Journal of Extension
www.joe.org

June 2016
Volume 54
Number 3
Article # 3RIB5
Research In Brief

Factors Influencing Yield Management of Pinot Noir Vineyards in Oregon

Abstract

Oregon's wine grape industry uses yield targets to achieve quality in Pinot Noir vineyards, and this practice has led to increases in cost of production. A multiapproach study was conducted to investigate how vineyard target yields are set, why yield thresholds exist, and who influences decisions related to vineyard target yields. Growers suspect that higher yields are possible without compromising quality, but they are unable to change yield targets due to winery and buyer decision making. To be effective in eliciting change and realizing impact, Extension educators need to do targeted outreach to buyers and wine makers in addition to growers and consider participatory research.

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Introduction

Cluster thinning is a common practice used by premium wine grape growers to achieve fruit quality in the vineyard. It is believed that higher quality wines are produced from lower yields, a notion originating from Europe's eminent wine regions, where yields are strictly regulated. Improved fruit quality is typically the purpose for restricting yield, yet research demonstrates that the relationship between restricted yield and improved quality is not always evident. Studies conducted mainly in warm growing regions with high-yielding varieties have shown improved fruit quality with reduced yields (Petrie & Clingeleffer, 2006; Reynolds, Yerle, Watson, Price, & Wardle, 1996; Wolf et al., 2003), whereas others showed no differences (Chapman, Matthews, & Guinard, 2004; Keller, Mills, Wample, & Spayd, 2005; Nuzzo & Matthews, 2006).

Yield reduction is considered necessary in cool-climate wine grape regions to achieve adequate fruit ripeness. However, specific guidelines have not been established. The majority of Oregon's grape production occurs in cool-climate regions of the state and is destined for the premium wine market. Pinot Noir, a cultivar suited to cool climates, comprises 62% of the planted vineyard acreage (Southern Oregon University Research Center [SOURCE], 2012–2014). The cultivar is low yielding

compared to other wine grape cultivars due to its small cluster size and lower number of clusters produced per bud. Oregon Pinot Noir growers spend approximately $540/ac annually on cluster thinning, accounting for 10% of the annual management costs (Julian, Seavert, Skinkis, VanBuskirk, & Castagnoli, 2008). Because profit margins are narrow for Oregon grape growers, they are interested in reducing unnecessary management costs and potentially increasing yields without compromising quality.

Preliminary results from crop load management studies conducted in Oregon Pinot Noir vineyards suggest that current yield standards may be too low (Skinkis, Vance, & Reeve, 2013), and this circumstance may be reducing potential profits of vineyards and wineries. In efforts to understand current industry trends in wine grape yield management and effectively direct outreach, a multiapproach study was conducted.

Methods

An online survey was administered to commercial vineyard and winery professionals in the Oregon wine industry following the 2012 growing season. A total of 420 individuals were recruited through the use of an email list maintained by Oregon State University Viticulture Extension. The survey consisted of 26 questions formatted as multiple-choice items, ranking items, or open-ended items.

As suggested by Coffey, Jennings, and Humenik (1998), a subsample of 10 survey respondents was selected to participate in interviews to elaborate on details of yield management. Interviewee selection criteria were based on a desire to obtain breadth and diversity among respondents to effectively represent various aspects of the industry, including growing region across Oregon, company size, and type of operation (vineyard or winery). Interviews were conducted in person or over the phone.

To compare yield management practices to other west coast Pinot Noir–producing regions, University of California Cooperative Extension farm advisors for Napa, Sonoma, Mendocino, and San Luis Obispo counties were interviewed by phone.

Results and Discussion

A total of 109 respondents participated in the survey, for a 26% response rate and representation of 60% of the state's planted vineyard acreage in 2012. The goal was to obtain responses from both vineyard and winery production. The majority of respondents (54%) identified themselves as working strictly in the vineyard as an owner, a farm manager, a consultant, a vineyard management service, or a combination thereof. Only 5% of respondents indicated a position associated strictly with the winery, including owner, manager, wine maker, or combination thereof. However, a total of 41% indicated that they held positions with responsibilities in both the vineyard and winery. The distribution of respondents reflects the composition of Oregon's small farm industry, with many producers being involved in both the vineyard and winery.

The majority of respondents (89%) reported that they conduct cluster thinning annually and that the on-farm practice is focused mostly in Pinot Noir vineyards. Yield of other cultivars was not as strictly managed. The greater attention to yield management in Pinot Noir is likely due to the higher value

compared to other cultivars grown in the state (SOURCE, 2012–2014).

In the open-ended responses, the most frequently cited reasons for reducing yields related to ripening fruit in a cool season and enhancing fruit quality. Other reasons cited included meeting target yields, achieving vine balance, and preventing fruit rot (Table 1). The majority of responses (73%) pertained to achieving good fruit quality, centering on the use of thinning practices that enhance quality, flavor, and ripeness and prevent fruit rot. When growers cited achieving target yields as the reason, the implication was that these growers are concerned with fulfilling contracts, which are set to meet fruit quality standards. Survey and interview results indicated that contracts were based on quantifiable metrics, including tons/acre, sugars (Brix), and acids (pH and titratable acidity).

Table 1.

Reasons Cited by Respondents for Conducting Cluster Thinning in Oregon Vineyards

Reason	**% of responses**
Achieve ripeness	23
Improve fruit quality	23
Achieve target yields	14
Achieve vine balance	11
Prevent fruit rot	7
Develop flavors	6
Other	16

Note. Total number of respondents = 109. Multiple reasons were cited by respondents (responses = 175).

In some cases cluster thinning is required to maintain vine health by matching vine yield to the size of canopy to allow adequate fruit development and ripening (achieve vine balance). A small portion (11%) of responses (17% of respondents) identified vine balance as the goal in cluster thinning. None of the respondents specifically identified quantifiable metrics, such as vine pruning weights, leaf area, or Ravaz Index (yield weight/pruning weight), by which vine balance may be determined. Therefore, it is unclear how the industry used this concept to drive yield management decisions or whether it is a secondary outcome of cluster thinning. Given that the majority of respondents (67%) reported using a similar target yield of 2 to 2.75 tn/ac despite different vineyard yield potentials (number of vines per acre), the data suggest that vine balance metrics are not a primary consideration in yield management.

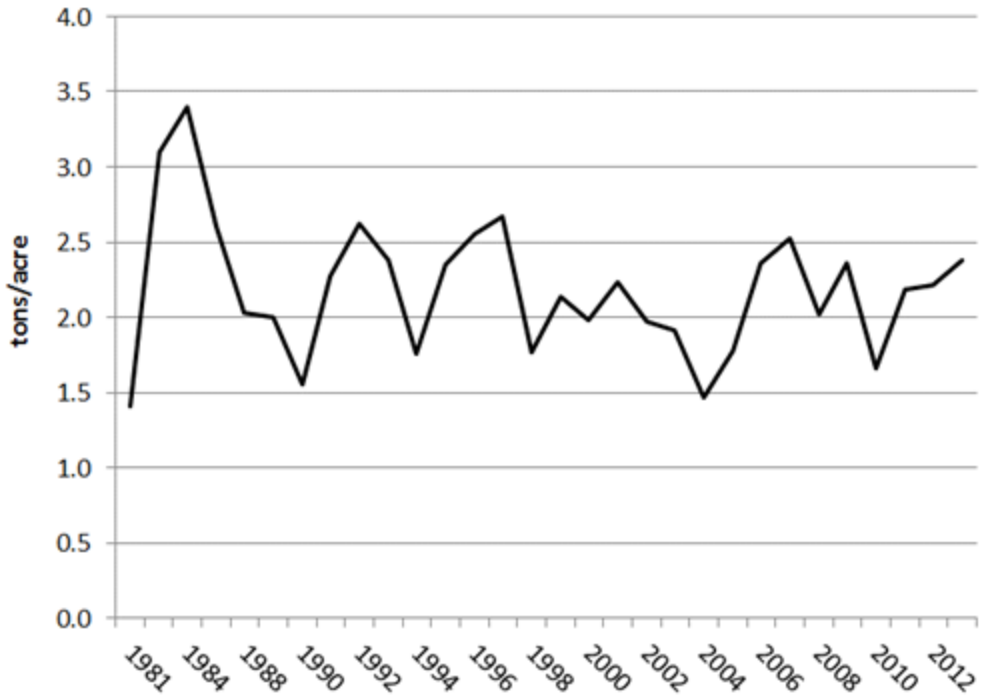
Survey respondents were asked what factors they consider when determining target yields, and one or more of the following factors were reported:

