

SUSTAINABLE VINEYARD DEVELOPMENTS WORLDWIDE

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ABSTRACT

Sustainable agricultural practices are becoming increasingly recognized, adopted and integrated within different sectors of agriculture. Viticulture and wine production have been at the forefront of these developments largely due to the nature of the business and its historic ecological stewardship. Recent surveys have shown that the majority of growers and producers in the wine industry see sustainability as an important part of an overall business plan. However, many also see that the adoption of sustainable practices must also enhance economic viability, which in turn should facilitate generational potential in their businesses. The wine industry must also help address issues associated with definitions, certification, and public understanding of industry practices in organic and biodynamic production, integrated pest management, carbon neutrality, and water foot printing. These processes will continue to require research, innovation, and efficient timing of technology transfer to increase adaptive capacity and reduce economic and social vulnerability in the overall scheme of sustainability.

INTRODUCTION

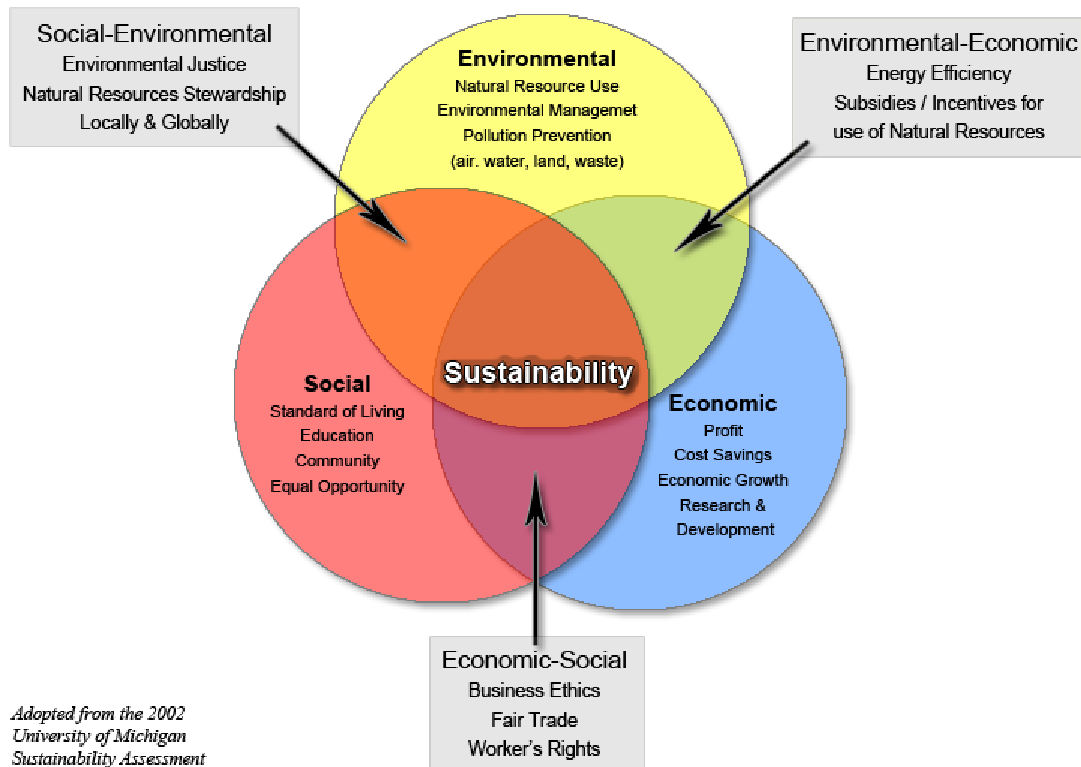
Historically traditional agriculture has had at its core a goal of sustainability; however numerous pressures over the last century moved main stream agriculture to a less than ideal sustainable framework. Today there is a growing movement that questions the role of the agricultural establishment in promoting practices that contribute to a myriad of environmental and social concerns (Blewitt 2008). The development of sustainable practices in agriculture not only addresses many of these concerns but provides the arena by which innovative and economically viable opportunities for growers, laborers, consumers, policymakers, and others in the production system can be realized.

