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Communicating Viticultural Innovation: How Wine Labels Influence Enthusiasts' Views of Disease Resistance

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Communicating Viticultural Innovation: How Wine Labels Influence Enthusiasts' Views of Disease Resistance

Abstract

The wine industry's competitive nature relies on visual marketing to shape consumer choices. This study examines how communication regarding selective breeding for disease resistant grapes on wine bottle labels influences consumer opinion. Via focus groups we explored consumer attitudes of both Emerging and Experienced Wine Enthusiasts. Experienced Wine Enthusiasts prefer detailed, transparent information about grape varietals and production methods, valuing authenticity and clarity. In contrast, Emerging Wine Enthusiasts, who are less familiar with wine, are more influenced by design and visual appeal. Sustainability, including eco-friendly practices and certifications, also impact evoke a positive attitude. While some consumers in both groups are enthusiastic about terms like "sustainable" and "chemical-free," others are skeptical. To balance simplicity and detail, incorporating QR codes for additional information is recommended. The study highlights the need for high-quality, transparent labels that communicate both quality and sustainability. Future research should explore broader quantitative studies to gauge national and global opinions and the effects of information overload in bottle label communication. This study offers insights into optimizing wine bottle labels to enhance consumer engagement and support a more sustainable wine market.

Keywords

marketing, wine, ELM, TPB, labeling, selective breeding, public opinion

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Introduction

The wine grape industry is a critical sector of global agriculture, known for its economic significance and cultural impacts. However, the cultivation of grapevines, particularly the widely favored *Vitis vinifera* species, is fraught with challenges, primarily due to the high inputs required for disease management. Among the myriads of diseases that afflict grapevines, powdery mildew, caused by the fungal pathogen *Erysiphe necator*, stands out as one of the most destructive. This pathogen not only threatens grape yield but also compromises the quality of wine produced, leading to significant economic losses for growers (Jones et al., 2014; Yin et al., 2022; Yu et al., 2022).

The reliance on chemical fungicides to control powdery mildew has escalated production costs, with estimates suggesting that up to 20% of total vineyard expenses are attributed to its management (Jones et al., 2014; Sosa-Zuniga et al., 2022). Further, the environmental implications of such practices raise concerns regarding sustainability and the health impacts of pesticide residues (Reiff et al., 2023; Wang et al., 2017). Considering these challenges, there is a pressing need for innovative solutions can mitigate the reliance on chemical inputs while maintaining grape quality and yield.

Selective breeding for disease resistance emerges as a promising strategy to address this issue. Recent advancements in molecular breeding techniques have enabled the identification and incorporation of resistance genes from wild grape and non-wine grape species into cultivated varieties (Feechan et al., 2013; Pap et al., 2016). For instance, the introduction of resistance loci from *Muscadinia rotundifolia* has shown potential in enhancing the resilience of commercial grape cultivars against powdery mildew, thereby reducing the need for fungicide applications (Feechan et al., 2013; Zyprian et al., 2016). Further, the genetic dissection of grapevine resistance traits has revealed specific pathways, such as salicylic acid signaling, that can be harnessed to bolster plant defenses against this pervasive pathogen (Dai et al., 2016; Yin et al., 2022). The integration of biocontrol agents and alternative management strategies also plays a pivotal role in the fight against powdery mildew. As the wine grape industry grapples with the dual challenges of disease management and sustainability, the pursuit of disease-resistant cultivars through selective breeding and innovative management practices represents a crucial pathway toward a more resilient and environmentally responsible future.

Public Perception of Sustainability Communication

Consumer interpretation of practices such as sustainability and biotechnology is significantly influenced by product labeling. Previous research indicates consumers are increasingly aware of the implications of genetically modified organisms (GMOs) and sustainable practices reflected in labels (Catching et al., 2024; Catching et al., 2025; Gibson et al., 2020). This awareness shapes their perceptions and buying decisions regarding agricultural products.

Roe and Teisl (2007) discussed how the message and the credibility of the messenger affect consumer perceptions of GMO labels. They argue that for labeling programs to be effective, the information needs to be considered credible and sufficient by consumers (Roe &

Teisl, 2007). This highlights the importance of clarity in communication regarding the benefits and risks of GMOs. Additionally, Zilberman et al. (2018) noted consumer opposition to GM products often stems from health and environmental concerns, demonstrating a complex landscape where consumer attitudes are formed based on their trust in biotechnology and the labeling provided.

Further emphasizing the narrative around biotechnology and consumer understanding, Sendhil et al. (2021) found public perception of GM foods has become increasingly recognized in policy deliberations about food security and sustainability. Additionally, awareness and education have also been found to directly impact acceptance of biotechnology in sustainable agriculture within a variety of contexts (Ahmed et al., 2024). However, proliferation of sustainability labels can lead to consumer confusion, suggesting a need for more cohesive communication strategies to effectively convey sustainability (Yang et al., 2024).

Agricultural communication, particularly through labels, plays a crucial role in shaping consumer perceptions of agricultural practices (Cantrell et al., 2020; Powers et al., 2020; Stanton et al., 2024). It influences their choices and acceptance of technologies designed for sustainability (Meyers & Miller, 2007; Jeong & Lundy, 2016). As the demand for transparency in food production continues to rise, the agricultural sector must adapt communication strategies that not only inform but also build trust among consumers (LeGrande et al., 2021; Lu et al., 2025; Robinson et al., 2020).

