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Reflections on the role of healthy eating style. Insights from citrus of the South of Italy

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ABSTRACT: As nutrition has become more of a challenge globally and sustainable eating practices receive renewed emphasis, understanding the important role of local foods can contribute to finding efficient solutions. Shedding new light on the Mediterranean diet, this research was aimed at examining citrus cultivation in Southern Italy and its vital role in developing healthy eating practices by preserving and enhancing cultural heritage. This paper contributes new insights to the literature, as it describes specific effects of locally sourced citrus fruits on nutrition and local identity, which are often overlooked in current literature. Methodologically, a qualitative analysis was conducted, introducing an overview on agricultural statistics for each of the two emblematic cases examined: the Syracuse Lemon (PGI) in Sicily and the Clementines of the Gulf of Taranto (PGI) in Apulia. The research shows that certified citrus products offer high-quality nutrition and support local identities and economies by using traditional farming practices. Findings show that growing citrus not only improves public health by encouraging people to eat local nutritious foods but also helps empower local economy and helps to the preservation of ethnic landscapes. The interdependence of gastronomy, health and ethnic heritage was highlighted in this paper, advocating for policies that strengthen small-scale producers and protect heritage crops. Research implications refer to the fact that increasing consumer awareness can strengthen both public nutritional quality and regional economic vitality. Research limitations should be acknowledged – this paper was focused on only two case studies, opening a window of opportunity for future research to incorporate a broader range of regions to further empower research findings.

KEYWORDS: Apulia, Sicily, mediterranean diet, local typical products, sustainability, food culture.

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1. INTRODUCTION

Gastronomy was primarily associated with culinary enjoyment, or "the practice or art of choosing, cooking and eating good food" as the Oxford dictionary states. There are scholars (Md Ramli et al., 2016) that have concentrated on how food heritage has tied up with the tradition of foods prepared and consumed over an unbroken sequence of generations. Also, gastronomy is closely linked to the culture and heritage of a certain region. Hence, what local people eat, when, where, and the way they eat are all visible

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manifestations of culture. Moreover, food can be considered as the most intimate contact with the local culture as it is ingested, and the uniqueness and authenticity of local food are important markers in constructing the identity of a destination (Chatzopoulou et al. 2019; Everett & Aitchison, 2008; Stone et al., 2019; Ting et al., 2019) and important vehicles for sustainable regional development (Soare et al., 2023).

Haven-Tang & Jones (2008) recognize local food and wines as identity marks of a destination, and a source of identity formation in post-modern societies (Richards, 2002). In this context, food tourism can be an important means of strengthening a region's identity (Everett & Aitchison, 2008). Also, local governments are acknowledging the importance of gastronomic or culinary tourism and developing programs to attract tourists. Moreover, foodways are eating habits and culinary practices of people, regions, or historical periods, that symbolize different things to different people depending on the context (Counihan, 1999, p. 19). When food is designated as heritage it "takes on even greater emotional weight" (Brulotte & Di Giovine, 2014, p. 2). Of course, it is equally important that the identity of the product, its production and the place of origin are interdependent and relevant to the same extent. However, some important Italian local/traditional foods awarded with Protected Geographical Indication (PGI) labels, such as Bresaola della Valtellina, use (and the PGI protocols allow it) raw products (meat pieces) imported from other countries (Argentina namely). The attributes of typicality, traditionality, authenticy and local origin in contemporary food industry are easier than expected. For instance, if we think about the Razza Piemontese cows, whose meat represents a typical local product of the Piedmont region with many important traditional recipes transmitted from generation to generation, indeed, they are the results of a quite recent process of genetic selection which has little to do with the ancient place-based production (Colombino & Giaccaria, 2013). However, connections between taste, culture and productions are important not only to locals but also to tourists and the agricultural entrepreneurs themselves. Populations, especially in the Mediterranean area, give importance to the quality, to reputational attributes, to the geographical origin, to ethical attributes, to food safety but also the healthiness of food (Nicolosi et al., 2021).

Finding ways to increase the adoption of healthier, sustainable diet with preference to local food may be difficult but a good example is the Mediterranean diet (Schwingshackl et al., 2015). The Mediterranean diet is not only recognized by UNESCO, but it is how we share food, the culture of food, political and economic dimensions, how we educate ourselves about food to arrive at models of innovation where we aim at the care of the ecosystem and care of the community. The Mediterranean diet is healthy, but most consumers do not know the reasons for its healthfulness and that, in addition to vitamins and plant fiber, it is due to the presence of sufficient amounts of other elements such as potassium, which is important in the prevention of many diseases. The Mediterranean diet, rich in grains, legumes, vegetables, and fruits, ensures a potassium intake that is not only sufficient but higher than the standards that are now recognized as indispensable but increasingly disregarded. Not infrequently, the typical foods of the Mediterranean diet, rich in potassium such as cereals and especially fruits and vegetables, are replaced by sweets, baked goods, cheeses and cured meats with little potassium and a high sodium content that increases the urinary elimination of potassium and thus its presence within the body (Clark et al., 2018).

