

Vine landscapes in Crimea: evolution, problems, prospects

Abstract

The conditions and factors of development of the vine landscapes in Crimea and their evolution are considered for the ancient, medieval, imperial, Soviet (first and second halves of the 20th century), and post-Soviet periods. The characteristics of the vineyard landscape zones (South Coast, Foothills and Steppe) are presented. Having reached their maximum areas in the period 1955-1970, the area of the vineyards in Crimea decreased steadily until 2017. The main causes of degradation were the spread of phylloxera, the campaign against alcoholism in 1985, the deterioration of sales after the collapse of the USSR, and the ineffective system of cultivation technology. The current ways of reviving grape landscapes – the introduction of innovative methods of farming, greening and cluster forms of viticulture and winemaking – are addressed.

Keywords

Crimea • vineyard landscapes • cultural landscapes • evolution • cultural heritage

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Introduction

The vine landscapes of Crimea are an integral part of its cultural landscapes, which have a history that spans several millennia. Viticulture is a priority direction for the development of the economy of this region, rich in traditions and experience in the cultivation of grapes. The grapes grown in Crimea are distinguished by high quality taste and good capacity for storage and transportation. The liqueur wines made from these grapes – Muscat white, Muscat pink and Muscat black technical varieties – are among the best in the world.

The well-known scientific school of viticulture and winemaking was formed in Crimea. The role of different natural factors in the functioning of the vine landscapes has been shown in the works of Akimtseva (1946), Bolgarov (1960), Negrul and Krylatov (1964), Blagonravova and Shcherbakova (1963), Fursa (1977), Davitaya (1981), Khachatryan and Gavrilov (1985), Kazantseva and Fursa (1985), and Dragan (1990). The directions of optimization of Crimean viticulture and winemaking in different periods of time were investigated by Buzni (1929), Ponomarev, Pargulov and Chernjavskij (1975), Rybintsev (1998), Matchina and Buzni (1999), Dzhenev and Antipov (1999), Avidzba (2000), Avidzba and Cheremisina (2003), and Dikan (2013).

The topicality of vine landscape scientific research carried out not only by Crimean scholars but also by the international community is a result of the problems of studying the conservation of the landscapes. This task was put forward by the Council of Europe 2000, the European Landscape Convention and UNESCO 1972, and the Convention concerning the Protection of the World Cultural and Natural Heritage.

The aim of this article is to study the evolution of vine landscapes in Crimea, to reveal the current problems and to identify directions of perspective development.

Sources and methods of research

Bibliographic, statistical and cartographic sources were involved in the research. The borders on the map of the modern zones of vine landscapes in Crimea were defined using the existing geographical zoning of Crimea. To study the dynamics of the vineyard area and their productivity, data from the Ministry of Agriculture of R. Crimea was used.

Environmental features and viticulture development

Crimea has a favourable natural potential for the cultivation of grapes and the formation of vine landscapes (ed. Pozachenyuk 2009). The main climatic factor that determines the possibility of cultivation is the temperature during the vegetation period. In Crimea, the territory from 46 to 44° North latitude, and from 33 to 37° East longitude, is appropriate for grape cultivation. The abundance of sunshine, and the long warm period with an average daily temperature above 10°C for 180 days in the North and 210 days in the South of Crimea, create favourable conditions for growing grapes of table and technical varieties (Ved' 2003).

The significant properties of the soils are the mechanical composition, the soil power and unconsolidated deposits, the moisture supply, the salt regime, and so on. In this respect, most soils in Crimea – chernozems/kastanoze, kastanozems, anthrosols, and partly sod-carbonate soils – are suitable for the formation of vine landscapes. The hydromorphic plains of Crimea with halophytic saline and chestnut soils are the limiting factor of the geographic vine landscape distribution. The Crimean Sivash area differs notably, with a near total absence of vineyards (eds. Skvortsova & Dragan 1990).