Wine Marketing

The wine industry is a complex and competitive market where visual marketing plays a vital role in impacting consumer preferences and choices. Visuals like bottle and label communication can significantly impact consumer behavior and purchasing decisions. Thus, understanding factors that influence consumer preferences in wine label communication and design is essential for wine producers to effectively target their marketing efforts (Barber et al., 2006).

Consumer choices in wine bottle label design can vary based on level of knowledge and frequency of consumption, emphasizing the importance of adapting packaging and design decisions to specific consumer segments (Chamorro et al., 2020). The use of eye-tracking studies to analyze consumers' visual attention and preferences can offer valuable insights for designers and marketers in creating effective wine bottle labels (Barbierato et al., 2023). In these eye-tracking studies, consumers attend first to visually salient elements such as images, icons, and brand logos, often scanning visual cues before engaging with text-heavy content, particularly under cognitive load (Laeng et al., 2016; Monteiro et al., 2019). As label information density increases, attention becomes fragmented, leading to cognitive overload and reduced message comprehension (Sielicka et al., 2020). Further, cognitive load strongly influences how consumers process label information. Scholars have found visually cluttered areas generate longer fixation times, suggesting increased processing effort and decision fatigue (Oswald et al., 2022; Włodarska et al., 2019). To manage this, consumers tend to prioritize key attributes such as nutritional or health-related cues to streamline decision-making (Hurley et al., 2015). When

sustainability messaging is presented alongside these attributes, consumers weigh their relative importance, shaping product evaluations and willingness to pay (Loo et al., 2015).

In addition to bottle design, consumer preferences for specific types of wine are influenced by several factors, including attitudes toward environmental sustainability, willingness to pay for quality traits, and varietal familiarity and recognition (Migliore et al., 2020). While outside the scope of the present study, the willingness of consumers to adopt environmentally friendly packaging practices, such as recycling attitudes and behaviors, further emphasizes the significance sustainability plays in decision making among wine consumers (Kelley et al., 2019). The present study seeks to better understand how wine consumers view communication regarding selective breeding for disease resistance in the wine industry through wine bottle label communication and design.

Past studies have demonstrated that extrinsic cues, such as wine bottle and back label characteristics, along with intrinsic cues like wine composition, play a central role in appealing to consumers and influencing purchase decisions (Kelley et al., 2015) and can significantly influence consumer behavior, as they often serve as the first point of interaction with the product (Chrea et al., 2010). Chrea et al. (2010) additionally found visual appeal of wine labels can predict consumer choice behavior, underscoring the importance of aesthetics in marketing strategies (Chrea et al., 2010). This aligns with findings by Sherman and Tuten, who assert that label design and product information are critical factors in consumer decision-making processes (Sherman & Tuten, 2011). By incorporating these perspectives, you can strengthen your argument regarding the importance of effective communication through wine labels.

Exploring consumer preferences for wine attributes related to tradition, environmental sustainability, and innovation underscores the evolving nature of consumer preferences and the need for innovation in wine bottle design and communication (Aqueveque, 2022). Understanding how wineries leverage marketing strategies based on market opportunities is essential for effectively positioning products in the competitive wine industry (Torres & Kunc, 2016).

The visual aspects of wine marketing extend beyond bottle design to encompass the entire consumer experience, including the impact of wine labels on consumer preference and the relationship between bottle weight, consumer perception of wine quality, and acceptance of lighter bottles (Laeng et al., 2016; Soares et al., 2022). Additionally, the choice between screw caps and corks and the impact of packaging type on the flavor of wine further emphasize the intricate relationship between packaging and consumer perception (König et al., 2022; Thompson-Witrick et al., 2021).

It is additionally crucial to consider the demographic differences in wine consumption preferences. Younger consumers, particularly Millennials and Generation Z, exhibit distinct preferences for wine styles and packaging (Poelmans et al., 2022). This demographic shift necessitates that wine producers adapt marketing strategies to cater to these emerging consumer segments. For example, Elliot and Barth (2012) highlighted that Millennials are drawn to non-traditional label designs, which may reflect their values and lifestyle choices. Integrating these insights will provide a more nuanced understanding of how consumer demographics influence label design preferences.

Additionally, the growing demand for sustainability in wine production and marketing cannot be overlooked. Prior research has indicated consumers are increasingly willing to pay a premium for wines marketed as sustainable or organic (Migliore et al., 2020; Vecchio et al., 2023). This trend is supported by findings from Sogari and colleagues, who demonstrate that consumers' attitudes toward sustainable labeling significantly affects purchasing decisions (Sogari et al., 2015). Further, the impact of storytelling and narrative elements on wine labels has emerged as a significant factor in consumer engagement. Engaging narratives can enhance the perceived value of a wine, making it more appealing to consumers (Petrontino et al., 2022). This aspect is particularly relevant when discussing the communication of selective breeding for disease resistance, as it allows producers to connect with consumers on a deeper level, fostering brand loyalty and preference while communicating to the consumer the science of selective breeding and its impact on sustainability.

The wine industry is indeed experiencing a significant impact from changing environmental conditions and growing consumer demand for sustainable products. Vintners are actively looking for ways to differentiate themselves through the promotion of environmentally sustainable initiatives on wine bottle labels (Visconti, 2021). Sustainable wine production and marketing have become focal points, with studies exploring consumer perceptions of environmentally sustainable wine, willingness to pay for sustainable-labeled wine, and the impact of sustainable practices on consumer preferences (Orth et al., 2005; Sogari et al., 2016). Additionally, environmental impacts of wine production, such as the use of pesticides and fertilizers has been highlighted as growing issues among wine consumers (Bosco et al., 2011; Fusi et al., 2014).

Consumer attitudes toward sustainable-labeled wine have been extensively studied, with research investigating how environmental values and beliefs about sustainable labeling shape consumer attitudes (Sogari et al., 2015). Furthermore, the influence of label content on wine consumers' intent to purchase has been analyzed, emphasizing the significance of label design in consumer decision-making (Escandon-Barbosa & Criado, 2019). The emergence of eco-certification schemes and labeling programs in response to consumer demand has led to a proliferation of voluntary and institutional social and environmental certification systems in the wine sector (Ugaglia et al., 2021).

Studies have also examined the impact of changes in regulatory and market environments on the sustainability of wine producers, suggesting regulations on sustainability labeling may offer quality signals to wine consumers, increasing their knowledge about sustainability and improving their willingness to pay for wine with sustainable labels (Temple et al., 2020). Additionally, the creation of engaging and interactive stories around wine labels has been proposed to communicate sustainability and safety aspects of wine products, particularly when new or unfamiliar varietals are used in the production of the wine (Papadakos, 2023).

The wine industry is certainly undergoing a significant shift toward sustainability, with a focus on environmental communication through label design. This shift is driven by consumer demand for sustainable products and the need for vintners to distinguish themselves in a competitive market. Understanding consumer perceptions, the influence of label content, and the

role of eco-certification schemes is crucial for wine producers aiming to effectively communicate the sustainability of their disease resistant wine grapes via bottle label design.

Theoretical Frameworks

The intersection of the Elaboration Likelihood Model (ELM) and the Theory of Planned Behavior (TPB) provides a comprehensive framework for understanding consumer decision-making, particularly in the contexts of food marketing, sustainability communication, and product labeling. While the ELM focuses on how persuasive messages are processed through central and peripheral routes, the TPB emphasizes the role of attitudes, subjective norms, and perceived behavioral control in shaping intentions and behaviors (Davies & Wright, 1994; Röös & Tjärnemo, 2011).

Labels on food products serve as vital informational cues that significantly impact consumers' perceptions and decision-making processes. Research has shown that sustainability labels critically inform consumers and aid in evaluating the environmental impacts of food choices (Potter et al., 2021l; Siraj et al., 2022). For instance, consumer willingness to pay a premium for sustainably labeled food is influenced by factors like knowledge of sustainability, demographics, and the format of the labeling itself (Cook et al., 2023). This aligns with findings from Potter and colleagues (2021) who found that individuals displayed higher preferences for eco-labels compared to traditional nutrition labels, indicating environmental considerations are highly persuasive.

In the context of ELM, sustainable labels can operate through both central and peripheral routes. Consumers with strong involvement and knowledge about sustainability are likely to process information more deeply using the central route, allowing for better retention and attitude reinforcement (Davies & Wright, 1994; Kumar et al., 2021). Conversely, those with less expertise may respond to peripheral cues such as attractive packaging or brand reputation, which can trigger immediate positive impressions without deep cognitive processing.

Behavioral Intentions and the Theory of Planned Behavior

The Theory of Planned Behavior posits that a consumer's intention to engage in a behavior, such as purchasing organic or eco-labeled products, is determined by their attitude toward the behavior, perceived social norms, and perceived behavioral control (Röös & Tjärnemo, 2011; Wong et al., 2018). This framework is vital in understanding the influence of product labeling, as seen in studies examining intentions to purchase organic food, where trust in labels and perceptions of health and environmental benefits play critical roles (Chang & Chen, 2022; Pereira et al., 2022).

Further, eco-labels and sustainability cues serve not only as information sources but also as tools for fostering a sense of social responsibility among consumers. Previous scholars have found that positive attitudes toward sustainability are significantly correlated with the intention to buy eco-labeled products, reflecting the direct influence of subjective norms (Ahmadi & Zazai, 2022; Nekmahmud & Fekete-Farkas, 2020). For example, Wong et al. (2018) confirmed

that the TPB is particularly effective in predicting purchase intentions for various sustainable products based on consumers' attitudes and their perceptions of social expectations.

Integration of ELM and TPB in Consumer Decision-Making

The combined application of ELM and TPB provides a more nuanced understanding of consumer decision-making. By integrating the cognitive processing modes outlined in the ELM with the intention-forming mechanisms of the TPB, we can better predict how consumers respond to marketing communications concerning sustainability.

> **Central Processing**: When consumers are deeply engaged with the content of sustainability labels and understand the benefits, their intentions tend to align strongly with their positively formed attitudes, as predicted by TPB (Cook et al., 2023; Donato & D'Aniello, 2021).
>
> **Peripheral Processing**: In contrast, for consumers less familiar with sustainability issues, peripheral cues such as brand imagery or label aesthetics can significantly drive their purchasing decisions, highlighting the need for effective visual communication strategies within sustainable marketing (Loo et al., 2015; Siraj et al., 2022).
>
> **Behavioral Insight**: The intersection of these models demonstrates that marketers must craft messages that cater to both high-involvement and low-involvement consumers, thereby bridging knowledge gaps and enhancing overall consumer engagement with sustainable products (Mancini et al., 2017; Qing et al., 2017).