Italy is the home of the Mediterranean diet (D'Alessandro et al., 2019). The current Italian problem, especially among the elderly, is potassium deficiency, due to insufficient intake of potassium-rich plant foods, in combination with an excess of sodium which causes potassium depletion (Clark et al., 2018).

Foods rich in potassium are fruits and vegetables. Citrus are a significant source and not alone. They are also full of vitamins as well as C vitamins. In addition, we find on market enriched food regulated by the European Regulation (EC) No. 1925/2006, which establishes a list of allowed substances as well as their sources. These regulations are the result of a lengthy process, with the aim of regulating and harmonizing the legislation regarding fortification in Europe. The rules state that in addition to classifying the permitted limits of the nutrients to be added, a nutritional table containing the values of the supplemental nutrients must be included in the product packaging. At the turn of the 21st century, the Scientific Committee on Food began issuing guidelines to define the upper limits for the intake of vitamins and minerals in food (Efsa, 2022).

This article explores the significance of citrus production in promoting a healthy and balanced diet, emphasizing the nutritional value of traditional agricultural products and their strong connection to the identity of their territories of origin. The study focuses on two emblematic cases of citrus production in Southern Italy - clementines from Puglia and lemons from Sicily - both recognized for their certified quality. These examples, while not exhaustive, highlight the broader importance of Italy's citrus industry. The aim is to underscore the exceptional quality and health benefits of these products, demonstrating their critical role in supporting a healthy lifestyle and overall well-being.

Italy's citrus production is mainly in southern regions, with Sicily and Calabria bringing together more than 80 percent of the total. Oranges exceed 59 percent of the total supply, followed by clementines and tangerines (25%), lemons (15%), grapefruits and other citrus for the residual part (Ismea, 2023). Quality production is also increasingly on the rise: this is the case of EU-labeled certified products (EU Reg. 2081/92 and Reg. 2082/92) that represent an important segment of the Italian citrus market.

After a brief review of the literature on the importance of the Mediterranean diet and local products, the study examines the characteristics of citrus production in Italy and provides a concise historical overview of citrus fruits, tracing their journey from Asia to Europe. The analysis focuses on two case studies: lemon production in Sicily and clementine production in Apulia. Despite the inherent limitations of the analysis, the reflections presented underscore the vital role of citrus cultivation in promoting healthy lifestyles rooted in the consumption of local products.

2. THE IMPORTANCE OF MEDITERRANEAN DIET LINKED TO PLACE'S IDENTITY

The Mediterranean diet is characterized as containing large amounts of fruits, vegetables, whole grains, legumes, moderate amounts of seafood, and small amounts of other meats and using olive oil as the primary oil (Vitiello et al., 2016). The dietary analyses have consistently found that diets higher in plant-based foods are associated with reduced disease risk compared to omnivorous dietary patterns (Tilman et al., 2011). For example, shifting from a westernized dietary pattern to one that is more a Mediterranean diet reduces risk of diabetes by 7%, and of heart disease by 10%, and total mortality by 8% (Sáez-Almendros et al., 2013). Moreover, increased adoption of a combination or a mixture of Mediterranean, vegetarian, or vegan diets would reduce the risk of diabetes, cancer, heart disease, overweight and obesity, and total mortality relative to expected dietary patterns in 2050 (Springmann et al., 2016). In addition, the adoption of the Mediterranean dietary pattern by a population, based on the specific proportions and composition of foods outlined in the Mediterranean diet, can positively impact both human health and the environment. The Mediterranean diet is recognized not just as a cultural tradition but also as a model that promotes health and sustainability (Serra-Majem et al., 2012).

In recent years, new tools have been developed to "enhance and protect the legal, commercial and cultural values of foods and customs whose characteristics and reputation can be variously attributed to their origin" (Parasecoli, 2017, p. 2). These tools fall into two principal categories: place-based labels, such as PDO (Protected Designation of Origin) and the broader PGI (Protected Geographical Indication), and UNESCO's Intangible Cultural Heritage list. UNESCO first referenced intangible cultural heritage in its 1989 *Recommendation for the Safeguarding of Traditional Culture Folklore*, but food was only included in this category starting in 2010 (Clough, 2015; Di Fiore, 2018). Labels like PDO and PGI demonstrate how European agriculture policies actively preserve and promote the value of traditional, locally produced foods and wines (Silva et al., 2018).