The relief of Crimea is also an important factor in the development of vine landscapes. The Crimean Mountains limit

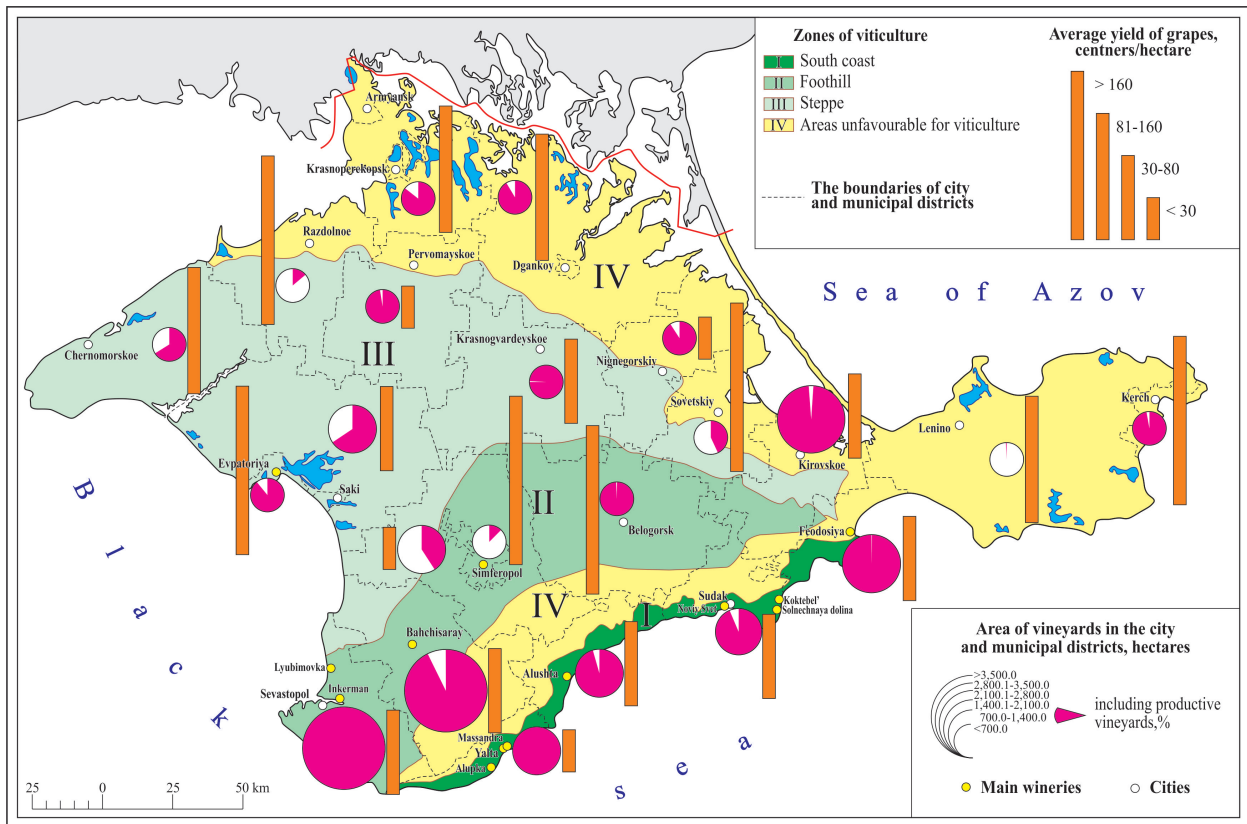


Figure 1. Zones of vine landscapes in Crimea

Source: Author's map based on information from the Ministry of Agriculture of R. Crimea, 2017

their spreading up to a height of 700 m. The lower boundary of the vine landscape formation reaches 70-180 m. Orientation in the mountainous parts of Crimea has a different effect on the functioning of the vineyards. The Northern, North-Western and North-Eastern slopes are not good enough for growing most grapes, while the slopes with southern expositions are favourable. The mountain valleys, because of the dominance of mountain-valley winds, fog and frost, lead to disease of the vineyards and reduce their productivity. The Black Sea has a positive effect on vine landscape formation. Especially positive conditions occur along the South coast, where the mountains protect these landscapes from the cold North-East winds, and the grapes are grown without the protection of bushes in the winter. The favourable influence of the sea also affects the West coast from Balaklava to the Tarkhankut Peninsula, where grapes are cultivated without cover during the winter. At the same time, the soil salinity of coastal areas reduces the quality and yield of grapes in the breeze zone.

