Problem Statement:

Viruses, viroids, virus-like agents, and phytoplasmas make up a class of plant pests for which no effective control is currently available to growers other than destruction of the plants themselves. These pathogens cause diseases of many crops that cost growers and consumers millions of dollars annually. Grapes are a roughly $3 billion industry in the United States so protection of grape plant stock is important, not only to the grape industry but also to nursery, winemaking, and wine industries.

Clean plant centers, which test for diseases and produce disease-free grapevine stock, are located across the United States. The costs of establishing and maintaining these centers have been documented, but comprehensive work to evaluate economic benefits from those activities has not yet been done. Work to quantify the economic impact of these types of disease is also generally lacking. In this paper, we build a framework for valuing the economic losses that result from these diseases as well as for valuing clean plant centers’ activities—the production, certification, and regulation of plant materials at clean plant centers—through a case study for grapevine diseases. Additionally, we provide valuable information on the value of these services to stakeholders such as nursery owners who make choices about whether to use certified clean
plant stock as well as policy makers who make decisions about whether and how to fund the clean plant centers, which typically receive a portion of their funding from governmental and/or academic organizations and some from the nursery industry that purchases cleaned stock.

The National Clean Plant Network (NCPN) is a program operated under the USDA’s Animal and Plant Health Inspection Service (APHIS) that promotes the use of disease-free plant material for a range of specialty crops in the United States. For grapes, the National Clean Plant Network for Grapes screens plant selections for a wide range of economically important viruses and other diseases that can be spread by contaminated material, and then utilizes a range of pathogen elimination techniques to clean the stock if these diseases are discovered in the screening process. The clean selections are then passed back to the institutions from which they came in exchange for a fee.

**Objectives, Data, and Methods:**

In order to estimate the value of the NCPN program, we compare the current scenario, in which the NCPN is operational as at present, to a counterfactual situation where the NCPN does not conduct disease testing for plants or provide clean stock. We follow the Alston et al. (1998) economic surplus framework to estimate changes in economic welfare for the grape industry, because data is more available for that industry than the nursery industry. We then disaggregate the welfare results to provide economic impact estimates for the grapevine nursery industry as well.

We use Dynamic Research Evaluation for Management (DREAM) software to evaluate the impacts of the certification program. DREAM is based on methods expounded in Alston et al. (1998) and allows alternative market assumptions, the inclusion of markets linked to the one in question by vertical or horizontal relationships, and can simulate the effects of spillovers to
other regions or industries. It accounts for changes other than those in yield or production costs—those dependent on biophysical, social and market factors. It also allows for lags and other dynamic components in the effect of new technology or programs such as NCPN, which is particularly important for grapevines as since they are a long-lived perennial for which changes in policy, technology, or other aspects can have delayed by long-lasting effects. The software was designed to allow simulation of likely effects of research and development, but can easily be utilized to examine the effects of a certification program, which has impacts (supply shifts) similar to a new technology.

**Results and Implications:**

We parameterize this model based on extensive interviews with a range of experts—viticulturalists, academics, pest control managers, and nursery managers across California. The resulting paper not only provides a comprehensive estimation of the benefits and costs of a unique program that is important to the nursery, grape, and related industries, but also gives a framework for doing so to evaluate the benefits of disease protection programs for other crops, both annual and perennial. We discuss tradeoffs implicit in incorporating dynamics into our model to capture the capital stock nature of grapevines and other perennial crops (especially those that are as long-lived as grapevines), in contrast to using a comparative statics approach, which is much simpler and is appropriate for annual crops. Insight into the economics of the nursery industry, which has previously been scarce, is also valuable.
References: