



**“Developing Identity ON
Yield, SOil and Site”
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“There is Alcinous’ fertile vineyard too, with a warm patch of level ground in one part set aside for drying the grapes, while the labourers gather and tread others, as the foremost rows of unripe grapes shed their blossom, and others become tinged with purple.”

Homer, Odyssey (BK VII, lyrics 129- 135)

CHAPTER 1. Historical facts for wine in Macedonia and Thrace

1.1 Wine from antiquity until the present day in Macedonia and Thrace – God Dionysus

Grapevine cultivation in Greece goes back in the depths of the ages. The first appearance of wild vines in the Tenagi of Philippi is placed during mid Pleistocene (850.000 years ago) (Athanasiadis *et al.*, 1993). Those first vines were unsuitable for consumption or for wine production. Humanity, after the prehistoric times, together with the cultivation of grains, began the cultivation of the grapevine. The grapevine cultivation in ancient Greece was widespread, not only in the area of Athens and the Peloponnese, but also in the islands, in Macedonia and Thrace. Especially, in the region of Macedonia, wine has a long history. According to Klearchos Soleas, the first person who discovered the art of vinification was Maron, the son of Evanthi, honored in Maronia of Thrace.

The first samples of vine cultivation were found in eastern Macedonia, near Krinides, in Kavala. In a recent excavations grape seeds were found, dating back to the late prehistoric period. Grape seeds have been found in the excavations at Toumba of Photolivos in Drama, dating back to the Neolithic period (around 4000 BC). Moreover, grape seeds, which resemble in general to modern wine grape varieties, have also been found in the same area near the village of Sitagri, where the water was artificially supplied. Those grape seeds date back to 3000 BC.

Based on seeds of grape berries already found in various excavations in Greece, is assumed by the researchers that the cultivation of grapevine and the production of the first wine is placed in the middle of the third pre-Christian millennium (Logothetis, 1970). However, there are researchers, assuming that the cultivation began in the Greek area around 1200-900 BC, based on the study of pollen, although they accept that the native grapevines appear earlier in the north-Hellenic area.

The first grapevine cultivation region in Greece is considered to be Philippi in eastern Macedonia from the period of 2800-2200 BC. More specifically, in a neighboring area near Philippi there are traces of grapevine cultivation and winemaking dated in the middle of the

3rd millennium (Logothetis, 1970). It could be assumed that vinification had already begun from the end of the 5th millennium BC, around 4100, based on patches found in Neolithic layers of old excavations, by recent studies (Valamoti *et al.*, 2007). In that case, we have the first indication of winemaking across the Mediterranean area.

At the same time, the worship of god Dionysus, inseparably bound with the vine and the wine, begins. There are many different views on the place of origin of god Dionysus. Although, ancient writers originally place him in Phrygia, in Lydia, in Egypt or far away in India, there is also the aspect of his Thracian background, and many contemporary researchers believe that he is native (Otto, 1991) and one of the oldest Greek gods. The name of Dionysus was seen by archaeologists on Linear Scripture sights B.

After the end of the Mycenaean civilization (1100 BC), the worship of Dionysus was out of the fringe. Most likely, the effect he had on the freedom of expression made him not likeable to those following tradition and rules of the time. Of course, in areas such as Thrace, he had never ceased to be a significant god figure. Consequently, it is no wonder that tradition wants Dionysus to be born on in that territory (Otto, 1991).

For the following centuries until the late Mycenaean period our knowledge for wine in Macedonia is rather limited. Homer knew Dionysus, but he did not rank him among the Olympian Gods, nor does he often mention him. Unquestionably, he mentions the famous ismaric wine (i, f 40 & 198), which was produced in Ismarus, a city of Kikones, near Maroneia. The most important information comes from Homer, who mentions in Odyssey that Maron had offered ten amphoris (clay pot) of wine to Odysseus. With this wine Odysseus had intoxicated the Cyclops.

From the archaic and the classical period, we have a lot of information on the cultivation of the grapevine and on wine industry in Macedonia, mainly from texts of those periods, from representations in coins especially from the 6th century BC and in vase paintings of the classical period. According to this information, there were vineyards in Thasos, Pella and Stagira, where even Aristotle himself owned his own vineyard. Furthermore, in an inscription of the 5th century BC in Thasos, there are texts that define all the issues relating to vintage, winemaking and the market of wine, which was sold only in amphorae sealed by

market inspectors. The same law, in order to protect the authenticity of local wine, defined that every ship transporting wine was restricted from accessing the port of Thasos, with the penalty of confiscation the ship.

Although vineyards have often been destroyed by adverse weather conditions, illnesses and warfare, it is known that in the 5th c. A.D. the cultivated land had increased, while wines were characterized by the region where they were produced. The famous wines of antiquity mentioned in ancient texts: the vivlian wine, the maronos wine, the mendeos wine, the acanthios wine, the skionios wine and the pelaios wine (Kourakou-Dragonas, 1998).

However, the Romans' prevalence in the Mediterranean shifted the center of gravity of wine trade from the northern to the southern Aegean even beyond that, outside of Greece. Nevertheless, wine production in Macedonia continued.

1.2 The Famous Wines of Antiquity in Eastern Macedonia and Thrace

1.2.1 Ismaric or Maronite Wine

In case of the Dikili Ta's seeds, near Krinides, are the oldest archaeological evidence of wine production in prehistoric Thrace, the earliest evidence of wine trade in Thrace in Early Historical Times comes from Homer. In both Iliad and Odyssey, Homer gives plenty of information on wine, the cellars and the thirst of his heroes. In fact, he provides so much information on wine praises, that Horatius called him *vinosus Homerus*.

However, apart from the general references to wine, only two famous wines are shown: the wines of Maron and Pramnios. While for the Pramnios wine there is a simple reference without giving more specific information, for the Maron wine he provides a detailed description of its sensory characteristics. This is a very sweet old fragrant wine from Ismaros, Thrace., In the ninth rhapsody of Odyssey, Odysseus begins to describe his adventures to Alkinoos, the King of the Pheakon, when he arrives on his island after twenty years of wanderings.

Of all the countries that he wandered with his comrades, the land of Kikones is the only one we know where exactly was Kikones, known from Herodotus, was a Thracian tribe, settled between Evros and Vistonida Lake, today's Porto Lagos. The Trojan War was placed at the beginning of the early Iron Age around the 11th century BC while the Iliad and the Odyssey were written in the second half of the 8th century. In those times the Thracians had inhabited low forested areas, cultivated vineyards and supplied wine to the camp of Acheous. Due to the fact that Kikones were allies of the Trojan's, Odysseus in the regional military operations defeated Ismaros and narrating to Alkinoos, he mentions that they had filled and got amphorae full of red wine. Maronias, a priest of Apollo and protector of Ismaros, in order to flatter Odysseus, offered him gold coins, a silver crater and twelve large amphorae with red wine. In the years of Homer, it was obvious that, the wine coming from the coasts of Thrace, the area around Ismaros, was famous and the subject of trade and exchange of prestigious gifts.

According to the ninth rhapsody of the Odyssey, Odysseus took with him, this black and sweet wine until they landed on the hostile island of the Cyclops, where later he gave this wine to Polyphymus. Its sensory characteristic is known from the description of Odysseus to Alkinoos. It was a sweet divine beverage, which could be mixed twenty times with water and still be sweet as honey. After this mixture, the color from black becomes red and a delicious smell arouses from the crater.

In ancient times, sweet wines were made from grapes berries which were spread out under the sun to evaporate part of the water, contained in the berries in order to concentrate their sugars. This sweet and vicious wine was produced by grapes containing a lot of sugar and the pomace was really dense. Therefore, Maron's wine, in order to receive twenty parts of water without losing its winy character, and still sweet as honey, it should have a high density. According to Ms. Kourakou (Kourakou-Dragona, 2013 (a)), such a great dilution was unrealistic and it is unlikely that Cyclops would get actually drunk. Apparently, the poet reports this ratio in order to show that it was a divine wine.

The Ismarian wines, seen in post-modern sources (Karadima, 2009), were sweet wines produced from sun-dried grapes, similar to today's risky wines or otherwise "naturally

sweet". The center of the area was Maronia, an ancient city built in the 7th century BC, at the foothills of Mount Ismaros, colonized by people originally coming from the island of Chios. Tradition conveys the foundation of the city in the past, assuming that its founder was the priest Maron.

The city evolved into a strong local power. It was the largest and most important of all the ancient Greek colonies on the coasts of Western Thrace, the only one with continuous prosperity throughout antiquity. It also held an important strategic position, due to its rich and extensive territory which included, within its borders, the entire meadow of today's city of Komotini and the mountain of Ismaros, which was rich in pastures, grapevines, but also gold and silver mines. In the 5th century the city became part of the Athenian alliance.

Ismaro and later Maroneus or Maronite wine, was known, and in high demand, as it is mentioned in ancient texts, such as the "Deponosphistes" of Athenaeus and the lyrics of Archilochus (725-650 BC), the father of iambic and scoptic poetry. Moreover, according to "Paiana" of Pindaros, a good quality of wine was produced at the coasts of the Thracian land. We are being informed from Archilogos that at the 7th century BC wine from Ismaros, was being traded in Thasos. He named the wine of the region as Ismaric. Plinius, the Roman poet of the 1st century, reports that even in those years the vineyards and the wine of Maronia were famous. Later on, at the 3rd century AD the poet Athineos refers to Marona and its wine, which as he mentions is was very dense and it has to be diluted in the ratio of 1 to 20, water-wine.

1.2.2 Thassian Wine

At the end of the 8th and in the beginning of the 7th century BC, Thassos and the coasts of Thrace across the island constituted the land of promise for the South Greek cities-states. In the early 7th century BC, Thassos was colonized by people from Paros, and quickly emerged as a powerful metropolis of a major colonial state, with extensions to the opposite coast of the Aegean Thrace. Galipsos, Apollonia, Isimi, Antisara, Neapolis (today's Kavala) and few other cities were some of the Thasian colonies on the coast of ancient Thrace, in the area

between Nestos and Strymon rivers. The expansion of Thasos to the continental coasts was completed during the 5th century BC (Koukouli-Chrysanthaki, 2007).

The character of the colonies was determined by the geomorphology of Thasos and the coastal zone. It was cosmopolitan with commercial contacts with the known world of that time. The base of the commercial conciliation was formed by the exploitation of the rich deposits of gold and silver, and from the agricultural crops as well.

Since the Neolithic era, the presence of the wild or the cultivated vines has not been identified on the island. However, in Skala Sotiros the presence of a domesticated vine in the early Bronze Age is confirmed. The trade of wine from Chios in the 7th and 6th c. BC in Thassos and in Thassian Perea is demonstrated by the archaeological findings. The Thassian wine trade was significantly emerged during the 5th century. Like the most famous wines of ancient times (the Ismarian wine of Maroneia, Chios, Akanthios, the Vivlian wine of the Vivlian Mountains of ancient Isimis), it was a dark red wine with a high alcohol content (around 18°) consumed only when diluted with water. In the middle of the 4th century BC, the Thassian wine, dominates the markets of mainland Greece, Macedonia, Thrace and the coast around the Black Sea, and is considered to be of high quality, similar to that of Chios. The wine was characterized by its black color (black and red) by the ancient writers. In Lysistraty hawse read that it had the color of blood and an exquisite scent Dionysus states "according to Ermipus that it has a scent of apple and was considered to be the best wine after the one coming from Chios (Kourakou-Dragonas, 2013 (b)). They prefer it aged, they filter it before consumption, they often dilute it before they serve it, and they heat it or cool it in the snow. According to an old recipe, if they put into the wine dough made of wild wheat and honey, the wine gets the aroma of the honey and sweetness from the dough. According to Theophrastus, this kind of wine was served to Thasos castle.

Latin writers refer to it as a fine product. The recipe for the production of the Thassian wine is found during the 10th century in an agricultural handbook, but definitely the vinification technique was traditional. It is well known from Plinius that the grapevines of Thasos had very sweet berries and they had to reach perfect maturity. According to Florentio, the mature grapes were exposed for 5 days under the sun and at the sixth day, when they were

wilted and dehydrated, berries were dived in a mixture of must and sea brine in equal parts, and then placed in the press for twenty four hours. After that berries were pressed by feet and the must produced was placed in pots. When the must became clear they were adding 1/25 of warmed must in order to increase its sugar content. Then the wine was added in clay pots until spring time. The first tasting of the new wine was during the feast of Anthesteria. Also, since the 5th century BC, there was a strict law in Thasos forbidding the adding of water in wine. The wine of Thasos, according to Dioskouridis, belonged to the non-aromatic wines. The wine was hermetically sealed in jars in the warehouses.

Despite written sources that are incomplete, archaeological researches have contributed to a more sufficient study of the production and distribution of the Thassian wine in antiquity. The great importance of that wine, which was significant for the economy of the island is testified by laws found in marble inscriptions, concerning the marketing of wine, the first legislative measures to protect its production and the trade within the boundaries of the city-state territory of Thasos and beyond. The most ancient law (480 BC), is saved incomplete and regulates the trade of wine and vinegar, defines a fine of one “ekti” for the offender and one more “ekti” dedicated to Athena and Apollo. On a marble slab exposed to the Museum of the island, there is an engraved text on the of wine or vinegar from the 'harvested crop' stage. The viticulturist is protected, while in violation of the law, the infringer buyer is punished and the trial is similar to extortion (Kourakou-Dragonas, 2013 (c)).

A third law engraved on the same marble, as the previous one, mentions the interference of special lords who supervise the export of wine: no Thassian cargo-ship was allowed to import wine into the territorial waters between Mount Athos and Cape Pacheia, because both the ship-owner and the captain will had to pay the fines provided for the dilution of wine with water. To protect wine from imitation and counterfeiting. Thassian wine was sold inside amphorae in order to guarantee their authenticity.

The study of the amphorae, a two - handed vase, designed mainly for the storage and transport of wine and other products (oil, cereals, walnuts) has contributed substantially in recent years to the progress of research on economy and trade in antiquity. The word

amphorae in the 5th century BC has the importance of a unit of measurement of capacity, as it is clearly seen in an inscription of Miletis and it even has subdivisions. It is estimated to have a capacity of just over 20 liters. The same meaning has the word “ceramion” or “thasion”. Twelve workshops making amphorae have been located in Thasos, most of them located around the coast, from which it was easier for the wine to be transported by cargo ships.

Most of the Thassian amphorae usually have a seal in one of its handles. The seal is done with a stamp before putting the pots in the oven. Until now, only one unused clay stamp has been found in Thasos. The common feature of the 15,000 seals found on the island is that they usually include symbol of viticulture or worship of local gods, the name of the city's lord and nationality. So far, the meaning of seals on the handles has not been clarified. Some researchers believe that this is a tonnage guarantee, while by other researchers it is being assumed that it was also a kind of fiscal control in amphorae production. Moreover, apart from Thasos, the same technique sealing amphorae was used by other wine producing areas (Rhodes, Cnidos, Sinopi, Iraklia Pontica, Samothraki, Aenos) (Karadima, <http://www.thassos-island.gr/el/ιστορία>).

From the middle of the 2nd century BC the trade of the Thasian wine gradually receded for the benefit of other production centers such as Rhodes, Cnidus, Kos and other cities of the Ionian coast of Minor Asia of which the wine was of lower quality. The gradual decline of viticulture on the island began in the 15th century, giving its place to the cultivation of olive trees, which slowly prevailed until the end of the 18th century. In the past centuries, many foreign travelers, looked for the famous wine of ancient times in the wine of Thasos. However, the Thassian wine concluded to be a red wine of medium quality and medium preservation. We must go back to the Byzantine and especially to the Hellenistic and Classical periods (from the 5th to the 2nd centuries BC) in order to trace the golden age of Thasian wine, seen continuously in texts and epigraphic testimonies.

The viticultural laws of Thasos at the 5th century BC, are the oldest legislative texts on the protection of wines with Designation of Origin in the field of a more general viticulture policy, aimed at ensuring the quality of the product and to protecting wine, as well.

Moreover, we can distinguish the first attempt to create the regulations for wines with a designation of origin, as they are now in force in EU countries. It's amazing that there are similarities between the legislation of Ancient Greece for quality wines originating from specific regions and the present EU legislation

1.2.3 Vivlian Wine

The Vivlian Grapevine is one of the twenty-eight grapevines varieties of the Ancient World as reported by the lexicographer Polydefkis. Nineteen of them are written with the first letter in capital (e.g. Limnia, Pellaia), which indicates their place of origin, while for the rest of them their name denotes a characteristic. Consequently, there is no doubt about the geographical origin of the Vivlian grapevine variety.

The wine traded by the Phoenicians was known as Vivlian wine and was produced in Phoenician vineyards, in the Vivlia of Foinikis and the surrounding area, where vineyards were cultivated. In the 4th century BC the Vivlian wine was of high value and competed, according to Archestratos, with the other exquisite and expensive wines of antiquity such as the wine from Lesvos. The name "Vyvlia" is of Semitic origin, but in ancient texts it is written as Vivlia because of pre-emptive assimilation of the "y" in "i".

In the ancient Greek literature there are several references to Vivlian wine for ten centuries (7th century BC – 3rd century AD) (Bakalakis, 1939 and Salviat, 1990). In "Dipnosophistes", Athenaeus (Sophistis of the 3rd century BC from Achaia) praises the Vivlian wine which takes his name from a homonymous region, however the poet does not know where this area exactly is. Epicharmos (comedian poet of the 6th century BC) speaks of some Vivlian landscapes. The data that Vivlia is a land of Thrace, between Antisara and Isimis, comes from Armenida, but it does not exactly associate it with wine. Combining all these references, the researchers conclude that the Land of Vivlia was a Thracian region where the Vivlian Mountains were located. On their slopes, vineyards were cultivated and the Vivlian wine was produced and not in the fertile plain areas for cereals (Kourakou-Dragonas, 2013 (d)). Thanks to modern archaeological excavations, we now know that by the end of the 7th century BC the Thasians established their first colonies in Thrace, Neapolis (today's

Kavala), Isymi (today's New Peramos) and a number of small commercial stations as well. One of them was Antissara.

There are indications that grapevines were cultivated since antiquity. According to Stefanos Byzantios (geographer and lexicographer of the Byzantine years) Isymi is identified with the Homeric Aisymis and it seems that, prior to the colonization by the Thassians, it was a city in communication with the Mycenaean world. The findings of the archaeological excavation (Yuri-Koukouli, 1988 and Koukouli-Chrysanthaki, 1993) support this, as well. Nevertheless, geographical indications that Vivlian Land and Vivlian Mountains are not mentioned by historians and geographers of historical times (Herodotus, Thucydides, Strabon, etc.). The gap in the name of the area leads to the idea that the Vivlian Mountains existed as a wine-producing center before the Thasian colonization of the 7th century and that's why the name was rescued due to the quality and the reputation of the Vivlian wine (Kourakou-Dragonas, 2007).

According to Epicharmos, the name Vivlian wine was toponymous, but there is also the point of view that it is due to a variety of vines cultivated in the Vivlia of Phoenicia. According to Mrs Kourakou-Dragona, the Vyvlia / Vivlia grapevine variety was a "brave" grapevine. The last name comes from Theophrastus in his book "history on plants" where he records the noble varieties with wide geographical spread in ancient times. Grafts were cultivated in areas where the Phoenicians had commercial relations or where they were settled. In the 9th century, the Phoenicians, naval and merchant people, arrived in Thasos and Pangaio Mount, searching for markets for valuable metals (Tiberius, 2004) due to the fact that they were great blacksmiths. At that time, they transported grapevine grafts and contributed significantly to the spread of the varieties, but also to the cultivation techniques of vineyards and the methods of making sweet wines throughout the known world of that era.

In the text of Isiodos there are clear guidelines on how to put under the sun the grapes and the preparation of sweet wine. According to Polidefkis, the sweet wines (sweet as honey) contained many sugars and a small amount of alcohol. Such a composition should also had the Vivlian wine. This dense wine could not be consumed as it was but it had to be diluted first. Salviat, considering various sources, expressed the view that Phoenicians spread the

Vivlian vine in the region of Thrace and the plant colonization was so extensive, that it manage to affectd its names: Vivlian Mountains, Vivlian Land. From the center of Thrace the variety immigrated to the rest of Greece and from there to Italy and Sicily. Moreover, in Askri of Biotia, Isiodous, during the 7th century BC consumed Vivlian wine, (in one part of wine he added 3 parts of water. According to Athinaios they were also drinking the Vivlian wine in Sicily.

1.3 Wine in the period of Byzantium and the Ottoman domination

The decline and collapse of the Roman Empire meant the abandonment of wine-growing and the dramatic decline in wine consumption in western and central Europe. Nevertheless, as Byzantium remained the guardian of the Greek and Roman cultural heritage in the Middle Ages, preserved viticulture.

The testimonies and references in historical texts inform us that the identity of the Byzantine wine tradition was the continuation of the ancient Greek. In the Greek and Early Byzantine times, in many ways the extension of the ancient world, there was a change in the relationship of man with Dionysius and his gift. The god himself, the godfather, the generous, the lysimeter (the enemy of problems and anxiety), the cunning, the “ambassador” of laughter and smile, clashed during the years of Justinian and defeated by another god, Jesus, the God of Christians, called the “true Ambelos”. The vine and the wine are indeed the most sacred symbols of Christianity. In Byzantium, wine unites biblical and Greek tradition. The ancient god, Dionysus, is always alive, though disguised. Despite his expulsion from the Christian vineyard, he has lent almost all of his symbols to Christ and to the emperor who both appear in the icons as vineyards, with Apostles and believers as grapes.

In the continuation of these two worlds, the ancient and the Byzantine, the activity of wine producers and wine-growers, is actually based, as well as the beginning of wine trade (the ancient verb "kapilevo" meant to trade), the legal and commercial provisions, the conditions to control wine coming from the West. The wine growers, the wine producers and the wine traders formed the chain of "production-handling-consumption" of wine in the Byzantine

era. Wine consumption took a different form. Unlike their ancient ancestors who drank a sour wine, the Byzantines preferred a more vivid and warm wine, stored in ceramic vases. The most appropriate pot was called “kafkos” (http://vizantinaistorika.blogspot.com/2014/08/blog-post_10.html). According to the historian Procopios, during the years of Justinian, large ceramic pots filled with wine were buried in the soil and in autumn are filled with must or new wine and sealed their spout with clay (Procopios, *For the wars*, VII 35, Anagnostakis, 1995).

The Byzantine society had two aspects: the official, brilliant Byzantium and the Byzantium of the farmer, the tavern, the poet. In the first, the Byzantine rulers narrate their feats in the banquets, around a marble board, with their gold cups full of sweet wine, just like the Homeric heroes. The ceremony of the harvest at the Royal Court is presented to us in the works of the Emperor Constantine Porphyrogennetos and testifies the importance given by both the kings and the church to the harvest and the pressing of the grapes. In fact, Constantinople, where all the wines of the Empire were gathered, will be named by the Anglo-Saxons, as Winburg, meaning Oinopolis, the city of wine. Every day people also continued to come together with wine at taverns and the wine was always present at the table.

Grapevine cultivation in the wine-producing regions of Pella, Thasos, Kavala and Drama continued, especially, in the area of Paggaios, was famous for producing high quality wine. This area has been visited by the emperors Nikiforos Fokas and Andronikos Kantakouzenos in order to taste those wines.

Equally important, if not the most important area of wine production during the Byzantine period was Chalkidiki. Due to the fact of many monasteries on Mount Athos - more than today - and the position of wine as a basic principle of the monks' diet, almost all of Chalkidiki, both in the south and northwest, until Kalamaria, was full of grapevines used for wine production. As a consequence to the systematic cultivation of the grapevines, during the 10th century, there was an abundance of wine in Mount Athos. Hence, it started trading in Thessaloniki and later was transferred to other areas of Macedonia, Istanbul and other

countries. The wine was stored in special warehouses in the monasteries, and respectively in warehouses of the monasteries all over Chalkidiki.

The wine was known in Europe through the Venetians after the conquest of Istanbul by the Crusaders. The Crusaders and Western feudal lords during their return to the Western areas and their abidance in Byzantium, carried different varieties of grapevine which they transplanted them mainly to the Mediterranean coast. In the 14th and 15th century, wines from the Peloponnese, Crete, Macedonia and Thrace, arrive in Istanbul or continue to the trade of the Black Sea. In Avdira and in the area of Maroneia, there was one of the most important vineyards of Byzantium and the famous "Pamiti Wine" was produced, a paraphrase of the ancient Pan-Methis, which was mainly derived from the present Thracian varieties Pamiti and Thrakiotiko. During the Ottoman Empire, the French consul in Constantinople resembled this area with that of Bordeaux, France.

During the Ottoman domination, the cultivated areas with grapevines decreased significantly. The main reason was the negative attitude of Muslims against alcohol and wine, attitude stemming from the ban of alcoholic beverages imposed by the Koran from the Muslim religion. However, wine-growing and winemaking did not stop in those areas. The main wine-making zones were then Siatista, Serbia, Amydeo, Naoussa, Goumenissa, Kitros (near Katerini), Gianitsa, the monasteries of Mount Athos in Halkidiki and the region of Thessaloniki. The Turkish traveler Evlia Celebi, who traveled during the 17th century all around Macedonia, observed that there were 4.600 hectares of vineyards around Thessaloniki and in each vineyard there was also a place for entertainment.

1.4 Wine in modern times

A severe damage in Grapevine cultivation in Macedonia were observed late in the 19th century, and at the beginning of the 20th century. Phyloxera attacked vineyards in Pilaia for the first time in 1898, an area outside Thessaloniki, during the following decades it

expanded to the vineyards of the rest of Macedonia and Thrace. Its expansion was rapid and catastrophic, especially in Macedonia, where whole vineyards, like Siatista and the Monastery of Megisti Lavra, were completely destroyed. As a result, in 1938, Macedonia produced only 7.9% of Greece's wine.

Without any doubt, many attempts have been made in order to establish new varieties with varieties of grapevines, originally coming from France, Bulgaria and other European countries, with controversial results. Although, the vineyards were saved, the cultivated areas reduced significantly and the quality of the produced wines decreased dramatically.