The modern geography of industrial viticulture coincides with the ancient centres of reference, where the grape is an important element of the trophic culture, and its cultivation is a component of targeted farming systems. In 2000, perennial plantations (vineyards) accounted for 6.2% of the total land area of Crimea.

Landscapes of the vineyard zones of Crimea

The territory of the Crimean Peninsula's climatic conditions for the formation of vine landscapes can be divided into four zones: the South Coast (I), the Foothills (II) and the Steppe (III, IV) (Figure 1).

Grape landscapes of Crimea were formed in the following natural zones (Major Habitat Zones) of Crimea (Pozachenyuk 2009):

- within the southern macroslope of the Crimean Mountains – the Submediterranean Vegetation of the South Coast (I – see Figure 1), partially in the forests of the Southern Slope (IV – see Figure 1);
- in the plains of Crimea – the True Steppe (III – see Figure 1) and partially in the Semi-desert Steppe and Saline Lands (prisivashe, IV – see Figure 1), as well as the Semi-desert Steppe and Saline Lands of the Kerch Peninsula (Kerch Peninsula, IV – see Figure 1);
- in the foothill and mountain areas of Crimea – the Premontane Forest Steppe (II – see Figure 1), partially in the forests of the Northern Slope (IV – see Figure 1).

The grape formation landscapes of Crimea have their own peculiarity in each natural zone (Tab. 1).

The South coast area of vineyards covers the Southern coast of Crimea (Figure 2). The natural conditions of this area are extremely favourable for maturing non-covered grapes, cultivating extra-early, late and very late varieties of grapes with a high sugar content (Tab. 1). The soils of the zone are highly-altered anthrosols, so-called slate-anthrosols. River valleys have more fertile soils and the grape harvest is larger, especially when watering.

This zone is characterized by the planting of square vineyards in river valleys – ordinary (trellis). The location of roads and the shape of the site affect the choice of the direction of the rows of grapes. The density of vine planting depends mainly on the climatic and soil conditions of the area. On the steep and stony

Table 1. Climatic resources of the zones of vine landscapes in Crimea

Characteristics	Zone		
	South Coast	Foothills	Steppe
Amount of active t °C above 10 °C	3,540-4,195	2,945-3,763	3,215-3,580
Average amount of precipitation, mm: November-March April-October	123-318 189-269	147-209 225-305	127-174 183-301
Absolute minimum t °C	-15-(-25)	-28-(-35)	27-(-33)
Average annual t °C	12.1-13.9	9.7-11.7	9.9-12.0
Soils	Anthrosols	Kastanozems	Chernozems/kastanoze Kastanozems, Calcisols
Habitat Zones	Submediterranean Vegetation of the South Cost, Forests of the Southern Slope	Premontane Forest Steppe, Forests of the Northern Slope	Semi-desert Steppe and Saline Lands, True Steppe, Semi-desert Steppe and Saline Lands of the Kerch Peninsula
Vineyards	Vineyards indomitable; square planting vineyards; trenching to a depth of 1-1.25 m	Mostly covered; square and ordinary planting vineyards; trenching to a depth of 0.70 -1.25 m	Covered, in some areas neucrylate; ordinary planting vineyards (trellis); trenching to a depth of 1-0.70 m

Source: Table compiled by the authors based on materials from the *Conception of Viticulture and Winemaking Strategy in the Republic of Crimea, 2014*

slopes, where bushes have a relatively weak growth (southern coast of Crimea), a square planting with a distance of 1.06 metres between one bush and the next is used. 8,927 bushes are placed in one hectare. On the gentle slopes, which have more rich soils, the distance between bushes increases to 1.42 m, giving 4,975 bushes per hectare.

This area produces the best Muscat wines, Port wines and Madeira wines of all post-Soviet countries.