Overall, sustainability attempts to integrate three main objectives: environmental health, economic profitability, and social and economic equity (Fig. 1). Maybe more proactively than any other sector of society, agriculture has embraced or adopted a variety of philosophies, policies, and practices that have each contributed to meeting these objectives. While numerous sustainability frameworks have evolved, the vast majority follow a 'systems' approach by accounting for interactions within and between the individual farm, the local ecosystem, and the local, regional, and global communities affected by the operation (Kates et al. 2005). While the on-farm approach is strongly oriented toward the stewardship of both natural and human resources, the overall goal is one of interdisciplinary efforts that educate others about the system in order to highlight the responsibility of all participants (i.e., farmers, laborers, policymakers, educators, researchers, retailers, and consumers).

On-farm management goals and principles in sustainability have tended to focus on; 1) the selection of species and varieties that are well suited to the site and to the ecoregion, 2) the diversification of crops (including livestock) and cultural practices to enhance the biological and economic stability of the site; 3) the management of the soil and biological diversity of the site, 4) both efficient and humane use of inputs to the site; and 5) a strong consideration of the agriculturalists' goals and lifestyle choices. In addition to on-farm strategies for preserving natural resources and changing production practices, sustainable agriculture requires a commitment to working with external non-farm components of the system (DFID 2004). Growers and producers must work with numerous sectors to facilitate changes in public policies, economic institutions, and social values. In addition, strategies for transforming the relationships between and among external partners in the system must take into account the intricate, multi-directional, and ever-changing relationships that exist between agricultural production and society as a whole. Areas where profound issues have arisen include national and international food and agricultural policy, local to regional land use issues, national and migrant labor issues, how rural agricultural communities are both preserved and developed, and how consumers influence the food and beverage system through their purchasing power.

Fig. 1: Connections and issues within the three spheres of sustainability (Rodriguez et al. 2002)

The Three Spheres of Sustainability



Sustainability is a rapidly evolving concept with numerous hurdles and conundrums to face both within the wine industry and with consumers. Given the strong orientation toward economic stability driving environmental stewardship potential, the relationships between producers and consumers become more critical to sustainability efforts (Daly 2007). However, in general, consumers currently have very little understanding of what sustainability is; yet, consumer awareness is rapidly increasing and grassroots definitions are beginning to solidify in many sectors of society. While sound sustainability developments have occurred within the wine industry, it is becoming more and more critical to begin orienting the industry's innovation, communication and experiences toward consumer definitions, not solely industry definitions, of sustainability to ensure these efforts are relevant and promote economic vitality.

While there are many definitions of sustainability what may be more important is how the term is oriented, where a quote by Pretty (1995) may best sum up the overall challenges: "Any discussion of sustainability must clarify what is being sustained, for how long, for whose benefit and at whose cost, over what area, and measured by what criteria?" The wine industry has been addressing how to best deal with sustainability since the emergence of sustainability programs and both internal and third party certification programs in the early 1990s. However, much work remains to better define, implement, and educate others about sustainability. Issues associated with definitions, certification, public understanding, and industry practices in organic production, biodynamic production, integrated pest management, carbon neutrality, water foot printing, etc. will continue to require assessment and relevance to be effective in the overall scheme of sustainability. The goal of this paper is to represent a general overview of sustainability while providing a review of some recent wine industry survey work examining sustainability understanding, viewpoints, adoption, and practices.

MATERIAL AND METHODS

While this paper is meant to be an overview of general sustainability issues and developments in viticulture worldwide, it also presents the results of a recent survey that assessed the main trends and needs within the wine industry. Some of the questions in the survey assessed grower/producer/industry views on sustainability, especially as they related to other activities within the industry. This survey was administered by Vinidea and Infowine on behalf of the Essec Group in 2010. The survey was a web questionnaire distributed in five languages (EN, FR, ES, PT, DE) to the Infowine.com member database, which offered an incentive for answering questions, and had an IP address control to avoid multiple surveys from the same person. Of the fifteen questions on the survey, three addressed the relevance and importance of sustainability and are reported on below.

RESULTS AND DISCUSSION

A total of 1305 valid surveys were submitted from over 25 countries with the responses over representing some countries (e.g., Italy and Portugal) and slightly under representing others (e.g., Spain, the United States, and Australia). Respondents were comprised predominantly from vineyard/winery estates and cooperatives (68%), but also included responses from those involved in vineyard research, wine-related organizations, and service providers to the industry (24%), and product and equipment providers (8%). Among those working directly in production, 40% came from small operations (<50,000 bottles), 32% from small-medium operations (between 50,000 and 500,000 bottles), 13% from medium-large operations (between 500,000 and 2,000,000 bottles), and 16% from large operations (>2,000,000 bottles). Nearly 60% of the sample elected to receive the small incentive; however a comparison of this portion of the sample with the remainder showed no significant differences, therefore the results are reported for the entire sample of 1305. The responses are divided by both country/geographic region and the size of the operation.

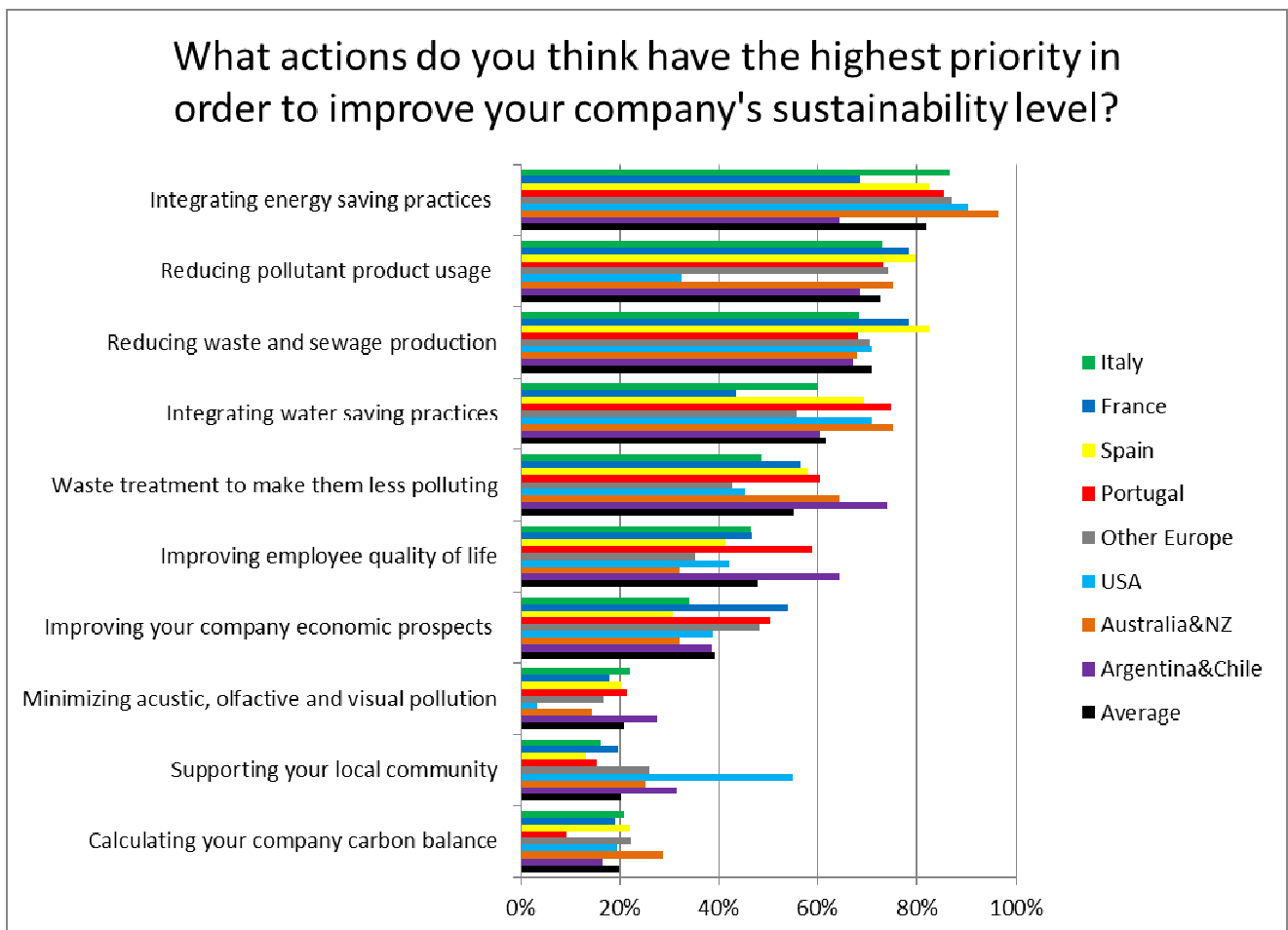
When asked “What do you think are the most important elements for wine producers?” of the nine possible responses, respondents indicated that elements related to economics were most important. These included marketing and communications issues (75%), product sensory characteristics (69%), control of production costs (53%), and sales (47%). The importance of the environmental sustainability level was mentioned by 36% on average, with the grape variety used (35%), adaptation of new technologies (34%), and the organization of labor (26%) having lower importance percentages. By geographic region, the highest responses for the importance of environmental sustainability came from Australia/New Zealand (66%) followed by the United States (43%), Europe (35%), and Argentina/Chile (29%).