According to Faostat data, the Mediterranean Basin accounts for about 20% of the world citrus production (and about 60% of the world fresh citrus trade). The production is mainly composed of sweet oranges and mandarins like fruits. Citrus is a major segment in the Mediterranean agricultural industry with citriculture representing a major source of income to a significant number of people. It is a source of employment at various levels of the chain, mainly during production because most of the fruit is harvested by hand and plays a role as a driving force to the economy of the entire Mediterranean region.

In Italy there are issues reflected in two paths where there is a clear reference to local and national gastronomic heritage as a closed system. Really, it is not true because globalization increases the popularity of ethnic cuisines.

The food industry involves multiple stakeholders from different sectors (Getz, 2000). These multiple stakeholders include also (food providers such as farms, farmshouse, restauranta and tourism operators) who must share a common vision to develop compositefood experiences; yet, competing interests and conflicts may interfere in its development (Alonso & Northcote, 2008; Gammack, 2006). Also, branding a food destination requires considerable negotiation among key stakeholders to define the place's identity which should emphasize the uniqueness of local food (Lai et al., 2019). Therefore, the uniqueness of local food and wine products (Haven-Tang & Jones, 2008), deeply rooted in a place (Frochot, 2003; Lin et al., 2011), can reinforce cultural differences among regions and countries (Fox, 2007). The natural landscape of territories is also considered as a unique attribute of a food (and wine) destination (Scorrano et al., 2018).

3. CITRUS IN THE LANDSCAPE OF SOUTH OF ITALY

3.1. Brief history of citrus fruits: from Asia to Europe

Citrus fruits, more than other fruit plants, have followed the history of man since the beginning. The etymology of the term citrus comes from the late Latin "acrumen", sour. The term "orange" probably comes from the Sanskrit nagaranja, meaning fruit favored by elephants, which arrived in Europe through the Arabic-Persian word *narang* or from the Latin *aurum*. The Arabs presumably discovered the bitter orange in India and from there transported it first to the Arabian Peninsula and, in parallel with their military and cultural expansion, to North Africa, Spain and Sicily around the 10th century. Another hypothesis attributes the introduction of the sweet orange, first in the gardens of Liguria and then throughout the Mediterranean, to Genoese navigators and traders, who, at the end of the 13th century, awaited the caravans coming from China and India along the coasts of the Black Sea to buy the precious goods. The apothecaries manipulated citrus fruits for the preparation of jams, medicines, and essential oils, highly prized for the perfume industry. The technique of extracting essential oils was known by the Arabs but it was the Italians who enhanced their production in perfumery. The Ligurian and Provencal Riviera established themselves from the seventeenth century as an area of production and trade of citrus fruits, both fruit and plants, In the late seventeenth century, sauces were prepared using candied flowers or fresh juice and cinnamon, and the beautiful fruit to see each other, was exhibited on the table in artistic forms (Calabrese, 2004; Camarda et al., 2013; Giarè & Giuca, 2008; Ivona & Privitera, 2023).

Without excluding the possibility of previous introductions, it seems that, through the usual Pakistani route, the bitter orange was brought to the Mediterranean by the Arabs around the middle of the 8th century. Moreover, the Arabic names of lemon and bitter orange make the first appearance in the "Nabataean agriculture book", a Syrian work of the III-IV century which, translated into Arabic in 904, also contains a brief description of the two fruits (El Faïz, 1995). The Arab works that subsequently deal with agriculture report, often in detail, the aspects related to cultivation, reproduction, properties, uses, etc. of citrus fruits in the western Mediterranean, Spain and Sicily including (Calabrese, 2004; El Faïz, 1995). The citrus fruits cultivated in these territories around the 10th century were cedar, bitter orange, and lemon, in several varieties as well as an unspecified number of intermediate forms between the three species, the lima and, probably also, the pomelo (El Faïz, 1995). Those plants, due to the suitable climate, reproduced in Liguria and from there spread to the rest of Italy, southern France and south-eastern Spain. It is very likely that they met sweet oranges in Chinese ports, cultivated in those places since time immemorial, and it can be assumed that in the first half of the 16th century they arrived in the port of Lisbon. From Portugal they passed to Spain and then to Italy. (Calabrese, 1998 and 2004; Wilkins & Hill, 2006; Langgut, 2017).

3.2. Citrus cultivation in southern Italy

Italy is one of the top ten citrus-producing countries in the world, after Brazil, China, the United States, Mexico, India, Spain, which have implemented important national development plans in the sector in recent decades, and Iran; in eighth place is Italy, followed by Nigeria and Turkey.