The Foothill area geographically coincides with the foothills of the main ridge of the Crimean Mountains. The covered vine landscapes, early ripening for the production of cognac wine materials and champagne, are on the larger forest-steppe of the foothills. Good table grapes are grown here as well. In the Western part of the foothills, where the landscape is formed under the influence of the south-westerly warm air masses blowing from the sea, the non-covered vineyards of technical grapes with a different maturing time are grown. The best wine material for champagne and fine table wines is found here, as well as grapes for good quality strong and dessert wines and juices.

When planting vineyards, the slopes are often terraced. This method of planting grapes in Crimea was introduced by the ancient Greeks. In river valleys and mountain terraces the ordinary (trellis) planting of vineyards prevails, and on the slopes the square method is used. In the grape landscapes in the mountainous part of Crimea, the bushes are typically 'cupped' in shape.

The Steppe zone coincides geographically with the majority of the Crimean plain. In its central part, covered vine landscapes of table grape varieties with early ripening are formed.

In the Crimean plain, the soils are more fertile, grape bushes have strong growth and are planted using the rarer ordinary (trellis) method. The distance between the rows is 2 metres, with a row of 1.5 metres between the bushes, and 3,333 bushes per hectare. This zone of Crimea, in comparison with other zones, is colder, so for good grape ripening the earth needs to be warmed



Figure 2. Cultural vine landscapes of the South Coast zone. Photo by authors

by the sun to a greater extent: the vineyard rows often run from North to South (with rows being exposed to the hottest rays at noon). This vineyard orientation is often used in the warmer locations on the South coast of Crimea, as in the hottest hours of the day, the bushes shade each other or receive side lighting.

The grape landscapes of the Crimean plain are characterized by the so-called 'bilateral Guyot cordon' form of bushes. The conditions of the area are favourable for the production of cognac and sparkling wine, strong and dessert wines. In the western part of the Steppe zone, due to the warming effect of the sea, non-covered and covered vineyards of early and medium ripening are formed. Their materials can be used for producing white wine

of all types, strong white and red table wines, ordinary dessert wines and vintage port.

Vine landscapes of Crimea's evolution

Throughout history, the scale of Crimean viticulture, its geographic structure and the role in the societal development of the Crimean region have changed. Six stages can be distinguished in the evolution of vine landscapes in Crimea:

I. *The antique period.* Viticulture and winemaking appeared in Crimea between the 9th and 5th centuries BC when ancient peoples – the Cimmerians and the Tauri – inhabited the Peninsula. In the period of the Greek colonization of the Northern Black Sea area (8th to 6th centuries BC), urban settlements (Chersonese, Panticapaeum, Tiritaka, etc.) appeared in Crimea. They were notable for their developed vine-growing and winemaking culture.

Colonists from Greece brought the vine to Crimea and introduced technology for the cultivation of grapes, which allowed crop quality to be improved – cutting leaves, tying up vines, late vintage and other methods. Wine in amphorae was an important article of foreign trade from Greek cities in Crimea with the cities of the Black Sea and the Mediterranean area. Almost all the territory of Chersonese (present-day Sevastopol) in the 4th century BC was divided into 400 so-called *clares* of 30 hectares each, where vineyards and wineries were located (*Kontseptsiya strategii razvitiya* 2014). The loss of areas in North-Western Crimea as a result of Scythian expansion in the 2nd century BC led to changes in the structure of agricultural production, the reduction of the vine landscapes and the increase of grain crop areas (ed. Petrova 2010).

II. *The medieval period.* When the Golden Horde invaded the territory of Tavria Kherson (medieval Chersonesos) in 1395-1396 AD, the most important centre of viticulture was burned and viticulture moved to the cave cities of southwest Crimea – Kachi-Kalon, Tepe-Kermen, Eski-Kermen, and the Principality of Mangup Caleh.