1.5 Wine, Religion and Culture in the wider area of Macedonia and Thrace

1.5.1 Wine and Dionysian worship

The cultivation of the vine, the production of wine from grapes and the effects of wine-making on the human body has always been caused awe to humans. Hence, it was connected with the gods. The birth of various gods in the Thracian mythology, is similar with the rest of the Greeks. One of these deities was the god of ecstasy, named in Thrace as Savazios and in the rest of Greece as Dionysus. In the Thracian tradition of the past, he is the main figure of every ritual and the protector of wine and vineyards. Therefore, he is considered to be a superior spiritual entity, since wine cultivation has been associated with the consciousness of the people of that time as a passage to a higher social status, from hunting animals. According to a myth, Dionysus was born and lived in Paggaios, where he was worshiped by a Thracian tribe, the Itonoi. It is about a deity associated with wine and agriculture that was especially loved in Macedonia and Thrace, an area where the Dodecatheo was not as widespread as in southern Greece.

In some regions of Macedonia and Thrace, Dionysus had an animal figure. He is particularly worshiped in Paggaios and Kissos along with the Mainades, referred to as "Klodonoi" and "Mimalonoi". In the following centuries, "Mainadism" continued in Macedonia until the fall of the ancient world and its ceremonies were transferred to the ancient theater. The

"mainadal" troupe, was very popular in Macedonia, consisted only of women, while the top dancer was a man wearing "crowns", "crocoton" and a "matrix", a model of the female Dionysus, unlike to other regions of Greece, where the image of Dionysus was resembled to a phallic image. Large quantities of wine were consumed in the performances. The same events take place during the Vackhic orgies, quite popular in Macedonia as well.

The Thracian coasts with the privilege of having fertile soil was a colony of an ancient Thracian tribe, the Kikones, from the Iron Age (1050-650 BC). Kikones were Thracian people living in the area between Lake Vistonida and river Evros. Their name come from the hero Kikona, the son of Apollo and Rodopi. For the first time Kikones were mentioned by Homer. In the Iliad (B 846) they are mentioned as allies of the Trojans, campaigned with their captain Euphimos. In Odyssey (I 39) they are being mentioned at the first episode in the wanderings of Odysseus, after leaving Troy. In the narratives, Kikones were numerous and skillful warriors and took their revenge from Odysseus and his comrades, who destroyed their city. Maroneia is the most important city in the region.

Maronas, a prominent hero, said to be the grandson or even son of Dionysus and a comrade of Silenos. Various stories regarding the life of Dionysus are placed in that period. Homer, for example, mentions a myth about Lykourgos, the mythical king of Idones, who was punished by the God because he pursued him and prevented the spread of Dionysian worship (Tiberius, 2007). The myth that took place in the land of Idones, was the main theme in two theatricals, one of Aeschylus, of which little is preserved (Spiropoulos, 1992) and a second one "the Vaches" of Euripides which was written when the poet was in Macedonia, in the court of King Archelaus. During the Archaic period there is a revival of his worship throughout the Greek area. Therefore, it is obvious why they consider Thrace as one of the birthplaces of the Dionysian worship.

A large number of texts found in the region of Eastern Macedonia and Thrace, refer directly or indirectly to Dionysus and in the vine and the wine (Loukopoulos, 2005). In Herodotus (VII. 111.2) we read about an oracle of Dionysus in the mountains of Thrace, while traces of an important sanctuary of Dionysus that was in operation until late antiquity lead to Drama (Koukouli-Chrysanthaki, 1992). A significant large number of monuments such as marble

statues and reliefs, figurines, vases, paintings, mosaics, coins dating from the Archaic period to late antiquity confirm the presence of Dionysus in the area. The crater of Derveni is one of the most characteristic and well-known monuments of Dionysian worship (Sideris, 2000).

The worship of Dionysus remained alive during the Hellenistic period, particularly in Pella, during the Roman period and at the first Byzantine period, especially in Amphipolis. At Lagadas, a few kilometres outside Thessaloniki, refugees from the coastal regions of eastern Thrace and the Black Sea still celebrate a festival on the 21st of May, the name day of Constantine and Eleni, known as the anastenaria. It is a tradition with roots to the Bacchanalian orgies of antiquity. The occasion involves reckless consumption of wine and walking with bare feet on glowing coals, two activities inseparably linked to the cult of god Dionysus in Thrace.

1.5.2 Wine, Vine and Christianity

During the Byzantine era and when Christianity was established as an official religion, the wine that was used for the worship of the gods, became the wine of the Divine Revelation, the Blood of the God-Man. Jesus Christ is called “the true vine”, while his students are the canes and the loyals are the grapes. The ancient god Dionysus collides with the new era and is no longer worshipped. The conflict between the Christian religion and the ancient Greek is merciless.

During the Early Christian period (4th - 6th century AD), the theme of the vine (canes- trusses) is found on royal floors, ecclesiastical utensils, with obvious symbolism, while during Byzantine and post-Byzantine times on frescoes, holy vestments, etc. Thus, large and modern wineries are made by the monks, thanks to which the art of winemaking was preserved in many areas, while the quality of the wine was improved. Christianity will play an important role in the historical continuation of Greek wine, through the winemaking activity of the monasteries of Mount Athos, the use of sweet wines from the Greek islands in the Holy Communion and the use of the vine as a basic element of Byzantine art.

Since the beginning of the 12th century, the Orthodox Church has made St. Tryphon the guardian saint of vines and vineyard workers, thereby assimilating extremely ancient beliefs

concerning vegetation and fertility. This saint had for centuries been extremely well-known and venerated in the vine-growing regions of Macedonia.

Apart from the celebration of St. Tryphon, there are many more customs in Macedonia related to wine. Their origins are lost in the depths of ages and almost all of them are being done uninterrupted until the present day. Wine is a fare fellow of joy and sadness, it essentially accompanies all the important moments of humans, but also their everyday life. At birth, baptism, engagement, marriage, death, wine was and still considered a necessary supplement on their diet. In everyday life wine accompanied and still does the delicacies at the lunch table, especially when meat is cooked on the cold winter days.

1.5.3 Wine and Vine at the Feasts and Customs

One of the best preserved feast in Greek culture during the Greek calendar year is the feast of winegrowers and winemakers. Its origins are deeply rooted in the past of the Greek population. Researchers in the field of archeology have found many mythological and religious feasts of wine among the population of Thrace and the ancient population of the Balkan Peninsula (Marazov 2000). Traces of the Thracian cultural heritage remain in Greek folk culture, a mixture of paganism and Christianity. The overlapping of cultural layers from ancient times to the present has created specific forms of rituals and celebrations dedicated to wine, viticulture and Saint Tryphon. The Saint's celebration day is considered as a feast of viticulturists and gardeners. The feast has been preserved and continues to exist over the centuries. Therefore, tradition continues today.

The calendar year is scattered with celebrations and customs related to the cultivation, growth and harvesting of the vine, as well as the production of its precious grape juice. All stages of cultivation and production are identified with great Greek national holidays.