The integration of the Elaboration Likelihood Model with the Theory of Planned Behavior offers a robust framework for understanding consumer behavior in the context of food marketing and sustainability communications. This combination allows for a multi-faceted exploration of how consumers interpret labels, the importance of their attitudes toward sustainability, and the social influences that guide their purchasing intentions.

Purpose & Research Objectives

The purpose of this qualitative focus group study was to understand how the science of selective breeding for disease resistant grapes in the wine industry should be communicated to consumers through wine bottle label design. Two research objectives guided this study:

> RO1: Describe the preferences for communication in wine bottle label design among Experienced Wine Enthusiasts.
> RO2: Describe the preferences for communication in wine bottle label design among Emerging Wine Enthusiasts.

Method

We selected focus groups for their ability to illuminate group dynamics relevant to the research objectives (Tracy, 2020) and for their potential to create a protective environment in which participants might feel more at ease sharing their experiences with researchers and each other (Gill et al., 2008). We conducted semi-structured focus groups to facilitate discussion and encourage natural conversation (Kvale, 1996). Each focus group adhered to an interview protocol that had been developed and reviewed by faculty members and graduate students from multiple areas of social science and grape breeding research as well as wine grape industry stakeholders including vintners and enologists. Consistent with qualitative focus group conventions, we designed the protocol to progress from broad, non-threatening questions to more specific and evaluative prompts, which allowed participants to build comfort before engaging with complex or potentially unfamiliar topics related to grape breeding and sustainability (Krueger & Casey, 2014; Tracy, 2020).

Focus group questions covered topics related to wine consumption, wine information seeking behavior, wine label communication, feelings and opinions regarding selective breeding of wine grapes, and information overload in wine marketing. We used probing questions and follow-up prompts to encourage clarification, elaboration, and interaction among participants, in line with best practices for focus group moderation (Krueger & Casey, 2014). Audio and video recordings of the focus groups were transcribed and field notes detailing comments, questions, and contextual information were attached to each transcript to enrich the understanding of the interviews for future reference (Tracy, 2020).

Four focus groups were held over a two-week period in June and July 2023. We sent recruitment emails for the focus groups out via a listserv held by a local wine education group in the Minneapolis/St. Paul, Minnesota, metropolitan area totaling over 400 members. Members of the listserv included individuals who were new to wine and wine education all the way up to those who work in the wine industry, including sommeliers. Forty-one members of the listserv indicated their interest in participating in the focus groups and a total of 20 were selected for participation in the study. To ensure experiences and opinions were varied among research participants, purposive sampling within those who expressed interest in participating was employed. Instructors from the wine education group helped us to identify participants for the study who varied in their experiences with wine (new to learning about wine vs. sommelier) and their length of time in the wine education group (an introductory course vs. an advanced course). This was leveraged to ensure each focus group had participants who shared similar experiences/knowledge levels with wine so as to allow for more open dialogue amongst group members (Krueger & Casey, 2014).

Four focus groups of five participants each were established, with two groups (10 participants total) consisting of individuals newer to wine and wine education (Emerging Wine Enthusiasts) and two groups (10 participants total) consisting of individuals with greater wine knowledge and experience (Experienced Wine Enthusiasts). Segmenting groups by experience level aligns with focus group conventions by promoting more open discussion among participants with shared levels of familiarity and reducing power or knowledge imbalances within groups (Krueger & Casey, 2014).

The focus groups lasted a total of 1.5–2 hours on average. The Experienced Wine Enthusiasts focus groups (named the Red Group and Rosé Group) lasted closer to two hours while the Emerging Wine Enthusiasts focus groups (named the White Group and Sparkling Group) were shorter. On the day of data collection, one member of the Rosé Group did not show up, thus only four participants made up that focus group. Each participant signed an informed consent form and at the end of the focus group received $50 in cash as compensation for their time. This study was approved by the Institutional Review Board at the University of Minnesota - Twin Cities.

Data Analysis

We systematically organized all data sources, including transcripts and field notes in chronological order following data collection. Data analysis followed a rigorous, iterative thematic analysis process consistent with established qualitative research practices (Nowell et al., 2017; Saldaña, 2013; Tracy, 2020). Additionally, in the reporting of our findings, pseudonyms were assigned to participants to allow for clearer delineation of participant responses. Next, we used a two-cycle coding approach (Tracy, 2020). During the first cycle, we independently conducted line-by-line open coding of transcripts and field notes to identify discrete concepts and patterns (Saldaña, 2016). We developed and refined the codebook throughout this process, documenting code definitions, inclusion and exclusion criteria, and illustrative examples to support analytic consistency.

During the second cycle of coding, we applied axial coding techniques to group related codes into higher-order categories and themes (Saldaña, 2016). We discussed coding decisions and theme development collaboratively among the research team through regular meetings, allowing for comparison of interpretations and resolution of discrepancies. This iterative process enhanced analytic rigor and dependability by ensuring themes were grounded in the data and consistently applied across transcripts (Biggs & Hacker, 2021; Gross et al., 2024; Nowell et al., 2017).