However, when asked “Do you think that it is important for your company to follow a sustainable development model?” respondents overwhelmingly said yes (89%), while 8% said that they did not know and 3% said no. There were no significant differences in the responses by producer size and only small differences between regions with most notably all of the Australia/New Zealand respondents saying yes (100%). When asked “What actions do you think have the highest priority in order to improve your company’s sustainability level?”, of the ten possible responses, respondents chose ‘Integrating energy saving practices’ most often (82%), followed by ‘Reducing pollutant product usage’ (72%), ‘Reducing waste and sewage production’ (71%), and ‘Integrating water saving practices’ (62%) (Fig. 2). Responses that received the lowest priority listing were ‘Minimizing acoustic, olfactive, and visual pollution’ (21%), ‘Supporting your local community’ (20%), and ‘Calculating your company carbon balance’ (20%). An interesting juxtaposition here is that one of the commonly mentioned benefits from calculating a company carbon balance (lowest priority) is understanding how to best save energy (highest priority) (DFID 2004, Kerrison 2010).

By question there are interesting differences by country/region, while all countries see ‘Integrating energy saving practices’ as a high priority, France, Argentina, and Chile respondents listed this as less important than other factors (Fig. 2). For the response ‘Reducing pollutant product usage’ USA respondents (32%) did not see this as high of a priority as other regions, but it is unclear if this is a response that means they use less pollutants to begin with, or they simply do not see it as big of a priority. The ‘Reducing waste and sewage production’ response was the most consistent of all possible

responses across the countries and/or regions. 'Integrating water saving practices' ranged from a low of 43% in France to a high of 75% in Portugal, Australia and New Zealand. Again it is not clear if the French respondents are answering based upon their low usage of water already or potentially more abundant water availability than the other countries/regions. The responses 'Waste treatment to make them less polluting' was also quite variable by region with Argentina and Chile respondents seeing it as their highest priority, while the USA and other European regions see it as a lower priority. Again, the responses here could also reflect the current conditions in these regions where waste treatment is already advanced or not well integrated. Respondents on average tended to list 'Improving employee quality of life' about half the time, but relatively large differences were found between Argentina and Chile (64%) and Australia and New Zealand (32%). Interestingly, 'Improving your company's economic prospects' had less than 50% response potentially indicating that many might see that environmental and economic benefits are not simultaneously possible. While overall the response 'Minimizing acoustic, olfactive and visual pollution' was a lower priority, significant differences were observed with the USA respondents giving it a priority only 3% of the time. This could be due to already strong regulations in the USA in regards to sound, odor and visual pollution sources. The response 'Supporting your local community' was also a low priority overall, but interestingly showed the largest difference between a region's response and the mean response rate with 55% of the USA respondents deeming it a priority. Finally, the response related to 'Calculating your company carbon balance' was shown to be a low overall priority with the largest differences between Australia and New Zealand with 29% and Portugal with 9% (Fig.2).

Fig. 2: Survey question asking "What actions do you think have the highest priority in order to improve your company's sustainability level?" Respondents were asked to list their seven most important responses. Source: Vinidea/Infowine/Esseco Group survey.