The mixture of empirical but ancient knowledge of viticulture and wine with the pagan customs and the great Christian tradition gave a series of celebrations and customs covering a full range of necessary works. Customs that usually work as rules and simply and effortlessly transfer experience in the future. They are being found in all parts of the country and others are as local as the nature of the plant of grapevine that thrives everywhere.

However, it produces fruits according to the specificity of the land and the local climate. (Loukatos, 1945, Politis, 1870-1872, Megas, 1939).

1. New Year's Eve

During New Year's Eve, in some parts of Thrace the festive table of each house includes nine feast dishes, the bread of Jesus called "christopsomo", a glass of wine and three small breads. In every small bread, they were putting a small candle and the mother of the house was lighting up the candles and smoked the table, the people, the house and their animals. The father was putting out a small bag with money from his pocket, left it on the table, and said, "These are money for Jesus." After finishing the meal, they were pouring wine in a clean corner of the house and left it there for the next twelve days.

In the village of Skopos in Thrace, the person who found the stick of vine hidden in New Year's Eve cake inherited the vineyard and the one found the coin inherited the house.

2. Epiphany

Everything, including vineyards, were sprinkled with holy water and after the sanctification, the priest was giving bread, cheese and wine to the fold.

3. Saint Tryphon's Day on the 1st of February

Saint Tryphon is considered to be the protector of gardens and vineyards and is depicted holding a shears. The Saint is presented in the most recent folk hagiographies as "young, ruddy, wedge-shaped" holding a pruner, the main tool of wine-making works of that time period. Given the fact that there are no episodes of his life or his miracles in his biography, connected to the vine and the wine, how come he was associated with vine and its intoxicant product?

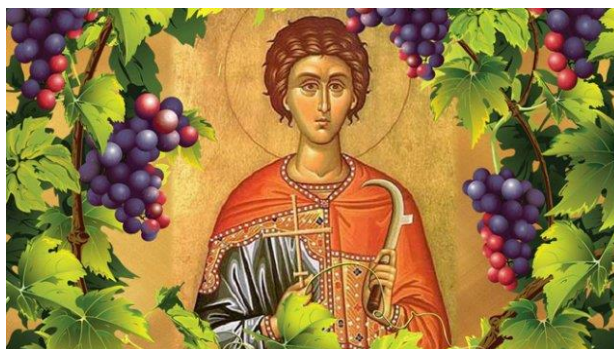


Image 1. Saint Tryphon, the protector of viticultures and vineyards

Saint Tryphonas was born in Lampsacos, the coastal town of Phrygia and became a martyr in 249 AD, during the times of the Roman Emperor Dekios. The area was famous for its vineyards as well as all the coast of Propontida. There were cities famous for their abundance of wines: Redestos, Cyzicus and Bithynia with the wines of Triglia, Kios, Nice. The Holy Patriarch of Nicaea is therefore associated in principle with the vine and the wine due to the origin of a quality wine region, since only few were Byzantine provinces, could brag for their wine as much as Propontida.

The place of his celebration in the annual cycle must also have played a role in establishing the saint as a patron saint of the viticulturists. Although the vine is "sleeping", bare of bunches, flowers, leaves and green shoots, February is a crucial turning point in its stem circle. It is the time when traditionally the most important wine-growing care, pruning, begins. Pruning is a technical work for which viticulturists declare that experience, craftsmanship and knowledge of the particular vineyard is necessary. By harvesting, the viticulturist intervenes vigorously in its vineyard and regulates the quantity and quality of its production, and inevitably determines the length of life and the healthy state of the vines.

Ancient beliefs about vegetation and fertility have probably been the lead for the celebration of Martyr Tryphon on February the 1st. Farmers and especially the viticulturists tried to secure the protection of the divine powers before they began to prune. When Christianity prevailed and old devotional elements were banned, they managed to survive the mantle of the new religion. The Saint, a specialist, has taken on the role of the patron saint of the wine-growers primarily. It accepts all wishes, invitations and special care with which believers seek to ensure the well-being, the good year, and the protection the vine from all kinds of disasters that can bring a late frost, like the hail, the wind, the strong or untimely rain, any illness. However, it does not seem to be a coincidence, that his most important French homologue, Saint Vincent, is celebrated in the vineyards at the same time of the year on January the 22nd.

Mystery covers the exact movements of Saint Tryphon from Lampsacus to Eastern Thrace and Eastern Romylia. In 1924, however, when the historical conditions forced the Greek populations of Eastern Romylia to abandon vineyards and settle in their new homelands, taking with them wine-making techniques and ways of worship, Saint Tryphonas was already established as a patron saint of the vine-growers among Christian populations of the Balkan Peninsula. In the wine-growing regions of Macedonia, it was especially well known and respected, as evidenced by the oral tradition of the local inhabitants of Goumenissa, Naoussa, Amyndeus, the murals of the Saint in holy temples built in the nineteenth century and also the quite ordinary male baptismal name Tryphon. The intensity of Saint's worship is influenced by the existence of vineyards and their importance for the region's economy. The gathering of cult traditions and the observance of customary practices is observed in the northern Greek region, and indeed in the refugee communities with a place of origin in Eastern Rumelia.

Therefore, Saint Tryphonas, from Lampsacus of Phrygia, was established as a patron saint of the viticulturists, holding a prune and has significant deterrent powers against the various enemies that act damagingly on vineyards, horticulture and fields: adverse weather conditions, diseases, insects, caterpillars but also mice retreat in front of him, provided of course they are given appropriate honours.

The folk tradition connects the Saint with the vineyards and wine-growers through narrative widely spread in the Balkan space. According to a variation, Saint Tryphonas clawed his vineyard ignoring the contrary suggestions of the Virgin Mary and as a consequence cut off his nose. The key phrase, "I'm pruning like that, he said and cut his nose" is accompanied by a gesture characteristic of the pruning technique, without which the listener cannot understand how the Saint was actually mutilated. This "technological narrative" explains the cult abstain from work in vines maintained by all the wine-growing populations. The Stenimachites explicitly express the ban: "Let's come to Tryphos the day first, and leave a handful of shawls in hand." The first of February is in popular conscience the institutionalized time stamp marking the beginning of pruning and following successive viticultural care. It is therefore natural for winegrowers to protect their sensitive vine in every way at that critical time.