Overall, in Italy, the agricultural area dedicated to citrus groves is 112,033 hectares, cultivated by 49,087 companies (Gismondi, 2022). The area cultivated specifically for oranges amounts to

approximately 86,000 hectares and is slightly recovering both compared to 2022 (1.1%) and the average figure for the last three years (1.6%).

In Italy, the production of oranges in the last harvest campaign is estimated at 1.6 million tons, up 20% on an annual basis, but below the average of the last three campaigns. The current campaign is also characterized by the abundant presence of medium-small sized fruits. Domestic demand is not very dynamic, but marketing started late in 2023, due to the harvest postponed by the anomalous heat (Ismea, 2024). Data on foreign trade indicates that, between October and December 2023, imports decreased by 19% compared to the same period in 2022, against a 53% increase in average prices. In the same quarter, Italy's exports exceeded 24 thousand tons with a 29% increase on an annual basis and a 6% increase in average price lists.

Italian citrus cultivation requires certain soil and climatic characteristics typical of the southern area. The first region for production is Sicily, followed by Calabria, Apulia, Basilicata, Sardinia and Campania. In Italy, the most widely grown citrus fruit is the orange. Southern regions, such as Sicily and Calabria, are particularly renowned for producing high-quality oranges. The surface area cultivated with oranges in Italy, in 2023, amounts to approximately 86 thousand hectares and is slightly recovering compared to 2022 (1.1%) and compared to the average figure of the last three years (1.6%) (Table 1).

Table 1. Orange – production area (in hectares).

	2020	2021	2022	2023	Share 2023	2023 vs 2022	2023 vs. average of previous three years
Italy	84.162	84.243	84.773	85.733	100%	1,1%	1,6%
Sicily	55.272	55.292	55.332	56.054	65%	1,3%	1,4%
Calabria	17.749	17.764	17.764	17.799	21%	0,2%	0,2%
Apulia	3.925	3.925	4.435	4.611	5,4%	4,0%	12,6%
Basilicata	3.809	3.809	3.809	3.758	4,4%	-1,3%	-1,3%
Sardinia	1.984	2.024	2.024	2.119	2,5%	4,7%	5,4%
Other Regions	1.423	1.429	1.409	1.392	1,6%	1,2%	-2,0%

Source: Ismea, 2024.

Over the past three years, the area cultivated with orange groves in Sicily has steadily increased to the current over 56,000 hectares (the main increases are in the provinces of Catania, 500 hectares in production compared to 2022, and Agrigento, 200 hectares). Calabria follows the ranking with approximately 21% of the dedicated surfaces, showing in the last campaign a substantial stability in the growth of the cultivated surface compared to the average data of the last three years. Apulia follows with approximately 5% of the national surface invested in oranges. The Istat statistics reported by Ismea (2024) highlight a positive trend in the Apulian surfaces in production, increased by 12.6% compared to the last three years. The Apulian orange groves are located mostly in the province of Taranto.

Generally, the production of citrus fruits is practiced on rather small surfaces; the average company surface, in fact, is equal to just 2.5 hectares. Farms with agricultural area used for citrus fruits of up to 3 hectares represent 83% of total citrus farms and 27.8% of the national citrus fruit area; on the other hand, the type of company with used agricultural area between 3 and 20 hectares constitutes 15.3% of citrus farms and 43.6% of the Italian citrus area; finally, companies with utilized agricultural area greater than 20 hectares represent only 1.7% of citrus farms and 28.6% of the Italian citrus area. Such a small company size is rather disadvantageous in terms of economy of scale, ability to amortize production costs and contractual strength on the market. Furthermore, the national citrus area decreased from 172,444 hectares in 2010 to 112,033 in 2022, with drops in all regions (-34% in Basilicata), and for all the most important citrus species (-19% oranges, -9% clementines, -9% tangerines, -14% lemons). However, the decline in surface areas has been offset in recent years by an increase in production, probably linked to young plantings, varietal innovations and new forms of investment.

Italy's citrus supply consists of oranges, clementines, lemons, tangerines, grapefruits, satsuma miyagawa and other citrus fruits including bergamot, citron and chinotto, thus a rich and varied heritage of varietal and excellence linked to different territories in Sicily, Calabria, Apulia, Basilicata and Campania. In fact, they range from red-fleshed oranges, such as the *Tarocco*, *Moro* and *Sanguinello* varieties of the Catania plain, to blond-fleshed oranges such as the Anapo oval of Syracuse or the navel oranges of Ribera, from the *Ciaculli* tangerines of the province of Palermo to the clementines of the Piana di Sibari and those of Taranto, passing through the bergamot and citron crops of the Tyrrhenian and Ionian coasts of Calabria, to the oranges of the Gargano and the Amalfi lemons.