Other surveys conducted recently show similar results to the Vinidea/Infowine/Esseco Group survey discussed above. For example, results from a survey of winegrape growers in Washington (Vinewise 2005) show that growers understand that sustainability is important to their business where nearly 80%

of respondents felt that practicing sustainable viticulture would make their crop more marketable. Furthermore, 75% of respondents said that they practice at least some form of sustainability currently, with the top three areas of practice being 1) pest management, 2) soil and nutrient management and 3) overall vineyard management. In a survey in California, Brodt and Thrupp (2009) find that economic viability was the most important theme identified from definitions of sustainability (mentioned 59% of the time). Hillis et al. (2010) and Hoffman et al. (2011), further summarizing the California survey work, addressed the important question of whether the environmental and economic benefits of adopting sustainable practices in viticulture are greater than the costs. While there are clearly some aspects of sustainable practices that have higher costs (e.g., labor and management), the survey results indicate that growers generally believe that the economic benefits exceed the costs for the majority of the sustainable practices used. Growers identified three main types of direct economic benefit:

- 1) Reduced input costs,
- 2) Improvement to both wine quality and vineyard health, and
- 3) Easier compliance with environmental regulations.

The California survey further identified six vineyard practices where the economic benefits outweigh the costs:

- Spot spraying for pest problems instead of treating entire vineyards;
- The use of pheromones to disrupt pest mating;
- Better computer models for disease forecasting;
- Overall dust reduction with cover crops;
- The use of ET-methods to determine when to irrigate; and
- The use of cover crops as refuge for beneficial insects.

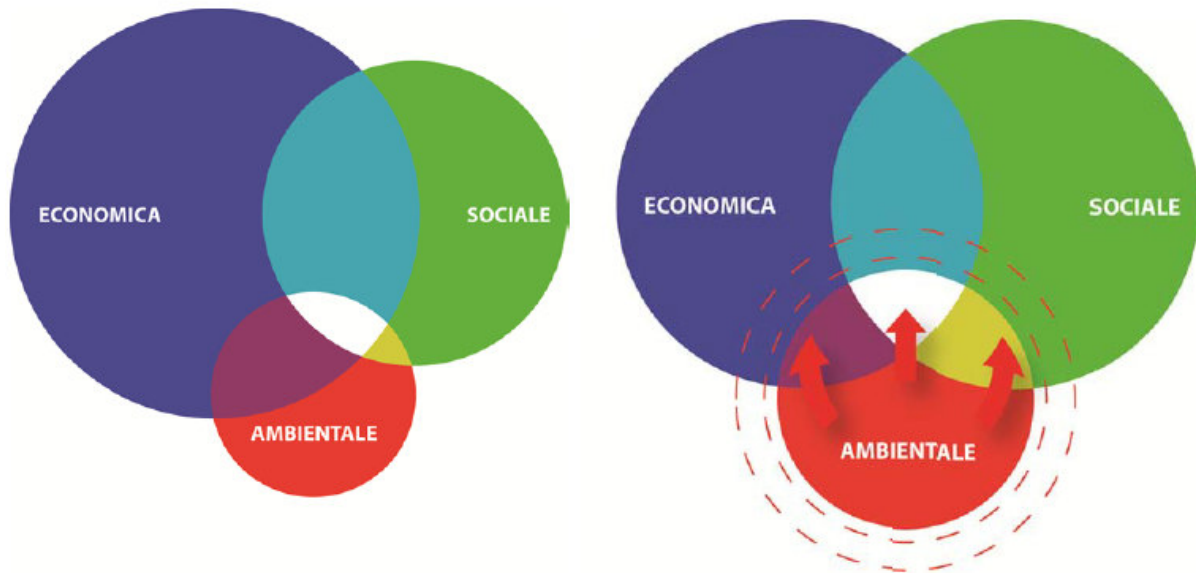
The authors note that these benefits are considered to give the biggest "bang for the buck" in terms of environmental benefits and are the mostly likely measures to be readily adopted. The authors note that two of the biggest challenges related to the adoption of sustainable vineyard practices come from practices that might have high environmental benefit, but low economic benefit, and from uncertainties about the level of effectiveness or benefit from a given practice. This is evident in the survey where few energy and management related measures show up as economically beneficial due greater levels of uncertainty associated with implementing them (Hillis et al. 2010).

