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Perspective

Trapped in the Past: The Decline of Italian Olive Groves in the Face of Traditional Visions and Policies, Emerging Challenges and Innovation

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Abstract: Italy has long been a key player in olive crop production, but the sector is currently facing an unprecedented crisis. This is evident by shrinking cultivated areas, farms, production levels, and investments. Multiple factors contributed to this decline, including traditional cultivation practices, limited innovation and competitiveness, siloed-oriented policies, landscape protection measures, and unsustainable agricultural systems. Phytosanitary issues, such as the spread of *Xylella fastidiosa* and the effects of climate change and drought, further compounded these challenges. Over the last decade, the sector has undergone preservation efforts focused on the perpetuation of traditional narratives and implementing policies to protect smallholder farmers, old cultivars, and safeguard traditional agri-food products. However, these approaches hinder the sector's ability to adapt and compete in the market, perpetuating stagnation rather than driving the necessary changes. To reverse this decline, the olive sector must undergo necessary evolution, as seen in other sectors, such as viticulture and tree crops. This entails embracing a comprehensive strategy encompassing research and development, infrastructure investment, the promotion of modern cultivation techniques, and policies that support the sector's evolution. Without such measures, the future of Italy's olive industry remains uncertain, with significant implications for its cultural heritage and economy. Italy must recognize the economic and cultural consequences of continued decline and take immediate action for long-term viability.

Keywords: olive crop decline; siloed-oriented policies; CAP; competitiveness; sustainability

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1. Introduction

Italy's olive groves (*Olea europaea* L.) and olive oil industry have been an essential part of the country's cultural and economic heritage for centuries (Bartolini & Petruccelli, 2002). Italy is one of the world's leading countries in olive crop production and land use of olive groves, accounting for approximately 11% of the world's cultivated area (Torrecillas & Martínez, 2022). However, over the past few decades, the olive sector is facing a crisis of unprecedented proportions, with a decline well represented by numbers (Cola & Sarnari, 2020). The downturn of the olive sector is reflected in several statistical indicators, such as cultivated areas, olive farms, production, oil mills, trade balance, and investments. The total olive-growing area in Italy is approximately 1,129 million hectares in 2021, equal to 8% of the utilized agricultural area (Council for Agricultural Research and Economics, 2022). Although cultivated areas have been quite stable over the past decade, 'Italy's olive orchard' is characterized by the massive presence of ancient olive trees (only 3% of the olive trees are less than 11 years old) and relatively low tree density per hectare (Figure 1). The most recent data indicate a contraction with a loss of about 17,000 hectares almost entirely confined to the Apulia (the most important region for olive production in Italy) due to the effects of infection of *Xylella fastidiosa* first appeared in 2013 (Schneider et al., 2020).

Figure 1. Traditional olive grove in Italy with wide planting spacing. Credit: Achim Ruhnau, Unsplash.

The general agricultural census data of the year 2020 indicate that the olive sector includes 619,378 farms, with a decrease of about one-third from the 2010 census. For production, the data indicate a trend decline beyond the traditional olive tree alternate bearing, which furthermore is more pronounced in ancient productive trees. Over the past decade, the production of olive oil in Italy has experienced a significant decline, dropping from more than 500,000 tons in 2010 to approximately 235,000 tons in 2022 (Cola & Sarnari, 2020; International Olive Council, 2023).

The fragmentation of the production structure is also evident from the high number of active mills, amounting to 4,448 (CREA, 2022), in comparison with Spain where there are less than 1,700 (Cola & Sarnari, 2020). Although the widespread presence of mills can ensure rapid olive processing and thus the hygienic-nutritional quality of the oil, as well as an added value in terms of tourism (Lombardo et al., 2022), it also results in a low average production per olive mill of only 74 tons in 2021.

Regarding trade balance, Italy is positioned as a net importer of olive oil, with a deficit amounting to 263,000 tons and 62 million euros in 2019, continuing the reduction observed in the past three years (Cola & Sarnari, 2020). Spain is the main supplier, accounting for more than 60 percent of imported olive oil, mainly extra-virgin olive oils (EVOO). In the context of worldwide olive oil production, an annual average of 3 million tons of olive oil is harvested, with the European Union (EU) being a prominent contributor for approximately 2 million tons of this annual yield. Among the key Member States, Spain leads with 66% of EU production, trailed by Italy at 15%, Greece at 13%, and Portugal at 5%. The EU constitutes the largest consumer of olive oil, with an approximate annual consumption of 1.5 million tons, and holds the position of the foremost exporter of olive oil, with an annual export volume of approximately 570,000 tonnes (IOC, 2023). Overall, the causes of this decline are multifaceted and weave together traditional views of cultivation, scarce innovation and competitiveness, lack of cooperation, siloed-oriented policies, landscape protection and unsustainable agricultural systems. In addition, in recent years the exacerbation of phytosanitary problems such as *Xylella fastidiosa* and the accentuation of climate change and drought have exacerbated the conditions of many operators in the olive supply chain. It has been estimated that if the expansion of the infected area is not stopped, the economic impact on Italy could grow to 5.2 billion euros (Schneider et al., 2020).