- climate data (weather forecasts, heat unit accumulation);
- historical yields;
- vine phenology dates (time of bloom, fruit set, etc.);
- target price point of wines;
- vine health;
- costs (total production costs vs. wine price point, labor);
- winery needs (winery capacity, sales capacity, wine maker preferences); and
- experience.

Though 30% of respondents indicated that historical data and experience were used to determine target yields, it is assumed that this was based on industry trends and not historical vineyard-specific data. According to 32 years of census data (U.S. Department of Agriculture National Agricultural Statistics Service [USDA NASS], 1981–2011; SOURCE, 2012–2014), the average yield for Pinot Noir in Oregon has been highly variable, mainly due to variability in fruit set and vine fruitfulness; however, the range consistently has been 1.5 to 2.5 tn/ac (Figure 1). Over this period, there was an increase in vineyard acreage planted to higher vine density, resulting in more vines per acre and greater yield potential per acre. This situation suggests a greater degree of cluster thinning required today than in past decades to achieve this yield standard. The ramification is higher management costs per acre without greatly increased yields per unit land. Interviewees reported offsetting these costs by selling fruit by the acre rather than by the ton. However, the increased cost of production at the vineyard also has increased winery production costs and can be a point of contention for growers and wineries when developing contracts.

Figure 1.

Mean Annual Pinot Noir Yields Reported by Producers at Harvest from 1981 to 2013



Oregon's wine industry is comprised of mainly small-scale producers who must focus on premium wine production for profitability. The majority of survey respondents (54%) farmed less than 25 ac. A total of 91% of all respondents were producing wines for sale at less than $20 per bottle. The high cost of the wines is reflected by the high production costs, in part due to low yield in the face of high vineyard management costs (Julian et al., 2008). The highest Pinot Noir yields (more than 3 tn/ac) were reported by companies with larger acreage and wine price points between $10 and $20 per bottle.

Interviews provided information about yield management that was not obtained from the survey. The interviewees were 10 producers from western Oregon, including two vineyard managers, one wine maker, two vineyard management companies, and five owner-operators of vineyard and winery businesses. Interviewees were selected with the goal of achieving representation from different sized operations (10 ac to more than 500 ac). The majority of interviewees were confident that they could maintain higher yields in warmer seasons, but they were often powerless to act. Target yield is not always the decision of the vineyard staff (Table 2). Survey results revealed that owners of operations were frequently the decision makers (43%), and this finding was confirmed in interviews. Of those who were owners, nearly half defined themselves as performing all roles (vineyard owner, vineyard manager, and wine maker). While a collaborative effort was indicated by 32% of respondents, the collaboration was not always equal. Only 5% of responses indicated that the owner or buyer and the vineyard manager and wine maker are included in the decision-making process. The majority of responses (56%) specified that target yields were influenced by the wine maker, winery manager, or winery owner, demonstrating the central role that winery staff play in making yield management decisions. This finding may suggest why there is a highly uniform yield standard as winery staff or owners may not have as intricate an understanding of vineyard capacity as the vineyard manager and may therefore find uniform standards easier to apply. Also, the high value of Pinot Noir may be preventing growers and wine makers from deviating from standardized

practices; this concern was also observed in Extension adoption studies conducted with tree fruit producers (Alston & Reding, 1998).

