releases in progress**. Before the end of 2020, **45 additional releases** will be presented to Iowa State University Research Foundation ( ISURF) and to CALS Germ Committee for further distribution. With this action, all the work accomplished by the ISU soybean project led by Cianzio will be in possession of Iowa State and ISURF, available for future public use.

This approach was done by intensifying selection of varieties with high yield and defensive traits. These tools were used: i) secure high yielding germplasm (developed by the project, requested from public and private breeding sectors); ii) identify new resistance genes particularly using plant introductions from the National Germplasm Collection, USDA-ARS); iii) incorporate the new genes into high-yielding backgrounds; iv) conduct molecular research to identify the genes and their molecular markers.

**II Number of Material and Transfer Agreements (MTA) signed**

During 2019-2020: **11**

**During the duration of the project**

* MTAs **350+**
* **Total** # releases duration of project:  **120+**
* **Expansion of the genetic base of the soybean commodity -** new genetic material introduced into production: **20 plant introductions**

The project has used plant introduction available for public use, curated by the National Soybean Germplasm Collection USDA-ARS in the following manner:

* 14 accession from the collection have been identified as possible new sources of soybean cyst nematode (SCN) resistance. The accessions have been used in crossing, inheritance research, screening under controlled conditions (greenhouse, growth chambers) and in field plantings to determine resistant phenotypes that later were studied in molecular research. The most promising have made to become public releases.
* 4 accessions have been used in a similar manner for resistance to sudden death syndrome (SDS)
* 1 accession has been used for finding new genes for resistance to Phtytophthora root rot (PRR)
* 1 accession has been used for resistance to Asian Soybean Rust (ASR)
* **Educational accomplishments – trained students**
  + **Undergraduate: 350 in** Iowa and Puerto Rico locations
  + **Graduates** 
    - **PhD 35**
    - **MSc 23**
* **Published research**
  + **Over 200+ research papers** in journals of international and national reputation

**- Scientific presentations**

* + **Over 120 presentations**, both nationally and internationally invited
* **Outreach presentations**
  + **Over 45+ presentations** to Iowa farmers and agribusiness professionals