The convergence of these challenges has hindered the progress of the olive sector, resulting in its apparent stagnation in terms of farm structure and the agri-food system. As a result, the sector has been unable to attain the transition necessary for achieving market competitiveness.

In this essay, we claim that the olive sector stagnation is strongly influenced by the peasantry and utopian envision and narratives (self-supported by the agricultural policies and subsidies) that would like to safeguard smallholder farmers and their income, old cultivars, agrarian landscape and traditional agrifood products, which instead just perpetuates the status quo.

We argue that a necessary evolution is required in the olive sector, similar to advancements observed in other agricultural sectors such as viticulture and fruit growth. It is crucial to strike a

balance between preserving cultural heritage and embracing necessary changes to modernize the industry, promote sustainability, and ensure its long-term viability. By challenging traditional visions and narratives, fostering disruptive innovations, enhancing cooperation, and implementing supportive policies, the olive sector can overcome its current challenges and regain its position as a dynamic and competitive industry. Taking proactive measures to address the multifaceted causes of decline will not only safeguard Italy's cultural heritage but also contribute to economic growth and sustainability in the agricultural sector. In the following, we will critically discuss these multifaceted challenges and explore the role of innovation in revitalizing the sector.

2. Characteristics of the Value Chain

The value chain for the olive sector in Italy encompasses a comprehensive set of characteristics that span the pillars of agricultural production, industrial processing, and commercialization phases. Notably, a significant proportion of agricultural farms in this sector exhibit an average size of less than two hectares, highlighting the predominance of small-scale cultivation practices (Cola & Sarnari, 2020).

The modest size of these farms is linked to high production costs and reduced inclination for innovation and market orientation, as evidenced by the higher average age of the farmers involved. Additionally, the presence of an aging workforce is more pronounced in the olive industry compared to other agricultural sectors. On the other hand, the production stage of the olive value chain in Italy benefits from a wealth of regional cultivars, encompassing a remarkable diversity of more than 500 distinct landraces (Pannelli & Perri, 2012).

However, this abundance of regional cultivars can pose challenges if their features and potential are not adequately evaluated and valorized. Indeed, despite the high number of oils with Protected Designation of Origin (PDO) or Protected Geographical Indication (PGI) (Lombardo et al., 2021), these landraces have a minimal impact on the overall production volumes and, furthermore, are often poorly recognized or unknown to consumers (Cola & Sarnari, 2020). It seems intuitive how it is impossible to individually enhance all these cultivars in the market when instead a strategy would be needed to synthesize this botanical richness into new pathways.

As previously mentioned, the industrial phase of the value chain is characterized by a significant concentration of small olive oil mills, predominantly located in southern Italy. In addition to small mills, the olive sector in Italy also comprises large companies that purchase olive oil and engage in bottling operations. However, the presence of a large number of mills can result in diminished economic efficiency, elevated production costs, and a postponed implementation of technological advancements. These factors, in turn, have the potential to impede the achievement and maintenance of high-quality standards in olive oil production.

Despite being a major producer, Italy holds the distinction of being the world's foremost importer of olive oil, as well as the second largest exporter. As indicated above, large bottling companies import the product to enhance its value through export. Italy's trade deficit in olive oil accounts for 28% of the total volume but represents just 2% of the corresponding value in commercial exchanges (Cola & Sarnari, 2020). The olive sector's significant export orientation underscores a key advantage that should be further fostered and expanded.

3. Traditional Visions

The olive groves hold a significant place as an iconic and symbolic representation of the Mediterranean regions, reflecting their extensive agricultural heritage and playing a crucial role in shaping the landscape. Beyond their cultural and historical significance, the olive groves have substantial economic, cultural, and ecological importance, along with viticulture and cereal cultivation (Giourga & Loumou, 2002). The olive tree, along with the vine and wheat, also holds a significant and sacred role within the symbolism of Christianity, representing consecrated alimentary products such as oil, wine, and bread. Its presence shapes the visual aesthetics of the Mediterranean landscape, reflecting a long-standing agricultural tradition deeply intertwined with the cultural identity of the local communities. Culturally, olives trees, local landraces and olive oil have deep-rooted traditions and are integral to Mediterranean cuisine. They are essential components of local dishes, representing a shared culinary heritage. Furthermore, olives and olive branches have symbolic meanings, representing peace, prosperity, and unity, and are often associated with the cultural identity of the Mediterranean regions. From an ecological perspective, olive groves contribute to the preservation of biodiversity and the conservation of natural resources. These groves create unique habitats for various plant and animal species, promoting ecological diversity (Fekete et al., 2023). Traditional and labor-intensive cultivation practices, including terracing, in the past have bolstered soil conservation and fostered sustainable land resource utilization in olive-growing regions (Giourga & Loumou, 2002). Nevertheless, as suggested by Duarte et al. (2008) traditional olive orchards have limited economic sustainability. Their viability depends on accepting reduced

opportunity costs for family labor and engaging in part-time olive growing, which ultimately results in an economically marginal status.

The culmination of these intertwined elements, perpetuated for centuries, remains evident in contemporary times, where Italian olive cultivation epitomizes a narrative deeply ingrained in peasant traditions. This narrative would guarantee the preservation of the timeless landscape, local olive landraces, and a production system rooted in traditional peasant practices. However, these visions, while preserving the cultural heritage, have contributed to the decline of the industry by failing to address the evolving needs of olive farming in the face of mounting challenges.

4. The Role of the Policies

The EU has historically placed significant attention on the olive oil sector, offering subsidies to support farmers engaged in olive oil production through the Common Agricultural Policy (CAP) (de Graaff & Eppink, 1999). Support for the olive sector has taken various forms, with consumption aid playing a significant role as a primary form until 1994. Between 1994 and 1999, consumption subsidies were significantly reduced and eventually abolished in 1998. They were gradually replaced by subsidies aimed at olive oil production. Between 2000 and 2005, there were relatively few changes in the support measures for the olive sector, while the 2004 reform incorporated support for olive oil production into the single payment scheme (Agrosynergie, 2009). Decoupling has been permitted in order to prevent the abandonment of olive groves in marginal areas, accompanied by the introduction of cross compliance for Good Agricultural and Environmental Conditions (GAEC) (Duarte et al., 2008). The CAP for the period 2023–2027 in Italy introduces targeted sectoral support for the production of olive oil and table olives. This support is implemented through co-financing programs that focus on the operational programs of producer organizations and their associations. The allocation of funds is closely tied to the actual production levels delivered to the market. Moreover, the CAP 2023–2027 also introduces eco-schemes which should encourage farmers to adopt environmentally friendly practices, by obtaining up to € 586 hectare (AgroNotizie, 2023). Substantially, the focus of the interventions is still on maintaining the status quo and tend to discourage innovation or does not encourage investment capacity and strategic orientation.

One of the main problems of the sector policies is that have demonstrated limited effectiveness as they have primarily prioritized problem mitigation rather than addressing the underlying causes. The logic of policy intervention has consistently treated the sector as static, primarily because olive growing is a long-term endeavor, leading to inertia and slower emergence of changes compared to annual production. Indeed, the various reforms of the CAP have consistently overlooked the central role of olive growers in terms of supporting their competitiveness and entrepreneurial capabilities. Instead, the focus of these reforms has primarily been on the widespread allocation of aid to small-scale producers following price-production dynamics, rather than tailoring interventions to address the specific requirements and challenges associated with various forms of olive cultivation and land management, or new consumption habits.

For instance, one aspect that has been insufficiently addressed in the reforms is the issue of fragmented land structures, which impose limitations on the competitiveness and investment capacity within the olive sector. It is worth noting that the average farm size in Apulia, for instance, is reported to be approximately 1.7 hectares, significantly smaller compared to the average farm size of 8 hectares observed in Andalusia in Spain.

As stated by Duarte et al. (2008) the main causes of abandonment are closely related to farm profitability, the main issue being the low yields of traditional olive groves. This low profitability is further exacerbated by the size of the farms, which hampers the implementation of innovative strategies. This interconnected relationship forms a self-reinforcing cycle wherein limited profitability due to low yields contributes to farm abandonment, and the inability to invest in productivity-enhancing measures further perpetuates the cycle of low profitability.

Evidence that policies intervention in the sector has not promoted an increase in high quality and competitive products in the market is indicated by consumer behaviors. Although Italy has the highest number of certified EVOO recognized as PDO or PGI (Lombardo et al., 2021), recent findings suggest that only 36% of consumers broadly understood health claims on EVOO (Lombardi et al., 2021). Despite various studies indicated an increasing willingness to pay for premium products (Di Vita et al., 2021), Lombardi et al. (2021) argued that low perceived health claims on EVOO hinders the ability of producers to take advantage derived from higher prices of the perceived high quality of these products.

5. The Innovation Imperative

The gradual decline of the olive sector in Italy highlights the urgent need for innovation. This calls for a combination of policy reforms and significant cultural shifts to support the necessary changes. To tackle the aforementioned challenges, the olive sector needs to initiate innovation in its growing practices. This involves adopting a new approach that moves away from traditional

orchards and towards a model that emphasizes farm-centered strategies and farmer-led with robust professional skills. An entrepreneurial mindset should guide this transformation, with a strong focus on incorporating innovation and leveraging new technologies at its core, as in the case of grape growing and fruit cultivation.