Table 2.

Individuals Responsible for Determining Target Yields in Vineyards

Who determines target yields	% of respondents
Collaboration[a]	39
Vineyard and/or winery owner	28
Wine maker	18
Vineyard manager	11
Buyer	4

Note. Total respondents = 97.
[a]Parties include combinations of owner, wine maker, vineyard manager, or buyer.

To better understand how Oregon's yield management practices compare to those used in a longer-established industry, information was obtained from California. University of California Cooperative Extension farm advisors reported growers' use of vine balance metrics rather than dependence on uniform yield standards in their regions to achieve premium wine quality. The ability of California Pinot Noir producers to produce higher yields is likely due to growing seasons that are warmer and longer than those in Oregon (Table 3). California production also encompasses a greater spectrum of the wine market, and this accounts for differences in vineyard management and yield production as reported by region. With California's more diverse and mature industry, growers and wine makers likely have more experience that allows them to develop site-specific standards. Similarly, the larger Oregon companies represented in surveys and interviews reported 10%–20% higher yields for Pinot Noir than the majority of survey respondents. Interview responses indicated that those involved in smaller vineyard operations were less likely to deviate from the industry standard. This reluctance may be due to their having less experience or to risk being greater in a small operation.

Table 3.

Pinot Noir Production in 2012 as Reported by Oregon and California Industry Censuses

State/region	Yield (tn/ac)	Bearing Pinot Noir vineyard acres	Seasonal heat units (GDD_{50})[a]
Oregon			

North Willamette Valley[b]	2.15	9,728	2,147
South Willamette Valley[b]	2.62	839	2,063
Umpqua Valley[b]	2.39	1,478	2,461
Rogue Valley[b]	2.65	542	2,700
All regions (state total)[c]	2.21	13,595	
California[d,e]			
Mendocino County	3.43	2,525	3,314
Monterey/San Benito	6.42	8,429	3,015
Sonoma/Marin Counties	4.36	12,114	3,114
San Luis Obispo/Santa Barbara	4.72	6,044	2,986
All regions (state total)	6.53	38,049	

[a]Data obtained from Western Regional Climate Summaries, 2015. Seasonal heat units are reported in GDD_{50}, the mean growing degree day, base 50°F, for the growing season (April 1 to October 31) in each region. [b]Data obtained from SOURCE, 2015. [c]Data obtained from SOURCE, 2012–2014. [d]Data obtained from USDA NASS, 2013a. [e]Data obtained from USDA NASS, 2013b; based on long-term weather data.

Conclusion

Preliminary data from research conducted by Oregon State University suggest that Pinot Noir vines can ripen greater yields than currently targeted by the industry standard. The goal of viticulture Extension is to encourage vineyard and winery businesses to shift yield management practices toward vine balance, allowing vines to carry as much fruit as the vine is able to support sustainably, and to shift away from universal yield standards. The first step in this process will require that a broader portion of the industry is targeted in outreach that provides new information from local yield research. These programs should include winery staff and owners who have a strong influence

on yield decisions. Those in the production stream from vineyard to winery need to understand the implications of yield management and methods by which to achieve optimum fruit and wine quality in order to consider change.

Changing industry practices will not be easily accomplished and will require alternative outreach methods. Despite decades of viticulture research in yield management across the globe, few studies have shown that lower yields consistently result in higher fruit and wine quality. However, industry is slow to shift practices in premium wine production regions such as Oregon. To encourage this change, Extension activities should go beyond simply informing industry about research studies and focus on active engagement of wine industry professionals in participatory research. With the risk involved in producing a high-value crop, participatory research may be the best method for evaluating practices and encouraging change. When industry members are doing the research on their own farms and making wine that they can assess through sensory evaluation, they will learn in the process and begin to break the status quo.

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