Mostly rural, the feast of Saint Tryphon, marks a festive circle in the Macedonian vineyard, where various local worship habits meet. According to their customs, the natives are honored by the local inhabitants of Naoussa, Goumenissa, Amyndeos, as well as the refugees from Eastern Rumelia at the Bridge (Sozopolites) in Nea Anchialos (Anhialoi) in New Mesimvria from Mesimvria). There are sanctifications in the churches and holy bread making on the memory of Saint Tryphonas. They also used to keep vintage grapes hanging in the underground wine cellars or in the arbor. It is considered as good luck to withstand these grapes until the first of February, when they take them to the church to be blessed and then share with the believers. Everyone gets grapes and eats them "for good health" and keep some in their iconostasis. With this sanctification they do not sprinkle the house, but the puddings, the orchards and especially the vineyards. They visit the vineyards on the first of February to sprinkle them with blessing and to carry out on this day of cult abstinence from labor a ceremonial pruning of four vines. These varieties are chosen to be really strong and are being placed wither at the corners of the vineyard or in the middle forming a cross. On top of them they will shed wine or sanctification, looking for euphoria, good production and prosperous year. In some areas will be buried beneath the vines the bunkasar bun and the red egg of the Holy Thursday. There is also a kind of elementary miraculous taking place connecting the Saint with the expected abundance, fertility and, "easiness", as they say.

For all other wine growers the day will probably end with a strong vowel, family or colleagues. The refugees from the Stenimachos vineyards in Eastern Rumelia will, however, perform the impressive ritual of the turban, bloody sacrifice in honor of Saint Tryphon, which they brought with them to their new homelands. The baptismal sacrifice in the context of the celebration of the agrarian saint, in return for a prosperous year for vines is explained by the Thracian origin of the custom and its agents. The "kourbani" was a common ritual in the Thracian areas and was offered to the Saint by individuals and communities in various occasions and with various aspirations. In Stenimachos, a flourishing Greek city before 1924, built 20 kilometers southeast of Plovdiv at the foot of Rodopi, the viticulturists dwelt every year in the memory of their patron saint, making a "kourbani", a public sacrifice of calves. On the eve of the feast, after the feast of the crowned animal, they sacrificed it in the courtyard of the chapel. Also, the meat was first blessed by the priest,

boiled with his broth in cauldrons and then distributed to the people. This was followed by wrestling games with the participation of Greek, Turkish and Bulgarian wrestlers as well as a wine festival. The event was attended by all Greek viticulturists from Stenimacho and the neighboring towns of Ano Vouna and Kuklaina. The “kourbani” is one of the most intense memories of the elderly living nowadays in communities of Macedonian vineyards, they keep the custom and they do not forget the lost homeland. Settled in Goumenissa, in the prefecture of Kilkis (from Ano Vendeno), in Stenimacho of Imathia (from Stenimacho) and in Trilof of Imathia (from Kouklina), they continue to cultivate vineyards, make wine, honor St. Tryphon with its annual “kourbani”, in order to remember what they left and sometimes to sing "Every moment that leaves will not come back and the good of the world are in the buckets", i.e. in the buckets of winemaking (Papageorgopoulou, 2013).



Image 1 St. Tryphon, the protector of viticulturalists and vineyards.

4. The day of the forty Martyrs at the 9th of March

The Forty Martyrs are being worshiped by the people in the city of Sevasteia. The number was considered divine and many customs were made for prosperity and fruitfulness. In particular, they planted trees and vines on that particular day because they believed that only that day the planted trees would bear fruits.

5. The Holy Thursday

In various villages of Thrace, during the Holy Thursday and the next two Thursdays, people were keeping it as a holiday, otherwise they believed their vineyards would be destroyed.

6. The five Thursdays

In various villages of Thrace, the ban of five Thursdays, was taking place from the holy week to the Ascension. In case they worked, then there was a risk of hail. Another danger of spring was drought. In order to avoid it, they did litanies in the vineyards with the image of Saint Tryphon and of other saints. They also made the custom of Perperouna, which was applied everywhere and for all the dawns.

7. Holy Saturday

In the village of Kydonies, they used to make a large round bread cake with a cross on it and five red eggs, and they were leaving it in order to become nut and eat it, accompanied with sweet wine on the 1st of May. Elsewhere the same bun was eaten on Easter on the vineyard.

8. Easter

In some places, the festive table was left for three days, and when they finally picked up the fluff, they threw them to the vineyards in order to have abundance. On the Monday following Easter they all went to church holding canes, set them upright and on fire.

9. In the middle of May

In some parts of Macedonia, it was dedicated to the vineyards that were then threatened with downy mildew and cholera, and they were making a remission in order to avoid them. After the service, they made a litany at the vineyards, where they sprinkled the holy water. During the litany, the bells were ringing.

10. Ascension Day

At the area of Mesimvria in Efxinos Pontos, people went to the cemetery, cleaned the memorials and watered them three times, morning, noon, and in between.

11. Saturday of the Pentecost

The Saturday of the Pentecost, in Thrace also called as “Rousaliou” from the Latin word Rosalia, was the continuation of the Greek “Anthestiria”. Greeks and Romans believed that the souls returned to the world of the leaving some days of the year and they devoted them a three-day festive which, in Byzantine times, was limited to the celebration of the Great Psychosavato. So, on that day in Thrace they did not cut the stems from the vineyards, because they believed that the souls returned for the last day and sat on the trees and vines

of the vineyards. They also made offerings for souls with shrimp, rice and milk puddings, incense, and wine on the graves.

12. Saint Bartholaios on the 11th of June

Hail was even more dangerous at that times, hence in some areas of Macedonia, they held a holiday in order to protect their vineyards.

13. Saint Paraskevi of the 26th of June

According to the tradition, Saint Paraskevi, a beloved saint in Thrace, asked God to make the vine and God heard it, gave her a vine which she planted and sprouted.

It is believed since then, that the Saint during her feast harvests grapes and gives them to the church, so people did the same. The priest blessed them and then hand them over with the holy bread.

14. Saint Marina on the 17th of July

Saint Marina protected cultivations from beetles and other insects and for this reason people made many sprinkles and litanies in the vineyards in many parts of Thrace. In other areas, like in the island of Tinos, they used to harvest the first grapes on that day.

15. The 15th of August

It was a day of free entrance in the vineyards.

16. September

The first day of September was an important date for both the Romans and the Byzantines. They called it "Indiktiona", which means a tax break, because most productions were completed and the state was collecting the proceeds.

The new agricultural year for cultivation, began for farmers in September. In their sowing bag, they often put grape berries in order for the land to be more productive. In many places the month took its name from vintage and was called "harvester". There are many superstitions and customs for vintage. For example, there is no harvest on Tuesday and Friday nor they ended their harvest on Saturday. In Byzantium the beginning of the vintage harvest had an official and festive character, with both the emperor and the patriarch taking part in the relevant ceremonies.

17. Saint John at the 26th of September and the 8th of May

They called him Saint John “Talaras” or “Kalathas” (the basket maker) from the baskets used in the vintage. But he was also called as “Spazokadis” (pot breaker) because he punished people who did not honor the holiday of his feast.