A viable innovation path is the shift toward intensification adopting high density or super high density planting system which allow for huge increases in production efficiency with a reduction of production costs (Lo Bianco et al., 2021) (Figure 2).

Previous research has established that these system plantings based on integral mechanization can be both economic and environmentally sustainable (Camposeo et al., 2022), able to improve soil carbon sequestration (Mairech et al., 2020). As suggested by Camposeo et al. (2021) super high density planting systems are able to produce nutraceutical EVOOs rich in polyphenols compounds, as demonstrated with "Lecciana" that is the first olive cultivar of Italian descent suitable for super high-density orchards.

Figure 2. Mechanized harvesting in a super high density olive orchard in Italy.

A recent study by Flamminii et al. (2023) conducted in the Abruzzo region examined allochthonous cultivars suitability for super high density systems and concluded that it is possible to obtain nutraceutical EVOOs comparable to traditional ones.

In such a framework, innovation's contribution to revitalizing Italian olive farming should include:

- New planting systems. Should ensure tree canopies suitable for mechanical operations and precision management.
- New suitable cultivars. The adoption of new olive cultivars, adapted to the changing climate, suitable for new planting systems, resistant to pests and diseases, low vigor, with better yields and oil quality. In the future, new plantations will be benefiting from new cultivars obtained with conventional and new breeding techniques.
- Mechanization. The adoption of integrated mechanization in olive farming for all cultivation stages can help reduce labor costs and improve efficiency. Mechanization facilitates the swift processing of olives at the mills within a few hours of harvest.
- Precision agriculture. The use of disruptive agriculture techniques, such as sensors, drones, and data analytics, to optimize irrigation and water management, fertilization, and pest management. Precision agriculture can help reduce the use of resources, increase yields, and improve oil quality.
- Climate-Smart Certification and Labeling: Implementing a climate-smart certification and labeling system for olive products can help consumers identify products that are produced using sustainable and climate-friendly practices. This can create incentives for farmers to adopt environmentally friendly approaches and differentiate their products in the market.
- Investment in education and training. Providing continuous education and training programs to olive farmers can ensure that they are up-to-date with the latest innovations, best practices, and market trends. Well-informed farmers are better equipped to make informed decisions and adapt to changing circumstances effectively.

To foster the growth of the olive oil sector in Italy, the government should adopt a comprehensive set of development policies that encompass various dimensions. Firstly, investing in new olive trees plantings to increase and rationalize production oriented only towards producing nutraceutical EVOOs products. Secondly, prioritizing research and development efforts to enhance mechanization practices becomes crucial. Considering the impending labor shortage in this sector, its significant impact on costs and final income is evident. Thirdly, it becomes imperative to implement targeted measures for the modernization of olive mills and their strategic placement within the territory. These innovative solutions require research, investment, and collaboration between farmers, researchers, policymakers, and other stakeholders. The adoption of these solutions can help ensure the long-term sustainability of Italian olive farming and contribute to the development of a more resilient and vibrant rural economy. It is only through innovation that the Italian olive farming industry can overcome the challenges it faces and ensure a sustainable future.

6. Summary

The paper provides insights into the current state of Italian olive groves, discussing their strengths and weaknesses. It highlights the factors contributing to their decline, while also acknowledging the potential of Italian olive oil sector and its ability to increase production, although it currently falls short of fulfilling domestic needs. To address these challenges, adopting new sustainable practices is crucial. One such measure involves increasing planting densities to improve productivity. However, it's essential to balance this approach with meeting minimum sustainability goals, including considerations for yield, labor, costs, as well as proper irrigation and fertilization practices. The perception of olive trees as low-maintenance crops has hindered advancements in care and management techniques. Nevertheless, there are opportunities to enhance the productivity of traditional olive groves through improved pruning, biostimulant-based fertilization, and incorporating modern machinery. Moreover, integrated mechanization could help counterbalance the potential scarcity of labor in the olive sector in the future.

Embracing innovation and sustainable practices is vital for the long-term success of the olive industry. A forward-looking approach should consider promoting the coexistence of multiple olive cultivation systems, such as terraced olive agro-ecosystems, catering to diverse needs and consumers. By diversifying and meeting varying market demands, the Italian olive industry can enhance its resilience and competitiveness. In conclusion, the revitalization of Italian olive groves necessitates the adoption of innovative and sustainable practices, alongside a willingness to challenge traditional perspectives. By taking these steps, the olive sector can unlock its full quality potential, fulfill domestic demands, and ensure a prosperous future for both olive growers and consumers.

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