The revival of viticulture in the region of Sudak (medieval Surozh, Sugdea), and in the 15th century on the southern coast of the Peninsula, began with the arrival of the Genoese. The main areas of the spread of vineyards were coastal areas – Kefe (Feodosiya), the territory between Gurzuf and Alushta, Sudak, Inkerman and Balaclava (Bolgarov 1960). In the period of the Crimean khanate, viticulture and winemaking were cultivated by local residents – Greeks and Karaites. Despite the Koran's ban on producing and consuming wine, the Crimean Khan Shagin Ghiray received a tribute from Sudak and Mangup vineyards (ed. Petrova 2010). However, on the whole, in the Muslim Crimea, viticulture and winemaking did not play a major economic role.

III. *The tsarist period.* The Russo-Turkish war (18th century AD) led to an almost complete destruction of the vineyards on the southern coast of Crimea. A new upsurge in the development of viticulture began with the annexation of Crimea by Russia in 1783 and Catherine the Great's policy of donating and selling Crimean lands for their accelerated development. As a result, Count G.A. Potemkin had a new plantation of technical grapes laid in the valleys and mountain slopes of the southern coast with Pinot Gris, Tokay and other vines imported from abroad. Count M.S. Vorontsov, who created new vineyards in his South coast estates at Alupka, Al-Danil, Massandra and Gurzuf, played an important role in developing this industry (*Istorija vinogradarstva v Krymu* 2018).

A government decree of 14 September 1828 approved the inheritance rights for the cultivation of vineyards. Preferential taxes to the treasury, cash awards and medals for success in viticulture were introduced (Zaharova 2005). In the 1930s, in the area of Alushta-Feodosiya-Kerch, more than 3 million vines were grown (Bolgarov 1960). Most of them were formed from varieties imported

from Europe and local wine varieties such as Cabernet, Riesling, Pinot, Kokur, Chasselas, Pedro Ximenez, Semillon, Claret, Tokai, Zand, Grenache and Muscats. The scientific institution 'Magarach' (Yalta), founded with the participation of Count Vorontsov, has engaged in variety testing, breeding new varieties of vines and training vine-growers and winemakers. During the Crimean war of 1853-1856, grape plantations in Sevastopol and Bakhchisarai were badly damaged and some were uprooted.

Thanks to Prince L. S. Golitsyn's idea on the development of the production of sparkling wines in the 'New world' estate (South-Eastern Crimea), new vineyards were installed. In 1889 in M.S. Vorontsov's estates, the 'Massandra' winery was organised and new approaches were adopted for the management of viticulture and the methods of combating grape diseases, such as oidium and mildew. However, problems arose in terms of planting diversity, a large proportion of old vineyards, and the lack of fertilizers, which resulted in relatively low yields and the rapid damage of bushes.

In 1908, the total area of vineyards on the Peninsula amounted to 9,400 hectares, corresponding to 6th position among the 11 major agricultural crops. In 1915, the export of fresh table grapes to St. Petersburg, Moscow and other Russian cities reached a record high – 1,277,000 tons (Buzni 1929). However, more than 60% of the vineyards were run by small farms using primitive grape processing methods. As a result of the First World War followed by the Civil War, the area of vineyards decreased to 5,400 hectares and the yield capacity fell to 6.9 centner per ha (Ponomarev et al. 1975).

IV. *The Soviet period (the first half of the 20th century).* During the 1920s and 1930s, the nationalization of estates was carried out. Cooperative economic associations ('Yuzhsovhos', later 'Crimsadvintrest', etc.) were organised. Due to the financial and technical assistance of the State, the total area of vineyards increased from 4,800 hectares in 1922 to 11,800 hectares in 1940, with 99.8 per cent of all vineyards falling under cooperative ownership and only 0.2% remaining the personal plots of the farmers (*Istorija vinogradarstva v Krymu* 2018). The large increase in vineyard areas and grape harvests can also be explained by the improvement of new agricultural machinery methods. Great damage was caused to the vineyards of Crimea during the Second World War: more than 4,000 hectares were destroyed, and the remainder of vineyards were thinned out by 30-40% (Bolgarov 1960).

