

## Nutrient Management Survey Helps Research Team Understand Current Industry Practices

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The High-Resolution Vineyard Nutrient Management research team designed an industry survey to understand current practices in nutrient management. The survey is important for the research team to bench-mark industry practices, to determine adoption of new practices and technologies, and determine ways to guide the research for relevancy and applicability. A summary of the survey results is provided here.



### Methods

An online survey was completed by commercial grape growers nationally during spring 2021 (15 March to 30 May 2021). The survey was distributed to commercial growers through Extension faculty and industry organizations in each region/state. The survey was administered using Qualtrics survey software. The survey included 34 questions with question logic organized so that participants only addressed questions relevant to their role in production. The main goal of survey questions was to determine how grape producers decide to fertilize vineyards and what procedures are used in vineyard nutrient management.

The survey was to be completed by only one person per company; for a large company with many vineyard holdings, only one person needed to complete the survey per vineyard or region. This survey was also designed for vineyard management companies and consultants. Participants were asked to respond to survey questions based on nutrient management practices applied across the majority of vineyards that they own, manage, or consult.

### Demographics

The survey was completed by 322 individuals from across 25 states, representing nearly 176,000 acres. Participation mirrored the relative population of grape producers across the US, with greatest participation from CA (22%), OR (20.5%), WA (13.4%), NY (12.4%) and TX (7.5%) (Figure 1). All other states had <4% of the responses. All four grape sectors (juice, raisin, table, and wine grapes) were represented, but 82% of respondents were from the wine grape industry (Figure 2). The majority of respondents were grape growers (88%), including vineyard owners, managers, or viticulturists. The remainder of respondents were consultants (7.5%) and vineyard management companies (4.5%). The majority of respondents did not farm under any certification (75%); sustainable certification (e.g., Certified California Sustainable Winegrowing, LIVE Certified, LODI Rules) was the most common (20% of respondents); and only 10% of respondents farmed under organic, biodynamic, or regenerative ag certifications.

## Nutrient Management Plans

The majority of respondents nationwide (88%) did not have a nutrient management plan for their vineyards. Maryland had the highest percentage of respondents with nutrient management plans (86%), followed by Idaho (33%) and California (24%). The majority of farm nutrient management plans (71%) were developed for regulatory compliance (e.g., Natural Resource Conservation Service [NRCS] or Soil and Water Conservation Districts [SWCD]). Only 17% indicated that a farming certification required them to have a nutrient management plan and even fewer (12.5%) indicated that it was required by the company for whom they work. For growers with nutrient management plans, 63% developed their own plans, over a quarter (26%) used a crop consultant, and only 11.4% used public resources, such as NRCS, to draft that plan.

## Nutrient Testing

The majority of respondents (57%) determined nutrient status using both tissue and soil testing rather than soil or tissue testing alone/separately (Table 1).

*Tissue testing.* The majority of respondents are testing vine nutrient status regularly, with 60% testing annually and 23% testing every two to three years. Most respondents only test petioles (47%), and far fewer test only leaf blades (10%). Whereas 22% of respondents are testing both leaf and petiole samples separately (two different tests), and 19% of respondents collect composite leaf samples where whole leaves (blade + petiole) are tested (Table 1).

Tissue test timing was split between bloom and véraison, with 44% of respondents sampling at both bloom and véraison. The majority of growers (62%) sampled vineyards at a rate of <5 acres per sample. However, 31% of respondents sampled at a rate of 5-20 acres per sample. Area represented in a tissue sample was not related to total farm size; growers with larger vineyards did not necessarily sample from larger land areas.

*Soil testing.* The majority of respondents test vineyards soils on a regular basis. The most common testing interval was every two to three years (43%), but 20% tested soils annually, and 24% tested soils at intervals greater than three years. The remaining respondents test vineyards only when problems arise (10%) or when required by regulation (2%).

## Fertilizer Application

The regular sampling of vine tissues and soil has the potential to help producers understand when and how to fertilize, as 75% of respondents indicated that they apply fertilizers annually. Respondents applied both foliar (66.5%) and soil-applied (74.3%) fertilizers, representing macronutrients (N, P, and K) and micronutrients at 61% and 55%, respectively (Figure 3). The nutrients of greatest concern for respondents were N, K, and B (Figure 4). As expected, there were differences in macro- and micro-nutrient concerns by state, with NY and TX having greater concern for N than the other states. Potassium was the most concerning nutrient in CA and NY, B was the most concerning nutrient in OR, and N was the most concerning in WA (Figure 5).

