

IMPACT OF CLIMATE CHANGE ON VINEYARD SUSTAINABILITY IN ITALIAN WINE REGION

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Climate change represents an increasingly tangible threat to the world's renowned wine regions. Vineyards are highly sensitive to climatic variations, with factors such as temperature, rainfall, humidity, and the length of the growing season directly affecting the quality and quantity of harvested grapes. While a particularly warm year might yield an exceptional harvest, consecutive hot years can have devastating effects.

Threats and Challenges to Italian Vineyards

In historic wine regions like Tuscany in Italy, winemakers are noticing troubling signs. Growing seasons are starting earlier, leading to accelerated grape maturation. This can result in wines with higher alcohol content and altered flavor balances. Simultaneously, warmer nighttime temperatures can reduce grape acidity, crucial for the wine's longevity and freshness.

It's not just temperatures that pose a threat; the intensification of extreme weather events such as floods, droughts, and hailstorms can physically damage vines or drastically reduce grape yields. Increasing drought in many wine regions makes irrigation, often viewed with suspicion in traditional viticulture, a necessity.

These changes force winemakers to make difficult decisions. Some experiment with heat-resistant grape varieties or move vineyards to higher altitudes. Others invest in innovative technologies, such as drones and advanced sensors, to monitor and adapt to changing conditions.

Investments Against Climate Change

Despite economic uncertainties in the sector exacerbated by climate crises, Italian wineries continue to innovate. Between 2017 and 2021, three out of four invested in renewing structures and modernizing facilities and processes, although often at the expense of some planned initiatives. This finding comes from a study on innovation in the wine sector by the Institute of Services for the Agricultural Food Market (Ismea), as part of the National Rural Network of the PAC, presented at Vinitaly. Today, Italian wineries use key technologies to counter the effects of climate change. These include sustainable agronomic strategies, precision agriculture, and advanced viticultural techniques. Sustainable agronomic strategies range from irrigation management to selecting grape varieties more resistant to heat and drought.

Changes to traditional pruning and harvesting practices are integral to this approach. According to the study, 78% of the companies involved expressed a willingness to invest over the next five years, despite the critical situation. The survey, conducted in 2022 on a sample of 197 wineries, also highlighted obstacles to innovation investments, including the small size of companies (45%), uncertainty about the benefits of investments (25%), market instability (24%), difficulties in accessing credit (22%), and community funds (22%), and the high cost of investments (22%). The investments have primarily focused on technology, introducing new agritech solutions and digital agriculture applications.

Future investments are expected to focus on genetics, with the development of new resistant varieties and assisted evolution techniques (TEA), considered fundamental for the future of viticulture, especially in light of upcoming European regulations to reduce chemical use in vineyards.



Use of Technology

Precision agriculture utilizes cutting-edge technologies like sensors and drones to monitor and manage vineyards, allowing producers to respond quickly to changing climatic conditions. Precision viticulture, with the use of sensors, precise irrigation systems, and advanced meteorological data, is crucial for anticipating and preventing problems, ensuring consistent and high-quality production.

Despite the challenges, Italian wineries demonstrate remarkable resilience. With a combination of traditional techniques and modern innovations, the Italian wine industry is well-positioned to thrive in a rapidly changing world. There is also growing interest in investing in artificial intelligence solutions to be used in production processes and in the field, for predictive data analysis and waste reduction.

The wine industry, known for its resilience, faces unprecedented challenges. Decisions made today will have repercussions for decades, with stakes higher than ever. Although climate change threatens the

wine sector, it also offers opportunities for innovation and adaptation.

By embracing sustainability and investing in advanced technologies, Italian winemakers can not only mitigate the impacts of climate change but also pave the way for a more resilient and sustainable future for their vineyards and wines.



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