In Europe the amount of land in conversion to organic, sustainable methods is growing exponentially in many countries (Mercier et al. 2011). From 2008 to 2009 national growth of organically certified acreage in France has grown 38.9% to nearly 40,000 hectares with the Languedoc-Roussillon region's organic vineyard area increasing by 51.9%, Rhône-Alpes by 50.8%, Aquitaine by 45.2%, Burgundy by 43.2% and Provence-Alpes-Côtes d'Azur by 34.6%. Growth in organic vineyards was slowest in the north and west of France, where climate makes organic viticulture more of a challenge. Italy has also showed steady growth with over 46,000 hectares in 2010, while Spain has grown to near 54,000 hectares, the highest amount in Europe. However, the numbers for Italy and Spain may be unreliable as both Italy's Organic Wine Association (AIAB) and the Spanish Association of Organic Winegrowers (SEAE) state that many growers who grow grapes organically do not bother to seek certification for a variety of reasons, namely because producers fear that the market believes that organic means lower quality or that the lack of standards may hamper certification (Mercier et al. 2011). Furthermore, organizations will have an increasingly difficult task in making it clear to consumers just what organic wine really is, what the environmental benefits are, and how it relates to overall sustainable production and carbon neutrality issues (Kerrison 2010).

Given the survey results above, it is clear that sustainability is considered to be an important business priority. Furthermore, Hoffman et al. (2011) also identified that the most important sustainability themes for growers include 'continuing in to the future', 'resource stewardship', 'winegrape quality', 'reduced environmental impact', 'reduced inputs', and 'civic contribution'. These are generally in line with the priorities listed most important by producers in the Vinidea/Infowine/Esseco Group survey and also are central to the general conceptual framework of sustainability (Fig. 1). Given the strong indications by

growers/producers that economic viability is an essential aspect of sustainability, it is critical that future developments enhance environmental and social sustainability while maintaining economic viability and stability (Fig. 3) (Capri 2011).

Fig. 3: Conceptual framework of the sustainability diagram (Fig. 1) with focus on the past and current situation (left diagram), where economic stability was the driving force, and necessary changes for the future (right diagram), where growth in environmental sustainability enhances social sustainability while maintaining economic viability (After Capri 2011).



CONCLUSIONS

Viticulture and wine production have been central to the developments in sustainable practices, making the industry a prominent leader in sustainable agriculture in general. From broad organic to biodynamic farming practices, to certification programs that qualify and/or quantify a wide array of different environmental stewardship initiatives, to water and carbon foot printing, the global wine industry is a major force in sustainable agriculture developments worldwide.

From the Vinidea/Infowine/Esseco Group survey it is clear that respondents, in principle, give importance to sustainability, although there appears to be some differences between countries/regions. These differences may be related to current conditions or regulations in some regions that accentuate or minimize the consideration of priorities. Another interesting aspect of the survey shows the importance of 'Integrating energy saving practices', but a strong disconnect with calculating a carbon balance, which is often cited as one of the best ways to understand energy use and conservation potential (Kerrison 2010). Survey work elsewhere has also shown strong support for sustainability efforts and principles, but overall the issue that economic viability is an essential aspect of sustainability remains central to developments. The conundrum is that economic viability facilitates/enables ecological resource stewardship, while ecological health and social equity provide functions that help sustain economic viability in the long term. Which comes first is the challenge, or can they be developed in parallel with appropriate innovation and education that increases the adaptive capacity of growers and producers?

Finally, it is evident in many regions worldwide that increases in the adoption of sustainability practices come from greater participation in industry-led sustainability programs. Furthermore, outreach professionals working with the wine industry report that these programs also serve to reduce environmental risks, improve relationships with regulatory agencies, and increase communication between growers (Hillis et al. 2010). Given these benefits it is clear that the development and participation in sustainability programs is a positive feedback system that has the potential to further transform the global wine industry as the leader in sustainability efforts in agriculture.

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