V. *The Soviet period (the second half of the 20th century).* The period 1955-1970 was the heyday of Crimean vine-growing and winemaking. The total area of vineyards reached a record level in 1959 (152,500 ha), and the area of fruit-bearing vineyards increased to 88,200 ha in 1970 (Figure 3). The largest grape harvest was collected in 1976 (661,500 tons) (Fursa 1977). In addition to the traditional areas of viticulture and winemaking, the Sevastopol and Steppe wine areas were formed.

The construction of numerous factories of primary winemaking, located as close as possible to the source area, contributed to the widespread development of viticulture. The cultivation and processing of grapes during this period was considered a priority branch of the national economy of Crimea. The share of the revenues from the sale of grapes among agricultural products increased from 18.2% in 1961 to 22.5% in 1970; the level of profitability in 1970 reached 85.7% (*Narodnoe hozjajstvo Krymskoj oblasti* 1977). The monocentric management model was entrenched in the grape and wine sector of the region. *Krymsovkhozvintrest*, which consolidated 109 specialized companies and more than 50% of the orchards and vineyards in Crimea, coordinated the production and bilateral Guyot, as well as grape processing, supply and marketing. The total number of employees in the system was 63,000 people, and

Krymsovkhovintrest provided up to 65% of revenue in the budget of Crimea.

Since the mid-1970s, destructive phenomena began to occur in Crimean viticulture. Significant damage was done by phylloxera. Valuable vineyards were uprooted as a result of this pest, and only a small part of them were inoculated. An extremely negative role was played by the Communist Party Resolution of 7 May 1985 'On measures of overcoming drunkenness and alcoholism'. Large areas of vineyards were destroyed in the realisation of this Resolution. The total area of vineyards in Crimea decreased by 53.6% between 1970 and 1996.

VI. *The post-Soviet period.* The process of reforming the regional economy, including the grape and wine complex of Crimea, was accompanied by a reduction in the share of state ownership and an increase in private and collective ownership, as well as the deconcentration of land use and production. The main cause of degradation was the ineffective system of cultivation technology. *Krymsovkhovintrest* disintegrated in 2006, and its plantations became the property of numerous joint-stock companies.

During the period 1990-2000, the grape and wine complex of Crimea remained unattractive for Ukrainian and foreign private investment. Among the few examples of foreign investment is the French company 'L'Empire du Vin' LLC, which established the 'Crimean Wine House' enterprise in 2004 (South-Eastern Crimea). As an experiment, 14 hectares of vineyards were laid with a drip irrigation system; new vineyards were planted and certified organic seedlings from France and Serbia were used.

State, problems and prospects

The state of Crimean viticulture by 2016 can be evaluated as stressful. The total area of vineyards in the Republic of Crimea and Sevastopol city had decreased to 22,800 hectares. The area of vineyards has grown from 17,090 hectares in 2014 to 18,500 hectares in 2016. 67 organisations are involved in the commercial production of grapes (Ministerstvo Sel'skogo Hozjajstva Respubliki Krym 2017).

For joint and individual enterprises, plantations with a small area have prevailed. 71.4% of these entrepreneurs have vineyard areas of less than 100 ha. The largest vineyard owners are the organisations with their own wineries included in the structure: the federal state unitary enterprise 'Massandra' (Yalta, 3,658.1 hectares of vineyards), 'Stary Krim' JSC (Kirovsky region, 1,092.9 ha), and 'Koktebel factory of chateau wines' LLC (Feodosia, 1,078.8 ha).

Cultural factors have had a particular influence on the viticulture industry of Crimea. Thus, the area of vineyards belonging to the Crimean Tatars is 2,551.52 hectares (14.6% of the total area); mainly table grapes are grown. Crimean Tatars are not represented in winemaking due to religious restrictions.

Grapes in Crimea are cultivated mainly in vaccinated inoculated open culture. The system is the following: a vertical trellis (the most common form), a mostly horizontal cordon of one or both sides on the medium and high trunk, and a planting scheme of 3 m x 1.5 m. Irrigated plantations make up 24% of the total vineyard area, but not more than 17% with drip irrigation. The water availability factor is a determinant of the yield and the gross grape harvest. The average annual grape production is 90,000-100,000 tons with an average yield of 51 centners/hectare. But in 2014, Ukraine's refusal to supply water to the North Crimean canal and the long summer drought led to a reduction in harvesting to 70,000 tons with an average yield of 43.4 centners/hectare. The age of the vineyards necessitates their systematic renewal (Figure 4).