Deciding how much fertilizer to apply to a vineyard can be challenging. Only 29% of respondents indicated determining their own fertilizer rates. A significant portion of the respondents (50.6%) rely on fertilizer rate recommendations by crop consultants, vineyard management companies, or Extension

agents. A small fraction (14%) used the recommendations that came from testing labs. All remaining respondents (6.4%) used visual cues, observations, experience, or routine to guide which fertilizers and rates to use.

The majority of respondents (65.3%) indicated that fertilizers are applied differently across vineyard blocks. The most common factors selected by respondents in how they apply fertilizers differently across blocks were soil characteristics, crop quality goals, and crop production goals. Topography was rarely selected by respondents as a factor for fertilizing differently across land area.

### **Importance of Vineyard Nutrition Management**

The majority of respondents indicated that nutrient management costs are not a large portion of their annual vineyard production costs, comprising only 5-10% of the total budget. However, 73% indicated that nutrient management was very important or extremely important to achieve yield or quality targets. The majority (64%) believed there would be yield losses with improper nutrient management. This is not surprising since nutrient deficiency can lead to poor fruit set, reduced fruitfulness, and reduced yields. However, most indicated that it would not impact the unit price they are paid for their fruit (68%). On average, yield losses were estimated at 11.7%, but price losses were only 4.5%.

### **Technology Use**

Only a small fraction of the respondents (17%) have used technology to assist in their vineyard nutrient management. The most common types of technology used were remote sensing and proximal sensing. For those who do not use the technology, they found that the technologies were not necessary, too costly, or they did not know how to use them. This means that nutrient management tools developed for growers needs to be easy to use and cost effective. However, input on new tools should also come from crop advisors, consultants, and vineyard management companies who are making the majority of fertilizer and application rate recommendations.

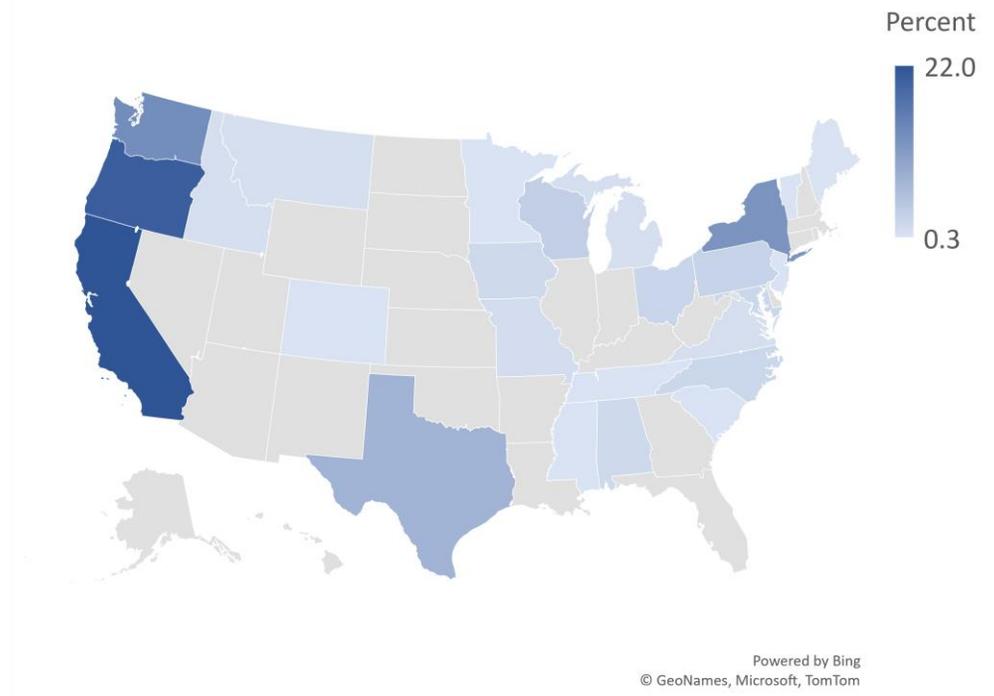
### **Further Information**

If you have questions about survey results please contact Patty Skinkis for more information ([patricia.skinkis@oregonstate.edu](mailto:patricia.skinkis@oregonstate.edu)).

