Project Proposal: **The Economic Contributions of the California Seed Industry**

Prepared for: The California Seed Advisory Board

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Project Duration: July 1, 2021 – June 30, 2022

Background: The California seed industry is a major contributor to California agriculture, to agricultural innovation globally, and to California's economy. In 2009, as part of the previous study funded by the California Seed Advisory Board, we estimated that the seed industry generated over $2 billion in revenue and accounted for over 6 percent of global seed market value. The economic contributions of the California seed industry have evolved over the past dozen years and this proposed study will assess those changes and extend the measures of contribution to include agricultural research and development. The California seed industry is a vital input to commercial crop production in California, enhances crop productivity, and leads to greater global food security, safety and economic viability.

Objectives:
Objective#1: Describe and measure the role of California seed industry in California agriculture and the economy of California by adapting and enhancing standard models. The seed industry in California extends from in the lab R&D, through the production of commercial seeds to marketing of commercial seeds produced on California seed farms. The models produce a long list of economic variables that characterize the direct, indirect and induced impacts.

Objective #2: Describe and measure the value of the California seed industry's contributions toward global food security, nutrition and food safety through extensive R&D in California. The seed industry in California contributes significant value to the local and global agricultural economy through R&D efforts and the intellectual property imbedded within its seed products.

Plan:
Achieving the first objective, measuring the direct, indirect, and induced impacts of seed industry activities on the California economy, will involve constructing an input-output model (I-O model). The I-O model accounts for the array of economic transactions between the seed industry and other sectors of the economy and will assess the magnitude of jobs created, labor income and total value added generated as well as other statewide economic impacts resulting from commercial seed development, production, processing and marketing activity.

- Construction of the I-O model will be done using the modeling system IMPLAN. IMPLAN uses a comprehensive model of the economies of each U.S. state divided into specific but broad economic industry sectors. Although the IMPLAN group provides a valuable tool for conducting economic impact assessment, the representation of specific industries within the IMPLAN database is challenging. In particular, IMPLAN does *not* have a specific sector designated for the seed industry, therefore we will need to adapt the model and accompanying data sets to create a sector to represent the economic relationships and

contribution of the seed industry. To do this we will require additional data that is not within IMPLAN.

- We will rely on both public and industry-supplied data to describe the seed industry of California and its relationships with the rests of the economy. Publicly available data on seed production in the United States is severely limited. USDA provides production data by states on flower seed, vegetable seed and various grass and forage crop seeds in the Census of Agricultural. For field crops, seed production data are usually combined with commodity production data in the USDA data sets making it difficult to ascertain separate seed production and marketing data. Public data that measure the inputs, labor use or total revenues earned by the seed industry is not available.

- Because of the limitations just outlined, we will collect from the seed industry primary economic data (costs of production, number of people employed, salaries and benefits paid, gross revenues) that accounts for the industry size and relationships with other industries. The accuracy of our empirical results will depend on the quality of primary data provided by seed industry.

- The explanation and quantification of the R&D and innovation contributions of the California seed industry will require a distinct treatment. This will not use the IMPLAN framework with standard multipliers, but instead will be quantified in terms of the economic payoff to agricultural innovation and the improvement of productivity growth.

- The results will be presented in a final report with several chapters that include a descriptive narrative and tables and charts with data results of statistical and simulation models. Results will also be presented in academic journal articles and several outreach publications.

Personnel: The project will be directed by Prof. Daniel A. Sumner. Project scientist Dr. William Matthews and a graduate-student researcher will conduct modeling and data analysis.

Budget: The total direct cost of the project is about $50,000, which includes data gathering, working with seed industry experts, data analysis and modeling, and preparation of reports and presentations. The detailed numbers with precise salary and benefits will be inserted by UC Davis grants specialist at the final stage.

The budget will cover:
Time of the economics graduate student (3 summer months): ~$12,000
Salary and benefits of William Matthews (25% for one year): ~$34,000
Editorial assistance for final report and publications: $4,000
Approximate direct cost ~$50,000
There is no charge for the time of Prof. Daniel Sumner, who will direct the project, lay out the framework and approach, and participate in the writing of reports and publications.