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Participatory Research Engages Industry and Leads to Adoption of Methods That Challenge Long-Held Production Standards

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Abstract

A citizen science project engaged wine industry professionals in challenging the long-held belief that low yields are required for production of high-quality wine. Strategies emerged for the planning and implementation of projects involving industry members as citizen scientists. Keys to success included factors related to industry inclusion, planning, coordination, and communication. Direct industry involvement in the research project strengthened industry–university relationships and led to the adoption of new production practices that had been difficult to bring about prior to facilitation of industry members' firsthand experimentation.

Keywords: integrated research and extension, citizen science, viticulture, enology, wine business

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Introduction

It is wine industry tradition to strive for low vineyard yields and vine stress to improve wine quality, and this farming philosophy is boasted in the marketing of premium wine (Matthews, 2015). Accordingly, many Oregon wine grape producers use low yield targets to ensure quality (Uzes & Skinkis, 2016), yet studies indicate that cropping levels could be higher and quality maintained (Reeve, Skinkis, Vance, Lee, & Tarara, 2016; Reeve, Skinkis, Vance, McLaughlin et al., 2018). Understanding the yield–quality relationship is challenging as it involves interactions among vineyard characteristics, management practices, production goals, and marketing elements. Such complex issues are not suited to traditional studies that address a single hypothesis (Hinkey, Ellenberg, & Kessler, 2005). Rather, large-scale collaborations can address these issues with practical and actionable outcomes. Agricultural producers desire engagement with university research teams (Franz, Piercy, Donaldson, Westbrook, & Richard, 2010), but faculty view engaged research as risky because of its nontraditional nature (Hinkey et al., 2005). However, engaged research projects can generate robust data from limited research funds (Salmon et al., 2008). Furthermore, as land-grant

universities strategize to meet community needs, faculty are encouraged to engage industry through innovative projects that lead to research-based adoption (Blewett, Keim, Leser, & Jones, 2008).

Project Overview

To challenge the "low yield equals high quality" paradigm in Oregon's wine grape industry, I led a research team that developed the Statewide Crop Load Project, a long-term regional project in which we involved industry members and researchers to address two questions: (a) *What yield levels ensure quality wine?* and (b) *How does vineyard and season affect those limits?* We engaged industry members in fruit-thinning trials at their vineyards and wineries. Collaborators collected production data and submitted fruit and wine to Oregon State University for analysis. From 2012 to 2018, 25 companies in western Oregon participated in the study. Fourteen collaborators participated for 3 years or more, and five were involved from the project's start. Including industry members on the research team allowed for information transfer and generated a large data set. Our research team analyzed vineyard and winery data to develop yield guidelines based on vine productivity measures, fruit composition, and wine sensory results.

Project Design and Implementation

According to stakeholders, the Statewide Crop Load Project has been one of the most important research projects for the wine industry because it fostered relationships between industry and university and empowered producers to observe research results firsthand. Here I outline project development tips for those interested in engaging industry citizen scientists in research.

The Planning Process

- *Listen*. The planning process began with a 15-member advisory group (80% industry and 20% academics), 2 years prior to project initiation. The group developed the project design and protocols.

- *Design*. Statistical design addressed the practical limitations of the vineyard and collaborator time. Cluster-thinning treatments were applied to whole vine rows for ease of application. We used a randomized block design but recognized that a completely randomized design would be confusing for collaborators. We compromised with treatments ordered at random for the first block and repeated in that order for the remaining blocks. Most growers replicated the trial in more than three blocks. We required that collaborators collect data from only three field replications due to time and labor constraints. Vineyard staff collected data from a subset of vines per plot and returned to these vines for all data and all years.

- *Direct*. Protocols existed for every step in the process, including experimental block selection, design, implementation, data collection, fruit sampling, and wine production. Each data set had its own protocol, with terminology and sampling strategy clearly defined. Data collection sheets and electronic data entry files were provided.

Implementation of the Project

- *Train.* Collaborators were trained on the basics of scientific research, the need for experimental design, replication, and precise data collection.

- *Communicate.* I sent out monthly emails to collaborators with project updates, reminders, and helpful tips for data collection. A faculty research assistant communicated directly with collaborators as needed. It was important to know each company's communication wishes, as each had its own policies. Collaborator contacts changed frequently, and annual updates were required to maintain communications.

- *Assist.* Industry collaborators are busy running their businesses, so we facilitated their project work by providing data collection forms, digital scales, prelabeled sample bags, printed protocols, and online access to protocols, and we arranged for sample pickup.

- *Report.* We gathered at an annual collaborator meeting to discuss research results, obtain feedback, and develop next steps. I provided each collaborator with a binder of data from all sites (anonymized) and provided each company its individual code. I presented composite results and explained how to understand the research results (e.g., analysis of variance tables, difference between means, error bars, etc.). We also provided other reports and seminars throughout the year.

Collaborator Successes as Citizen Scientists

The majority of companies (79%) were successful in following protocols and meeting deadlines. I outline below the requirements for participation and traits of successful participants.

- *Willingness to cooperate.* I held a recruitment period each spring. Because participation was voluntary, our ability to evaluate crop levels under a wider diversity of vineyard conditions was limited.

- *Sufficient acreage.* Companies needed enough acreage so that the project would not use a significant portion of their total production. Experimental blocks of 1–3 ac were required for producing wines at a minimum of 1.5 tn for each crop level.

- *Winery affiliation.* Estate vineyards with associated wineries had the highest success rate. Vineyards not affiliated with a winery and/or those with very large production facilities struggled to produce research wines.

- *Sufficient staff.* Data collection required significant time and resources, and I communicated that circumstance to all applicants. Companies that dropped out of the study did not anticipate these requirements.

Conclusions

Our team was able to generate multiyear, multisite data to develop yield management guidelines for the Oregon wine industry by engaging citizen scientists. Success required a strategic approach to planning, understanding of producer needs (Nicholas & Hinckley, 2011), coordination, and communication to the extent that is often challenging for citizen science research (Blair, Fortson, Anderson, & Strauss, 2018). Direct industry involvement increased awareness of scientifically tested yield metrics and led to increased yields before the publication of quantitative scientific research. Through coordination and communication, our team proved that motivated industry members are successful citizen scientist partners for researchers seeking to address complex production issues. Industry engagement was a vital step in achieving industry adoption of

practices that challenge tradition.

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