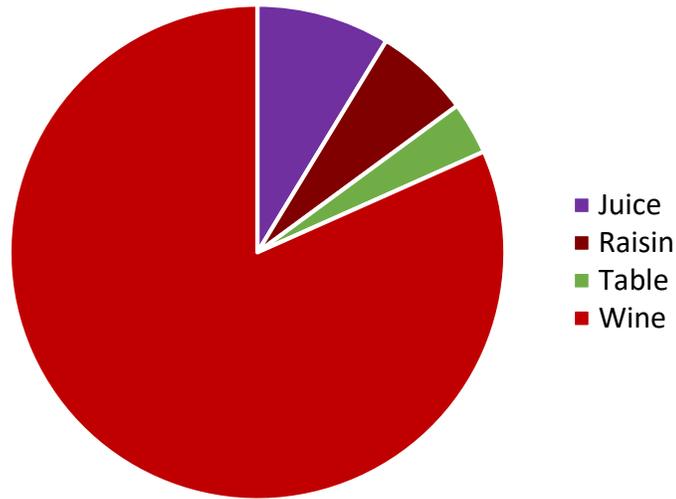
**Tables & Figures**

**Table 1.** The method for monitoring vineyard nutrition and type of tissue sample collected, as reported by respondents (commercial growers, consultants, or management companies) across the US in a spring 2021 survey. Data are organized from highest to lowest based on percent of responses. Survey respondents were given the choice to select only one option that best fit their practices for both method and tissues tested.

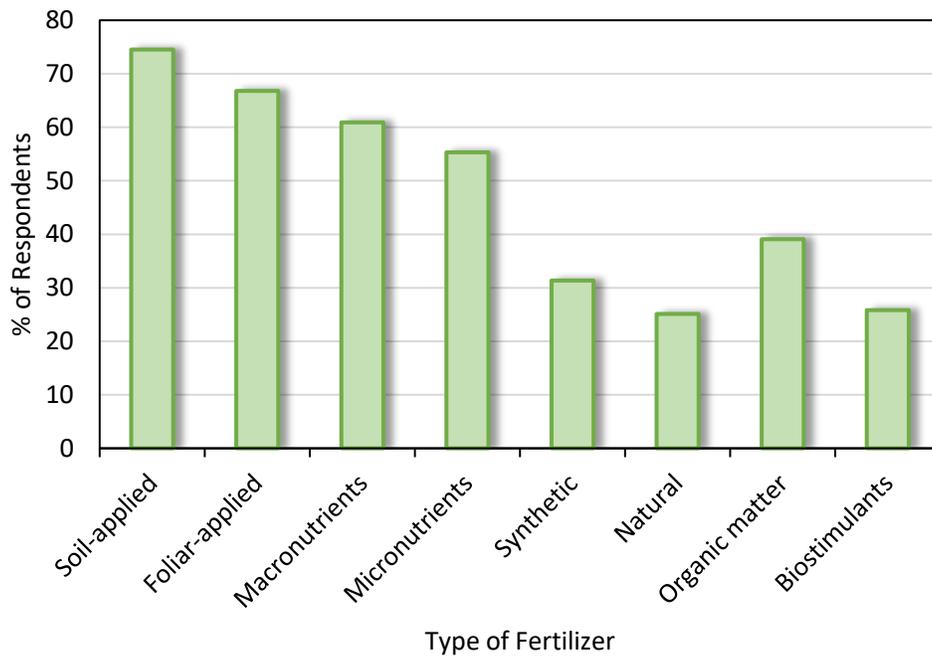
<b>Method for monitoring vineyard nutrition</b>	<b>Method</b>	<b>% of Respondents</b>
	Both soil and tissue tests	57
	NDVI maps, soil and vine tissue tests	14
	Soil tests only	10
	Experience only (e.g., visual inspection)	9
	Tissue tests only	8
	Other	2
<b>Tissues sampled for nutrient testing</b>	<b>Type</b>	<b>% of Respondents</b>
	Petioles only	47
	Leaf and Petiole (analyzed separately)	22
	Entire leaf (petiole + blade)	19
	Leaf blades only	10
	Other	2