The marketing of Italian citrus fruits takes place mainly from October to April of the following calendar year; unlike the main autumn harvested fruit species (apples, pears and kiwis), citrus fruits do not undergo cold storage of the product for long periods because storage at low temperatures would affect their organoleptic quality. The citrus fruits remain on the trees until the climatic and market conditions recommend their collection. Once harvested, the product must then be quickly marketed. Most of the offer is intended for fresh consumption, but a large part of the production is given to the juice extraction industries and a more limited quantity, mainly of bergamot and small citrus fruits, is destined for the extraction of essential oils (Ismea, 2020).

3.3. Sicilian Citrus fruit: the case of the Syracuse Lemon (PGI)

Sicily is home to the red *Tarocco* and more varieties of oranges, located in the citrus groves on the slopes of the volcano Etna, which are particularly appreciated and considered distinctive from other varieties in the area for the tenderness of the pulp and the balanced, bittersweet and palatable taste, seasonality, related to the pedoclimatic conditions of ripening. Excellent production is characterized by exports to foreign markets.

Regarding the composition of the production of PGI citrus fruits, in the 2021 campaign 48% of the certified production can be attributed to red orange of Sicily (PGI). This is followed by - in strong growth – Orange of Ribera POD (15%), Syracuse Lemon PGI (13%), Lemon Interdonato Messina PGI, and recently the Lemon of Etna has been certified (Ismea, 2023).

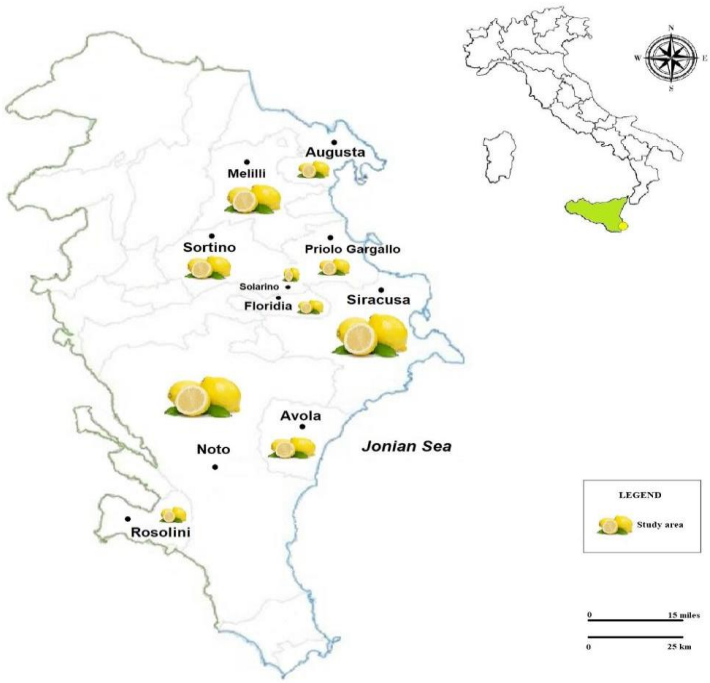

Figure 1. The production area of the Syracuse Lemon (PGI).
(The size of the lemon image is purely indicative, it does not represent the size of the phenomenon but only its location)
Source: Antonietta Ivona, Donatella Privitera (2024)

Here we highlight the Syracuse Lemon, recognized PGI in February 2011, produced between the sea and the flat hinterland and as indicated in the production specification never over 210 meters above sea level. Warm sun, humid air, alluvial and limestone-rich soil, and underground rivers make the certified lemon unique, unbeatable for juice content, very high quality of essential oils, and the high levels of vitamin C and citric acid. The fruit is advertised and recognized on the market with a nice colored brand recalling the Geographical Indication certification.

The area includes the municipalities of Syracuse, Noto, Avola, Floridia, Solarino, Priolo Gargallo, Augusta, Sortino, Rosolini and Melilli (Figure 1). Coastal strip lemon groves look eastward toward the Ionian Sea and extend along a wide area of 10 km.

Unity of climate and compactness of soil are well suited to the lemon variety reserved for the cultivar Femminello and its clones, cultivated with a traditional technique. Refreshed by the Anapo, Asinaro and Marcellino rivers, which flow down from the Iblei mountains in a westerly direction, Syracuse's lemon groves extend 50 km from north to south.

An area immersed in beauty and nature, a unique human and landscape heritage. Sicily has a historic tradition in the cultivation of citrus fruits and the respect for ancient traditions in the cultivation of these plants, handed down from generation to generation continues in the Syracuse area, giving rise to a true school of specialists in the cultivation of the Syracuse Lemon. For these reasons, the Syracuse Lemon maintains a deep connection with the environment that is evident throughout the product chain.