Trustworthiness & Veracity

Given the qualitative nature of this study, we paid particular attention to establishing credibility, dependability, and overall trustworthiness (Lincoln & Guba, 1986; Tracy, 2020). Credibility was enhanced through multiple strategies, including peer debriefing among research team members and member checking during and immediately following focus group sessions, where the moderator summarized key points and invited participant confirmation or clarification (Guba & Lincoln, 1985; Krueger & Casey, 2014). Triangulation was achieved by integrating multiple data sources including the focus group transcripts, field notes, and reflexive memos to corroborate interpretations and strengthen analytic claims (Hitge & Schalkwyk, 2017; Yoshikawa et al., 2023).

We ensured dependability and confirmability through the maintenance of a detailed audit trail documenting methodological decisions, protocol refinements, coding iterations, and analytic discussions throughout the research process (Hitge & Schalkwyk, 2017; Saldaña, 2013). Our

regular team discussions functioned as peer debriefing sessions and provided opportunities to critically assess emerging interpretations and address potential inconsistencies (Nowell et al., 2017). We addressed transferability by providing thick description of the research context and data collection procedures, allowing readers to assess applicability to other settings (Merriam, 2009; Tracy, 2020).

Researcher Reflexivity

We are a multidisciplinary research team including faculty and graduate students in grape genetics, applied economics, and agricultural communication. Researcher reflexivity was emphasized throughout the study to acknowledge how disciplinary backgrounds, assumptions, and positionalities may have influenced study design, data collection, and interpretation (Merriam, 2009; Tracy, 2020). We held reflexive discussions to document assumptions, reactions during data collection, and evolving interpretations, which were revisited during analysis to mitigate bias and enhance transparency (Hozesorkhi et al., 2023; Krueger & Casey, 2014).

While this interdisciplinary approach strengthened the study by integrating scientific, economic, and communication perspectives, it also required us to have intentional dialogue to align disciplinary priorities and vocabularies. We used collaborative discussions to balance scientific accuracy in descriptions of selective breeding with language accessible to consumers. We acknowledge that our disciplinary lenses may have shaped the themes emphasized; therefore, findings are understood as co-constructed through participant narratives and our research team's interpretive frameworks.

Findings

RO1: Describe the Preferences for Communication in Wine Bottle Label Design among Experienced Wine Enthusiasts

Label Design and Perception

Participants expressed a strong preference for labels that exuded a sense of classiness with a well-designed label, believing that such labels were associated with higher quality wines. Robby from the Red Group said, "I think when they [the labels] are classier, you tend to think they're better wines." Reba of the Red Group said, "I feel very opinionated about good design. So, if it's a well-designed label… I really like that. I think it's important to have a good graphic designer, media person…somebody who really knows what they're doing. Because it just draws me immediately." Parker from the Rosé Group said, "A well written description makes it seem like it's a higher quality wine."

Design elements such as unique shapes, fonts, and colors were noted to be particularly appealing, with participants expressing a preference for labels that stood out from the norm. Members of both the Red Group and the Rosé Group felt the design of the bottle played an important role in attracting them to the wine. Unique labels were also important to Experienced

Wine Enthusiasts. Paisley from the Rosé Group described an occasion when a unique label design drew them in and ultimately made them make a purchase:

> A couple of years ago I went into the wine shop, and I saw that there was a label that had three otters on it and it was so cute. And then I noticed it's Rosé and it's from Oregon and those are like two things that I'm really into. I really like wine from Oregon so that's kind of how I made my decision in that case. So, the label for me does have an impact.

Transparency and Clarity of Information

Transparency and clarity of information was the second theme to emerge among the participants. They desired labels that clearly displayed essential information such as grape varietals, vintage, and winery details. Members of the Red Group said the following regarding displaying essential information: Rod - "Where's it from? What county? That's important to me."; Robby - "Usually vintage. I mean, some things are inherently not vintage, but I want to know."; Reese - "I want to know what's in the bottle, where's it from, which year? A few basics. What's the alcohol? If it's a blend, what is it blended with?"

Members of the Rosé Group said: Paige - "You've got to have the winery, the winemaker, and the grapes that are present [in the wine]. You've got to have the vintage."; Peyton - "The grape varietal. When they put not only the grape varietals, but the percentage of what [grapes] are in it is important to me."; Paisley - "Maybe production methods, you know…I care about that."

Concerns were raised regarding misleading marketing language, with participants emphasizing the importance of accurate and informative labeling, particularly regarding production methods and additives. Participants also felt that naming of wines can communicate perceived quality of the product. Reba of the Red Group discussed an issue they have with the way some wine businesses market their products: "One thing I think [a wine bottle label] shouldn't do is, too often times they use flashy or weird names, cutesy type things…and you figure that wine is awful! They put all the money into the marketing." Rowan of the Red Group said, "They come up with really funny, clever names. I laugh and then…I'm not going to buy that. It doesn't seem to have other information that I need to make my purchasing decision." Finally, Paisely of the Rosé Group summarized their feelings regarding marketing tactics as "All that marketing effort is sort of lost on me."

Familiarity played a significant role in consumer decision-making, with participants more likely to choose wines from familiar regions or with familiar grape varietals. "I think it's a combination of looking at familiar wines. Like there's certain wines that I know that I like. So, if I see that style, but it's [a wine] I haven't seen before, it's like, oh, what's this one? I might check it out," said Peyton of the Rosé Group.

Recommendations and suggested pairings on labels were appreciated, but participants desired more specificity in these suggestions. Rod of the Red Group said: "I just like the parings to be more specific. That helps," while Paige of the Rosé Group said: "Sometimes they put, like,

'Good with…', like the food recommendations suggestions are on there, suggested pairings. I always take that kind of with a grain of salt too."