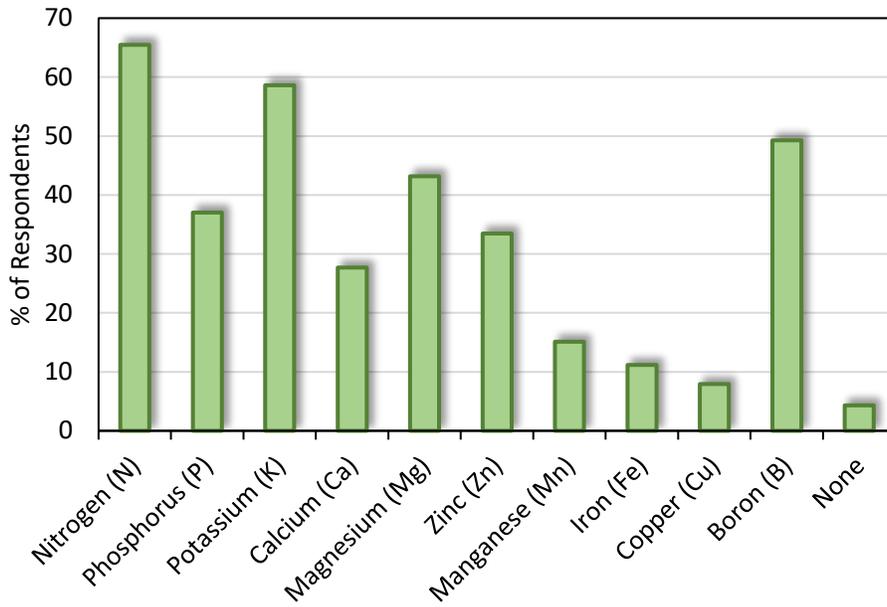
**Figure 1.** Distribution map of US grape grower participation in the vineyard nutrition management survey during spring 2021. Greater color intensity indicates higher percentages of participation. Participants were from 25 states, n=322. Gray areas indicate states that had no participation.



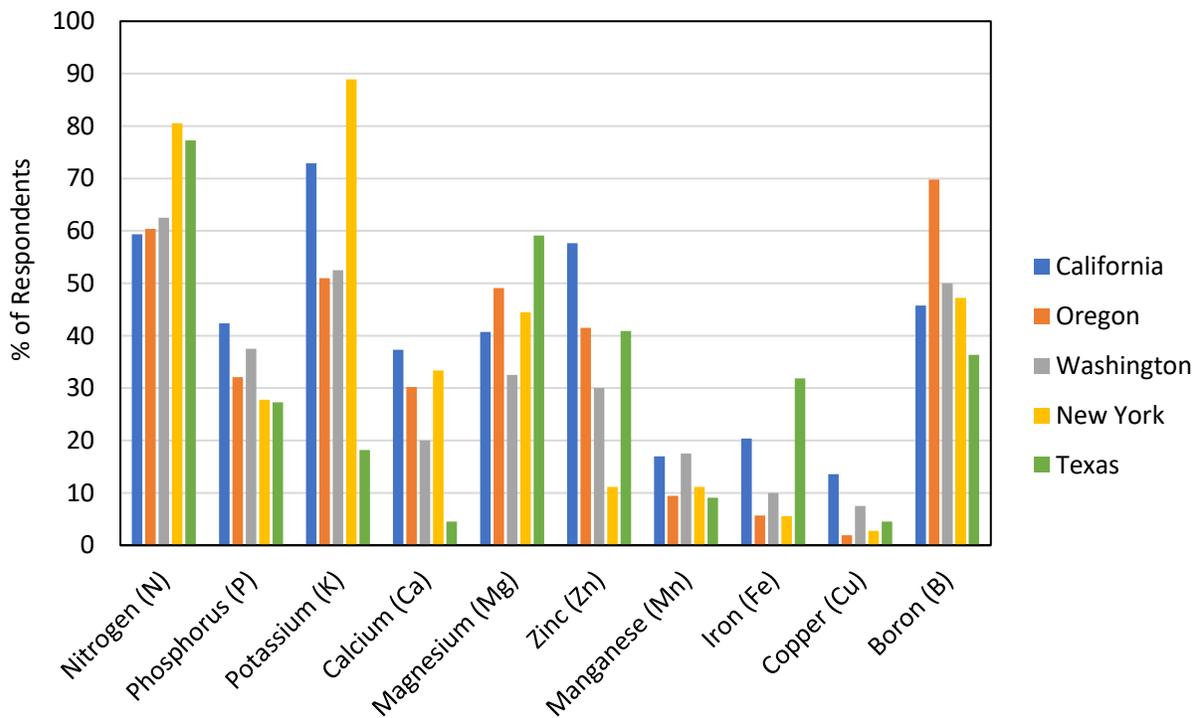
**Figure 2.** US Grape markets represented in the nutrient management survey conducted in spring 2021.



**Figure 3.** Type of fertilizer applied in vineyards. The respondents selected all that applied to their vineyard(s).



**Figure 4.** Mineral nutrient of greatest concern for respondents. The respondents selected all that applied to their vineyard(s).



**Figure 5.** Mineral nutrients of greatest concern by the top five states represented in the survey. Respondents selected all that applied to their vineyards(s).