The reference of the companies is the Consortium for the Protection of the Syracuse Lemon (existing since 2014), which groups more than 160 companies of small, medium and large size, and about 5,800 hectares, for a production equal to more than 30 percent of the total Italian harvest (www.limone disiracusa. com). The consortium represents a protection for producers who comply with the specification and for consumers, who are guaranteed the provenance and excellent quality of a product that, like few in the world, can boast such close and long-lasting identification with its territory of origin. Syracuse can consider itself the first province for production in Italy.

Figure 2. Panoramic view of citrus fruits in eastern Sicily.
Source: Donatella Privitera (2024)

The landscape of citrus groves is characterized by a symphony and explosion of shapes and colors, catching the eye all the way to the blue sea (Figure 2).

The Mediterranean nature of the lemons is captured in the diverse ecosystems aided by farmers with an unfortunate lack of rainfall, but in manicured and specialized plantings where the concept of terroir coincides. Landscape value is represented by the presence of distinctive and qualifying elements of the rural landscape, including in combination with each other, such as: terracing, verges, bezel structures mainly made of dry-stone or rammed earth, dry-stone walls, roofing with canopies or other materials, and protective structures designed to protect a single tree. A characteristic part of the built architecture are the artifacts related to the collection and distribution of water through the methods of irrigation by submersion and run-off.

3.4. Apulian citrus fruits: the case of the Clementines of the Gulf of Taranto (PGI)

The Apulian citrus cultivation plays a role of limited importance in the regional context of the agricultural economy, although in some areas it represents a reality of extreme interest. It is almost completely localized in the province of Taranto, in the western Ionic arch called Conca d'Oro (Golden Valley). Smaller areas are also used for citrus groves on the Gargano promontory, in the northern part of the region. In this part of Apulia, particularly, the "transformation of ancient natural and rugged landscapes into a varied countryside shaped by practices derived from needs, values and ambitions, documents the identity and culture of the communities that produced it, placing itself as social construct, a real cultural landscape" (Nocco, 2021, p. 50).

Apulian citrus cultivation is a recent reality; at the beginning of the 1950s the reclamation works, and Land Reform started a process of total transformation of agriculture in the Ionian arc area. Subsequently, the environmental, climatic, pedological conditions and the availability of irrigation water favored the cultivation of citrus fruits. The acquisition of modern cultivation techniques has favored, over time, an overall improvement in Taranto's citrus cultivation to obtain excellent quality products. The pursuit of quality was an important goal for the Apulian citrus growers, who absolutely cannot compare in terms of quantity with the productions of the main citrus-growing regions such as Sicily and Calabria. Already in the 80s the technological level of the Apulian citrus farms was high regardless of their size and form of management, much more than what happened in the citrus-growing regions par excellence.

In particular, the dynamics relating to the citrus area while recording on the one hand a consistent decrease in the areas of mandarin and orange groves, on the other hand the important expansion of the cultivation of clementines which in many cases is re-grafted on the mandarin itself. Consequently, various Italian and EU legislative interventions were aimed at improving production, encouraging the reconversion of orange and mandarin groves towards the other varieties most requested by the market. The reconversion of Apulia was directed towards the common clementines which, in the Conca d'Oro area, found environmental conditions particularly favorable to cultivation.

The geographical origin of this fruit is uncertain; probably the clementines owe their name to a friar, Father ClémenteRodier, who discovered them in Algeria. Their origin is however controversial: for some authors they would be a natural hybrid found in Algeria in 1898, while for others it would be citrus fruits like the Canton mandarin, of Chinese origin. Its diffusion in the Taranto area dates to the eighteenth century, but to see a specialized production of the crop it will be necessary to wait until the twentieth century.

After the Second World War, thanks to the aforementioned Land Reform, which made it possible to make adequate water resources available to farmers, there was an expansion and specialization of citrus cultivation in the territory of the Gulf of Taranto, allowing it to assume the connotation of pre-eminent cultivation in the area. Since 2003, this fruit has been greatly enhanced with the attribution of the PGI[1] and the name Clementines of the Gulf of Taranto, with which the fruit is advertised on the market. The production area is in the province of Taranto and includes the municipalities of: Palagiano, Massafra, Ginosa, Castellaneta, Palagianello, Taranto and Statte (Figure 3) (Regione Puglia, 2022).

[1]The Protected Geographical Indication (attributed to agricultural products, foods or wines that guarantees their local origin) is also a guarantee of particular aromas and organoleptic characteristics, induced by the microclimate. In the case of clementines, the climate is characterized by mild temperatures and low humidity thanks to the presence of sea breezes.