Crimea's specialization is the cultivation of technical grape varieties, which account for 83% of the total area. Along with the

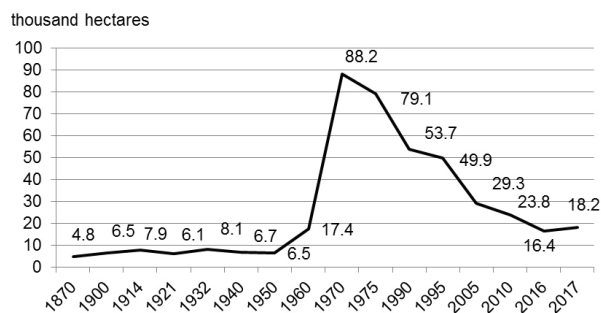


Figure 3. Dynamics of the productive vineyard area in Crimea in 1870-2017, thousand hectares

Source: Figure based on information from the Ministry of Agriculture of R. Crimea, 2017

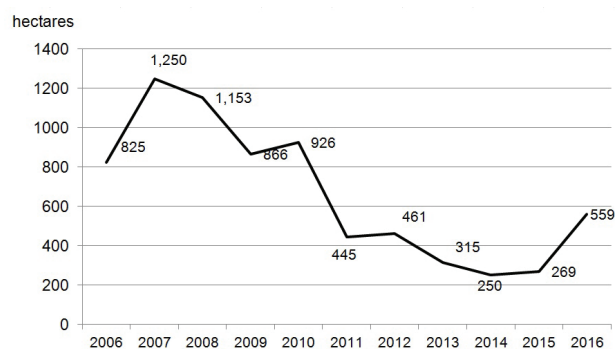


Figure 4. Planting of young vineyards in the Republic of Crimea in 2006-2016, hectares

Source: Figure based on information from the Ministry of Agriculture of R. Crimea, 2017

popular Italian and French varieties, selected by the 'Magarach' Institute of Viticulture and Winemaking, the varieties Bastardo Magarach, Early Magarach, Libya and Chocolate have become widespread. In recent years, many farms have started reviving the native grape varieties Kokur white, Kefesia, Sabbath and Asma (Tab. 2).

Under the European Convention, landscapes are understood as a common heritage of European identity resources. The vine landscapes play an important public role in cultural, ecological and social fields. They create a resource for economic activity, stimulate job creation, create a recognisable image of Crimea and contribute to the development of tourism. The vine landscapes of Crimea are a unique part of the landscapes of the region, and its cultural heritage, requiring systematic conservation and regeneration.

The reformation of the viticulture and winemaking sector in the Russian Federation. The number of economic entities has increased, but the process of the concentration of production and capital v mergers and acquisitions is just beginning. During privatization, one of the largest wineries in Crimea – the Crimean factory of sparkling wines 'Novy Svet' – was transformed from a state enterprise into a joint-stock company, and in 2017 it was sold to the St. Petersburg company 'Southern project' (established by 'Russia' Bank).

The state has launched a programme to support viticulture and winemaking in Crimea. In 2014, state support amounted to 78.3 million rubles, in 2015 – 85 million rubles, in 2016 – 189.5