Participants showed a reluctance to be swayed by celebrity endorsements or overly cutesy labels, preferring labels that were authentic and informative. Parker of the Rosé Group said:

> When it comes to celebrity endorsements, if it's like overly cutesy I would assume, oh, this is crap, and I wouldn't try it. So, it would be more that labels would cause me to not pick up something, as opposed to, to pick up something. No, I'm not going to fall for this. There's a reason they're trying to dress it up.

Other members of the Rosé Group shared similar sentiment: Parker - "I will avoid celebrity wineries like the plague."; Paisley - "I'm not going to buy it just because a celebrity makes it." However, Paige of the Rosé Group did find they surprisingly liked a celebrity-endorsed wine: "My brother-in-law brought this wine over the other day to our house, and it had [Celebrity] on it. I would have just avoided something that like. And he brought it, and we drank it and it was not as bad as I thought it was going to be."

The use of QR codes was seen as a potential solution to provide additional information regarding selective breeding for disease resistance without cluttering the label. Parker had this to say about using QR codes: "It would be really nice if you could use [a label system]. I don't know if it's a symbol because it wouldn't take up that much space and it would send a message immediately. Like a QR code maybe?" Members of the Red Group also discussed options for using QR codes on wine bottle labels. Reese - "I like the idea of a QR code."; Rowan - "A QR code could work if you can make it tiny."; Reba - "I want [QR codes] to take you to the website of this bottle so you can read about it."

Overall, participants exhibited a high level of discernment and sophistication in their wine selection process, seeking out labels that not only appealed visually but also provided clear and informative content both with regard to and excluding information pertaining to selective breeding for disease resistance. This highlights the importance of how thoughtful and transparent label design is in influencing perceptions and purchasing decisions of Experienced Wine Enthusiasts in the wine industry when marketing them new, disease resistant grape varietals.

RO2: Describe the Preferences for Communication in Wine Bottle Label Design among Emerging Wine Enthusiasts

Attractions to Wine Bottles

Participants reported a variety of factors influencing their attraction to wine bottles. Many respondents emphasized the impact of displays and labels on their purchasing decisions. For example, Wren of the White Group stated, "The end cap, the big display and the cute labels. But I know. No, that is not what I'm going to buy because that is the garbage wine." Whitney echoed this sentiment, saying, "Whenever the label is really cute, I'm like, dang, you just know this wine is going to be garbage and it is." There was a consistent aversion to overly flashy or gimmicky

labels, with comments such as, “Some of the weird ones, um, I think those are gimmicky and so I avoid them,” from Willy of the White Group.

In contrast, participants expressed a preference for classic and clean labels describing them as more appealing and trustworthy. Wren remarked, “I always tended to go with the more classic looking, clean cut, well made.” Willow noted, “Something just square and traditional and if it has a castle on it, that’s a pretty good idea.”

Reliability and exploration also played a role in purchasing decisions. Willy mentioned, “Sometimes I’ll choose one, like, really reliable thing that I know well, and then one fun one.” Others highlighted price considerations as a factor, with comments like, “Price point comes into play. Um, sometimes I’m like, well, I want to keep it under 30 or under 20,” from Corey in the Sparkling Group.

Finally, brand marketing influenced some participants, as illustrated by the statement from Cameron in the Sparkling Group, “So let’s say there’s a lot of marketing behind like a name brand wine. Maybe I’ve had it. Maybe I haven’t, but it’s like, like Kim Crawford, for example, gets heavily marketed sometimes.”

Wine Label Preferences

Participants expressed clear preferences regarding the information regarding selective breeding for disease resistance and visual appeal of wine labels. They valued informative labels, seeking details about the wine’s origin, maker, and tasting notes. Wyatt of the White Group shared, “Where it’s from, who made it, and the vintage.” Willow emphasized the importance of tasting notes: “If I buy a white, I want to know if it’s gonna taste like grapefruit to me or pear or both.”

The visual appeal of labels also influenced purchasing decisions. While some participants disliked gothic or overly stylized labels, preferring more fun and interesting designs, others appreciated the creativity behind the artwork. Chris of the Sparkling Group noted, “Be fun and interesting,” while Callie said, “I like to look at the artwork that goes behind it. They’re very creative.” Perceptions of quality were also linked to label design. As Cameron of the Sparkling Group mentioned, “If it does look appealing, it definitely would draw my interest more,” while Casey expressed, “I don’t care how ugly the label is. I’ve never put any thought into labels.”

Wine Production and Grape Information

Awareness of environmental and production methods varied among participants. Some showed interest in labels indicating conservation efforts, with Whitney of the White Group noting, “Washington and Oregon, um, they have labels with regards to conservation.” However, others were skeptical of terms like “biodynamic” and “organic,” considering them either meaningless or irrelevant to their purchasing decisions. Willy stated, “Organic doesn’t do anything for me. Biodynamic is just voodoo anyway.”

Reactions to production information were mixed. While some participants appreciated details about sustainable farming and small producers, others found certain terms and concepts off-putting or irrelevant. Cameron of the Sparkling Group shared, "I do like if I can see that it's, you know, a small farmer or, uh, an independent or women owned or BIPOC, then that adds a little quirk to it." Corey found certain production methods unappealing: "I think for me, if I try a certain style of wine, if it, let's say it's biodynamic farming or pet nat or something, it might have more residue. And I haven't enjoyed that before."