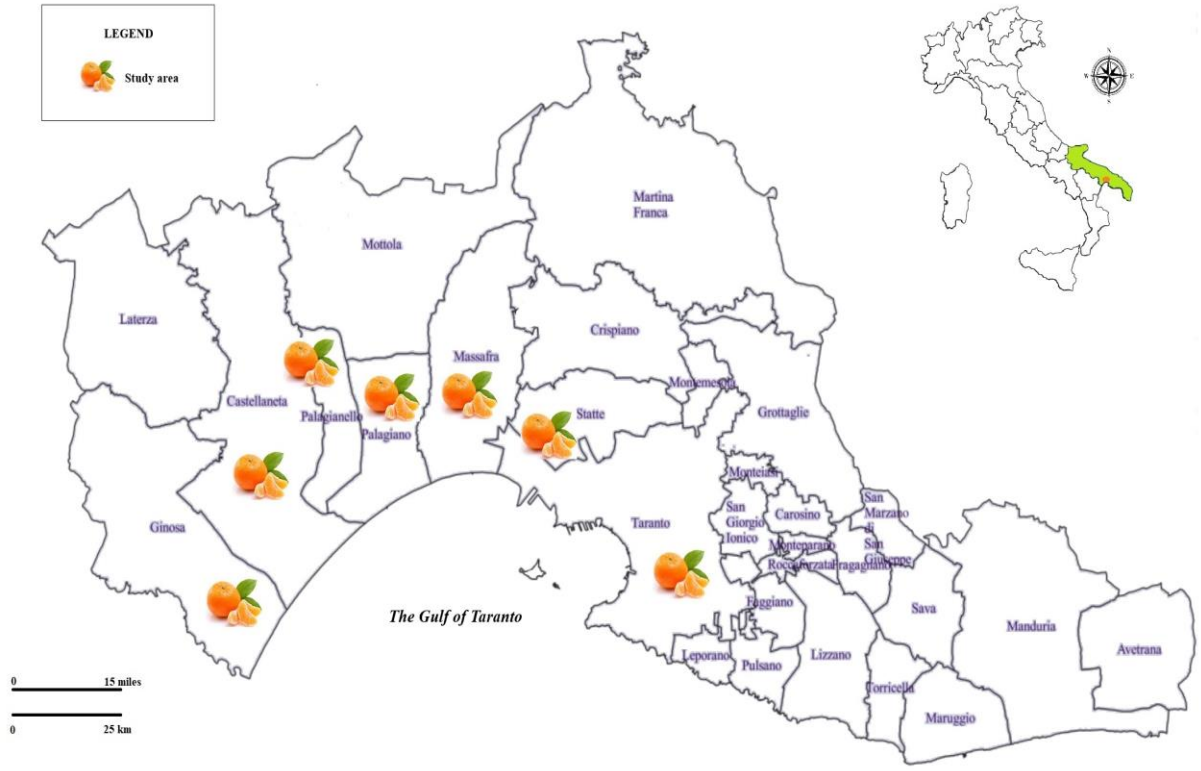

Figure 3. The production area of the Clementines of the Gulf of Taranto PGI.
(The size of the image of the clementines is purely indicative, it does not represent the size of the phenomenon but only its location)
Source: Antonietta Ivona (2024)

The taste of clementines is very similar to that of orange, with the particularity of containing a few seeds. This cross between mandarin and orange is characterized by a spheroidal shape, slightly flattened at the poles, smooth and thin skin, rich in essential oils such as linalool, alpha-pinene and limonene. Like all citrus fruits, it has a high content of vitamin C, trace elements such as calcium, iron, and magnesium, and is normally available on the markets in the months from November to March.

The cultivated varieties are different: Comune, Fedele, Precoce di Massafra and Grosso Puglia; only fruits with a minimum juice content equal to 40% of the weight are allowed for distribution. 100 grams of clementines contain approximately 5 grams of water, 0.1 of lipids, 0.9 of proteins, 1.2 of total fiber, 8.7 of sugars and carbohydrates and important quantities of sodium (4 mg), potassium (130 mg), calcium (31 mg) and phosphorus (18 mg). The fruit is seedless (presence of a maximum of 5% with seeds), packaged in containers of 3 kg up to a maximum of 25 kg. Clementines of the Gulf of Taranto are quite common on the markets in their fresh state and in the form of juices, jams, syrups and for the preparation of cosmetic products.

