

Economics of Precision Mechanization in Wine and Table Grape Production

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Abstract : The motivation for this study centers on the labor- and cost-intensive nature of wine and table grape production in the U.S., and the potential opportunities for precision mechanization using robotics to augment those production tasks that are labor-intensive. The objectives of this study are to evaluate the economic viability of grape production in five U.S. states under current operating conditions, identify common production challenges and tasks that could be augmented with new technology, and quantify a maximum price for new technology that growers would be able to pay. Wine and table grape production is primed for precision mechanization technology as it faces a variety of production and labor issues. Methodology: Using a grower panel process, this project includes the development of a representative wine grape vineyard in five states and a representative table grape vineyard in California. The panels provided production, budget, and financial-related information that are typical for vineyards in their area. Labor costs for various production tasks are of particular interest. Using the data from the representative budget, 10-year projected financial statements have been developed for the representative vineyard and evaluated using a stochastic simulation model approach. Labor costs for selected vineyard production tasks were evaluated for the potential of new precision mechanization technology being developed. These tasks were selected based on a variety of factors, including input from the panel members, and the extent to which the development of new technology was deemed to be feasible. The net present value (NPV) of the labor cost over seven years for each production task was derived. This allowed for the calculation of a maximum price for new technology whereby the NPV of labor costs would equal the NPV of purchasing, owning, and operating new technology. Expected Results: The results from the stochastic model will show the projected financial health of each representative vineyard over the 2015-2024 timeframe. Investigators have developed a preliminary list of production tasks that have the potential for precision mechanization. For each task, the labor requirements, labor costs, and the maximum price for new technology will be presented and discussed. Together, these results will allow technology developers to focus and prioritize their research and development efforts for wine and table grape vineyards, and suggest opportunities to strengthen vineyard profitability and long-term viability using precision mechanization.

Keywords : net present value, robotic technology, stochastic simulation, wine and table grapes

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