Table 2. Grape varieties grown in the major viticulture zones of Crimea

The main viticulture areas	Technical varieties of grape	Table varieties of grape
South coast	<i>Cabernet Sauvignon, Aligoté, Rkatsiteli, Merlot, Chardonnay, Sauvignon Green, Pinot Gris, Bastardo Magarach, Saperavi, Traminer, Alibillo Krimskii, Verdelho, Sémillon, Tokaji, Shabash, Kokur white, Muscat Blanc, Muscat Rose, Aleatico, Kefesia</i>	<i>Moldova, Asma, Shabash, Red Globe, PG-12 (Shokoladnii), Muscat amber, Muscat Hamburg, Muscat Italy, Magarach's Rannii, Cardinal</i>
Foothill	<i>Rkatsiteli, Cabernet Sauvignon, Merlot, Chardonnay, Sauvignon Green, Rheinriesling, Aligoté, Pinot Gris, Muscat Ottonel, Pinot Noir, Traminer, Bastardo Magarach, Saperavi, Shabash, Kokur white</i>	<i>Moldova, Muscat Hamburg, Muscat amber, Muscat Italy, Magarach's Rannii, Cardinal, Kodrjanka</i>
Steppe	<i>Aligoté, Cabernet Sauvignon, Rkatsiteli, Merlot, Sauvignon Green, Rheinriesling, Chardonnay, Saperavi</i>	<i>Magarach's Rannii, Cardinal, Moldova, Muscat Hamburg, Muscat Italy, Arkadiya, Agadai, Odesskii souvenir, Karaburnu</i>

Source: Table compiled by the authors based on materials from the *Conception of Viticulture and Winemaking Strategy in the Republic of Crimea, 2014*

million rubles, and in 2017 the subsidies amounted to 235 million rubles (Ministerstvo Sel'skogo Hozjajstva Respubliki Krym 2017). The main investments will be aimed at sowing new plantations of grapes.

In the context of sanctions against Russia will remain the main market for Crimean grapes and wines. However, in the long term, high-quality Crimean products can enter the world market.

The deterrent factors for the further development of viticulture in Crimea include intra-industry, intra-regional and external problems.

The most urgent problems of Crimean viticulture include:

- the disproportion of the modern vineyard area of Crimea to its potential. The sharp reduction of vineyard areas and the vintage volume of grapes has led to the dependence of the Crimean wine industry on imported wine materials;
- almost 50% of the vineyards are over 20 years old;
- in the transition from a planned economy to market relationships, the varietal composition of plantations has worsened, and grape growing technology has deteriorated. Poor use of resource-saving technologies and special agro-technical measures aimed at increasing grape productivity has resulted in the relatively high cost of grape production;
- there is no nursery base in Crimea – the selection system has been destroyed;
- there is a deficiency of qualified personnel for viticulture and winemaking in the region.

The solution to these and other problems should become an integral part of the development strategy of viticulture and winemaking in the Republic of Crimea and Sevastopol. The Concept developed by the expert group of the Union of Vine-growers and Winemakers of the Russian Federation includes the goal to create a wine-producing province in Crimea. Among the key objectives for the development of viticulture are: planting 60,000-70,000 hectares of new vineyards, reaching a total vineyard area of 100 hectares by 2025; the replacement of table and technical grape imports to the Russian market (20% and 30%, respectively); creating nurseries for cultivating at least 15 million seedlings per year; organising an agricultural equipment park for processing grapes and industrial refrigerators for storing table grapes with a capacity of at least 40,000 tons of simultaneous storage.

The necessary organisational form for the future development of viticulture and winemaking is a wine cluster, as has been successfully implemented in several countries. It is important to develop and realise the models of several regional clusters, uniting the grape and wine enterprises and related organisations located in the same region and involved in a common business. Big brand businesses, lease-holders and medium and small enterprises, including farmers, can enter this cluster.

The successful development of viticulture in many countries shows the important role of state support. Taxation, credit and subsidies for the industry are preferential, as well as financing marketing activities and research aimed at improving the quality of grapes.

Conclusion

Crimea has a more than 2,000-year history of viticulture and winemaking. Reaching its heyday in the 1960 and 1970s, Crimean viticulture developed extensively; however, while the areas of the vineyards increased, their productivity did not. The 2000s saw the degradation of the vine landscapes in Crimea – that is, the reduction of vineyard areas, thinning out, and the reduction of yield due to the deterioration of the varietal structure of plants and cultivation technology violation. The reforming of the wine complex of Crimea must be based on a scientifically-developed strategy; the advanced organisational form is that of a regional wine cluster. The vine landscapes in Crimea are the cultural heritage of the region.

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