Terms and Visuals Related to Disease Resistance

Participants had distinct preferences for the terminology and visuals related to disease resistance on wine labels. Preferred terminology included positive and familiar terms such as "sustainable," "chemical-free," and "innovative." Wren noted, "A positive word like sustainable would appeal more to me than a negative word like fungicide." Label design preferences leaned toward simple, clean visuals, with some participants suggesting a leafy motif to signify sustainability. Callie of the Sparkling Group mentioned, "It's gotta have a little leafy sort of look to it."

Reactions to disease resistance information varied. While some participants found it too technical, others were neutral or mildly interested. Wyatt remarked, "It's more science than I want on a bottle," while Sparkling Group member Callie stated, "If I were presented with a bottle of wine that said it was from a disease resistant grape, I guess I'd see that somewhat neutral."

Communication of Grape Production Methods

Participants expressed a desire for simple and accessible information regarding grape production methods. They preferred brief descriptions on the label with the option to access more detailed information via a QR code or link. Wren of the White Group suggested, "That's [a QR code] a genius idea because there are people that are like really want to know." However, there was a consensus that information should not be overwhelming. As Casey of the Sparkling Group noted, "Short and sweet. And if I want to know more, have the information available." Chris echoed this sentiment, "If I turn the label around and look at the back, if it's dense print. I'm completely disinterested. I just want it clean and simple."

Discussion, Conclusions & Recommendations

The findings from the focus groups reveal insightful perspectives on wine bottle label design and communication preferences among Experienced and Emerging Wine Enthusiasts. These insights align with and expand upon the existing literature, providing a nuanced understanding of consumer behavior in the wine industry with regard to disease-resistant cultivars and the broader communication of agricultural science through packaging and labeling. Consistent with prior research on food and agricultural products, wine bottle labels function not only as branding tools but also as critical points of science communication where trust, understanding, and perceived value are negotiated between producers and consumers (Donato & D'Aniello, 2021; Liu & Leon, 2023). For agricultural communication undergraduate programs, this reinforces that curriculum must bridge the gap between traditional marketing and

agricultural literacy, preparing students to use packaging as a strategic tool to communicate complex science such as disease-resistant cultivars and other agricultural and sustainability innovations to diverse public audiences.

Both Experienced and Emerging Wine Enthusiasts expressed a preference for well-designed, classy labels, associating them with higher quality wines. This aligns with the literature indicating that visual marketing significantly impacts consumer preferences and purchasing decisions (Barber et al., 2006; Chamorro et al., 2020). The importance of design elements such as shapes, fonts, and colors was highlighted, consistent with findings from eye-tracking studies that underscore the influence of visual attention on consumer behavior (Barbierato et al., 2023). Similar to findings in broader agricultural and food marketing research, visual cues tied to sustainability or environmental stewardship can enhance willingness to pay and product valuation when they are visually appealing and easily interpretable (Tokuoka et al., 2024; Yadav et al., 2024). The differences in how Experienced and Emerging Wine Enthusiasts engage with wine bottle label information align with the Elaboration Likelihood Model (ELM), where detailed production and grape information appeal to central-route processors while visual aesthetics, symbolism, and branding attract those using the peripheral route. This theoretical grounding in ELM is particularly important for agricultural communicators, as it reinforces that effective science communication requires more than just accurate information; it demands a strategic understanding of how different audience segments process visual and textual cues, enabling practitioners to design labels and materials that resonate whether consumers are carefully scrutinizing details or making quick, aesthetically driven judgments.

Transparency in labeling was a critical factor for Experienced Wine Enthusiasts, who emphasized the need for clear and accurate information about grape varietals, vintage, and production methods. This preference for informative labels is supported by Kelley et al. (2015), who found that both extrinsic and intrinsic cues play a significant role in consumer decision-making. Similar patterns have been documented in research on eco-labels and sustainability claims, where clarity and credibility are central to building consumer trust and avoiding skepticism (Aadya, 2025; Donato & D'Aniello, 2021). Additionally, the skepticism toward misleading marketing language and cutesy or flashy labels reflects a discerning attitude toward authenticity in wine marketing, resonating with Aqueveque's (2022) exploration of consumer preferences for tradition and innovation in wine. These findings reinforce the importance of transparent, meaningful labeling to address information asymmetries, a key objective of sustainable food labeling initiatives globally (Aprile et al., 2012).

Familiarity with wine regions and grape varietals was a significant factor in consumer decision-making for both Experienced and Emerging Wine Enthusiasts. This finding aligns with previous research suggesting consumer preferences are influenced by their level of knowledge and frequency of consumption (Chamorro et al., 2020). The role of familiarity in reducing perceived risk and enhancing trust in wine selection is well-documented in the literature (Rihn et al., 2022a; Rihn et al., 2022b). Parallel patterns are observed in consumer responses to agricultural innovations more broadly, where familiarity and prior knowledge increase acceptance and reduce uncertainty (Hamad et al., 2025). Emerging Wine Enthusiasts, who are more influenced by design and branding, demonstrate peripheral cues such as label aesthetics and sustainability imagery can effectively shape consumer perceptions, even in the absence of

deep cognitive processing. This aligns with green marketing research showing informational cues and eco-labels can positively influence attitudes and intentions when they are emotionally resonant and easy to interpret (Kuria, 2024; Liu & Leon, 2023).