Citrus growers pay close attention to production methods; the soils, homogeneous and almost always flat, are fertile, deep, and well drained. This facilitates irrigation, which, practiced almost all year round, takes place by dropping or gushing, directly but away from the canopy, to avoid rotting in the collar area of the plant. Pruning, carried out every year in late spring, is aimed at supporting the balance between the vegetative and productive functions. Fertilization is based on the state of fertility of the soil and takes place every three years. Harvesting is done strictly by hand with the help of scissors, trying not to damage the fruit. The harvesting period varies according to the variety, the Municipality is the one that has the longest productive period, while the others are first fruits. The harvested fruit must be dry, with at most a few leaves (Figure 4).

Figure 4. Massafra: a field of clementines.
Source: Antonietta Ivona (2024)

There are 1,041 agricultural businesses dedicated to the production of citrus fruits in the province of Taranto, 9% of the total Ionian agri-food business, with a production of clementines, oranges and mandarins of 1.9 million quintals. In the other Apulian citrus production area, the Gargano, on the other hand, 103,000 quintals of oranges and lemons are produced, in an area at high risk of hydrogeological instability, characterized by historic citrus groves. As for the average company size, the Taranto area (2.70 hectares per farm) is among the main citrus provinces, before Catania (2.61 hectares per farm) and after Syracuse (3.25 hectares per farm). At the regional level in Apulia, the average agricultural area used with citrus fruits is equal to 1.54 hectares per farm. Overall, the annual production of citrus fruits in Apulia is 1.2 million quintals (Istat, 2024).

4. CONCLUSIONS

Southern Italy is rich in history, culture, natural landscapes of high environmental and socio-cultural interest and quality products; all these characteristics could activate virtuous processes of sustainable development. A balanced and eco-sustainable use of the territories, together with an appropriate awareness of the economic potential of local productions, would produce undoubted advantages for the entire communities that live there.

Citrus production certified with a geographical indication mark is growing year after year; despite this positive trend, they now represent a residual share of national citrus production. These are modest shares which could certainly increase considering the reduced competition from similar products and the strong territorial connotation of the productions with the EU-labeled certified brand. Also, food and gastronomy has become a motivation for traveling, and constitutes an element of identity for a territory, not only for the appreciation of the quality products but also with the exploration of the cultural and landscape heritage (Ivona & Privitera, 2023).

In many cases, however, the EU-labeled certified recognition process suffers from some negativities, such as: an insufficient analysis of the actions necessary to satisfy market demand; a frequent inadequacy of the organizational structures, which often have not been able to aggregate the sectoral economic operators (Clough, 2015). Furthermore, the often-limited dimensions of the production areas and an ineffective communication of the organoleptic and healthy qualities of the product complete a

rather opaque overview. In addition, it is necessary to consider climate change which, with drought, is limiting production, particularly in southern Italy.

The diffusion of healthy and wholesome food styles would certainly favor the whole quality agricultural sector, including certified citrus production. The benefits of human health deriving from a habitual consumption of citrus fruits are widely recognized by the international scientific community. It would be enough to leverage this element to facilitate and support the consumption of fresh citrus products, also developing new methods and opportunities for consumption. The players in the supply chain, also with cooperative initiatives, could pursue product and process innovation to increase the added value of the product (cut-out range, increase in shelf life, etc.) and to create new opportunities for consumption and ways more suitable to stimulate consumption also by young people (for example, fruit salad or juices in places of concentration such as cinemas or stadiums). Future challenges around forms of well-being will have to be faced with a more holistic vision that includes physical fitness, a healthy diet, and a long-term strategy. Really, experts have reflected the acknowledgment that gaining accessibility to a healthy and sustainable form of diet is one of the obstacles to a better future (e.g. food desert), and very few link these reflections to a reexamined understanding of sustainability and the relationship between food production and consumption (Bertella, 2020), which needs to be further enquired through academic research.

In terms of practical contributions, this study provides insights for policymakers and practitioners aiming to promote sustainable agriculture and regional development. Specially strengthening geographical indications like PDO and PGI can enhance the market value of citrus products while preserving their cultural and territorial identity, making them more competitive in local and global markets. In addition, encouraging environmentally friendly agricultural techniques observed in these case studies can contribute to sustainable farming, reduce ecological impacts, and align with green policy initiatives. Moreover, integrating citrus cultivation into culinary and agritourism experiences can diversify local economies, attract visitors, and foster an appreciation for the Mediterranean diet as part of intangible cultural heritage.

Finally, there are some limitations of this study that should be highlighted, since they may be the trigger for future research. Reflections on the subject relied on self-reported preferences, from the bibliographic review rather than observed behavior of consumers; in fact, which is tentative and doesn't provide insights from the producers nor the public policies. These limitations highlight areas where future research could refine and expand upon these findings, perhaps by including samples, using behavioral observation, or exploring additional cultural and personal factors that influence gastronomic preferences.

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