Attitudes toward sustainability and production methods varied, with some expressing interest in labels indicating conservation efforts, while others were skeptical of terms like "biodynamic" and "organic." While Migliore et al. (2020) found that sustainability attributes can increase consumers' willingness to pay for wine, the findings from the present focus groups suggest this relationship is moderated by consumer experience and information processing. Experienced Wine Enthusiasts appeared more likely to engage in central-route processing, actively considering production practices and sustainability information as quality cues, which aligns with stronger attitudes toward sustainable wine production and greater willingness to pay. In contrast, Emerging Wine Enthusiasts relied more heavily on peripheral cues such as label aesthetics and branding, indicating lower motivation or ability to process detailed production information. From a Theory of Planned Behavior perspective, these differences suggest stronger attitudes and perceived behavioral relevance among experienced consumers may translate into higher willingness to pay, whereas less experienced consumers may require more accessible cues to shape attitudes and purchase intentions. This theoretical application demonstrates why agricultural communication curricula must emphasize that attitude formation and behavioral intention are not uniform processes. By understanding how experience level shapes information processing, from central engagement with production details to peripheral reliance on visual cues, educators can prepare students to design targeted sustainability messaging that meets diverse audiences where they are cognitively and motivationally.

Similar findings emerge in agricultural biotechnology and plant breeding research, which emphasizes the role of education and familiarity in shaping public acceptance of innovative practices (Hamad et al., 2025; Kebede, 2022). The emphasis on sustainable packaging and clear communication of production methods highlights the growing importance of environmental considerations in the wine industry (Temple et al., 2020; Visconti, 2021). Broader packaging research similarly indicates consumers increasingly favor eco-friendly materials and transparent sustainability communication (Aadya, 2025).

The preference for simple, accessible information about grape production methods, with the option for more detailed information via QR codes, highlights the importance of clarity and brevity in label communication. This aligns with findings from previous studies on the influence of label content on consumer intent to purchase (Escandon-Barbosa & Criado, 2019). Research on front-of-package and point-of-sale communication further demonstrates that concise cues are most effective when complemented by optional, in-depth information (Shin & Park, 2023). The mixed reactions to disease resistance information suggests a need for careful consideration of terminology and visuals, with a preference for positive, familiar terms like "sustainable" and the misnomer "chemical-free." The mixed reactions to disease resistance terminology reinforce ELM's notion that message relevance impacts engagement, suggesting that simplifying language and providing optional deep-dive content through QR codes could bridge the gap between central and peripheral processors. Emerging evidence also supports the use of digital and NFC-enabled labels to provide layered sustainability information without increasing on-package clutter (Gegeckienė et al., 2022).

The findings of this study provide valuable insights into the preferences and perceptions of Experienced and Emerging Wine Enthusiasts regarding wine bottle label design and science communication. Viewed alongside broader agricultural marketing research, these findings highlight the role of packaging and labeling as critical interfaces for communicating complex science topics and fostering consumer trust (Aadya, 2025; Donato & D'Aniello, 2021). Wine producers can leverage these insights to enhance the effectiveness of their marketing strategies, targeting specific consumer segments with well-designed, transparent, and informative labels that communicate both quality and sustainability.

Wine producers and marketers should prioritize high-quality label design by collaborating with skilled designers to create visually appealing and unique labels that attract discerning consumers. Transparency is essential, with labels clearly displaying key details such as grape varietals, vintage, production methods, and winery information while avoiding misleading marketing language. Familiarity can be leveraged by emphasizing well-known regions and grape varietals, particularly when introducing blends that include less familiar disease-resistant grapes. Sustainability messaging should use positive, consumer-friendly terms like "sustainable" or "reduced chemicals" and highlight conservation efforts and eco-friendly farming practices. To provide additional information without cluttering the label, QR codes should be incorporated, ensuring accessibility and ease of use. These recommendations are consistent with evidence-based guidance from agricultural communication (Cantrell et al., 2020; Jeong et al., 2016; Stanton et al., 2024) and sustainability marketing research (Catching et al., 2024; Catching et al., 2025; Gibson et al., 2020) emphasizing eco-labels, educational cues, and layered information strategies. Finally, balancing information and simplicity is crucial, thus labels should include brief, clear descriptions while offering consumers the option to explore more details if desired, avoiding overly dense or technical content. By implementing these strategies, wine producers can enhance consumer trust, effectively communicate product quality and sustainability, and strengthen their competitive position in the market. For agricultural communication faculty, translating these evidence-based strategies into the classroom prepares students to bridge the gap between marketing and science communication. From QR codes to simplified sustainability terms, this teaches future professionals how to layer information in ways that align with how different audiences cognitively process agricultural messages.

Future quantitative research in this area is needed to better understand the perceptions of Experienced and Emerging Wine Enthusiasts on a larger, national and global scale. This study was limited to the experiences of the participants in the study and is geographically limited to Minneapolis/St. Paul where the focus groups took place. Further research should focus on message testing of sustainability communication in wine marketing. This includes the use of eye-tracking studies to determine attention allocation to sustainability messaging on wine bottle labels as well as wine advertising in both print and digital formats. Additional research should also examine how digital and e-labeling systems influence consumer comprehension and confusion, particularly as atypical packaging designs and layered information environments become more common (Oluyemi et al., 2024). Finally, future research should examine the role of information overload of science communication in wine bottle design and wine marketing to better understand how the amount of science communicated in marketing and bottle design influences consumer perceptions and actions.

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