18. Saint Dimitrios at the 26th of October

In some parts of Thrace, at that time of the year locals opened the barrels containing the new wine and those who had given, also gave much for the production of sweets. After the church they returned to their houses and tasted the stinging wine. They call it like this because the wine was not ready and its taste was stinging. Many people were holding the custom of “Jamala”, with two villagers dressed with a camel wooden dummy covered with hams, while others dressed with strange clothes and leaves and shoots from the grapevine on their head. They all went together in the village and wished "good year" to their fellow villagers.



Image 2 Picture of Jamala's custom in Avdira

Consequently, wine has been a common and consistent reference point for the region of Eastern Macedonia and Thrace even before the ancient Greek period, until the modern times. It defines the region both at a cultural and economic level, in mythology, food, religion, customs, since it is a significant productive activity over time, opening channels of communication with other areas through its trade.

CHAPTER 2. Geomorphology, Geology, Climate in the Region of Eastern Macedonia and Thrace

2.1 The position of the Region of Eastern Macedonia and Thrace in the wider area

The Region of Eastern Macedonia and Thrace is located at the north-eastern edge of our country, occupying an area of 1.415,75 hectares and according to data of the Hellenic National Statistical Service (census 2011) has a population of 608,108 inhabitants (source: <http://www.statistics.gr/2011-census-pop-hous>).

The northern side of the border of the Region of Eastern Macedonia and Thrace is part of our national borders with Bulgaria, while the eastern side contains the whole of our land borders with Turkey. At the west, it is neighboring with the Region of Central Macedonia and more specifically the Regional Unit of Serres. Moving south, it meets the Aegean and the Thracian Seas at its south-western and south-eastern borders respectively. The Region consists (from east to west) of the Regional Units of Evros, Rodhope, Xanthi, Kavala and Drama. Capital of the Region is the town of Komotini (<http://www.pedamth.gr/files/ArticleID/174/MakroprothesmoPAMTH.pdf>).

At the north-west of the Region, the Regional Unit of Drama spreads out with five municipalities (Kato Nevrokopi, Drama, Doxato, Prossotsani and Paranesti). At the east, we come across the Regional Unit of Evros with five municipalities (Orestiada, Didymoteicho, Soufli, Alexandroupolis and Samothrace).

Northeast of the region there is the Regional Unit of Kavala which consists of four municipalities (Kavala, Thassos, Nestos, Paggaiio). The center of the Region is occupied by the Regional Units of Xanthi and Rodhope, each of them consisting of 4 municipalities (Avdira, Myki, Xanthi and Topeiros for the Regional Unit of Xanthi, and Arriana, Iasmos, Komotini and Sapes for the Regional Unit of Rodhope).

Geographically, the Region of Eastern Macedonia and Thrace is the eastern gate of Greece and thus of the European Union to Turkey and to the Middle East, and Europe's bridge of contact with the Balkans and the Black Sea.

The Region is becoming a very important node of south-east Europe as it connects central-west Europe with the Middle East and Asia through the modern 'Egnatia' Motorway and its six (6) vertical axes to Bulgaria within the territory of Eastern Macedonia and Thrace five (5) of them of them already constructed and in use: Exohi-Gotse Deltsev, Ehinov-Zlatograd, Nymphaia-Makaza, Kyprinos-Ivaylovgrad, Ormenio-Svilengrad, while Dimario-Rudozem is projected to be ready during 2019, the Balkan hinterland with the Mediterranean Sea, while additionally is being upgraded as a transit and tourist point, with the ongoing modernization of the two major ports and airports of the Region in Kavala and Alexandroupolis.

The Region of Eastern Macedonia and Thrace is also set to become a major energy center of Southeast Europe as the construction of the TAP (Trans-Adriatic) gas pipeline is already underway, while, at the same time, other gas pipelines and supporting networks are being planned. The Regions' key, strategic and geopolitical position on the Balkan Region, has a wider significance today, with what is currently taking place in the Balkan Peninsula.



Image 3 The Region of Eastern Macedonia and Thrace

2.2 Geomorphological data

The Region of Eastern Macedonia and Thrace in terms of geomorphology is characterized by a duality of mountainous and coastal areas formed by the mountainous masses of southern Rodhope, the mountains of Lekani and Paggaiio, subsequently forming internal plains and basins (Philippi and Drama Basins) and coastal lowland areas as well.

More specifically, in terms of morphology, at the western part of the Regional Unit of Drama, the mountain range of Orvilos - Vronodus – Menikiou can be spotted, at the center and up to Nestos dominates Mount Falakro, while east of the Nestos River, the mountainous volume of Rodhope spreads out (Sinanis, 2008).

At the Regional Unit of Kavala, there are the mountains of Paggaiio (1.956 m), Symvolo (694 m) and the Lekani Mountains (1.298 m) while in Thassos rises the Mount Ypsario (1.127 m).

Multiple tips of the Rodhope mountain range extend into the Regional Unit of Xanthi, with the highest peak being Gyftokastro (1,827 m), followed by Haidou (1,525 m), Ahlat-Tsal (1,400 m) and Kamertzi (1,070 m).

The most important mountains of Rhodope are: Papikion (1,483 m), Megalo Livadi (1,267 m), the mountains of Sapka (1,044 m) and Kallithea (944 m). In the Evros Regional Unit, the foothills of the eastern part of the Rhodope Mountains, alongside with the various peaks coming out of the eastern section of the Regional Unit of Rhodope, form an arc which reaches down to the Thracian sea. The most important peaks are: Silo (1.065 m), Kallithea (961 m), and Kapsalo (618 m) (Sinanis, 2008).

The region is really affluent in water resources; River Nestos rides down through the Regional Units of Drama, Kavala and Xanthi and finally flows into the Thracian Sea, opposite Thassos, forming a Delta with a width of two kilometers.

The River Aggitis is in Drama, originates from Mount Falakro, while the main rivers of the Regional Unit of Kavala are: Strymonas, Marmaras and Chrysoupolis. At the Southeast of Xanthi lies Lake Vistonida, a lake rich in fish. The Regional Unit of Rhodope does not have

any large rivers, only small ones with most important being Philiouris, Kompsatos, Akmar and Mpospo.

The Evros River runs through the height of the Regional Unit of Evros, while other important rivers are: Ardas and Erythropotamos. Furthermore, due to natural silting on the banks of the river, small lagoons have been formed around the Evros Delta. In addition, the Regional Unit of Evros has six thermal springs, two of which are under systematic use. The Region also includes two islands, Thassos and Samothraki (<https://www.diaamath.gr/sites/default/files/5.pdf>).

2.3 Geology of the wider area of study

The wider area of the Region of Eastern Macedonia and Thrace, regarding the alpine and pro-alpine structure, belongs in the Rhodope zone, while a smaller part of it is occupied by the rocks of the circum Rhodope mass. In Greece the mass of Rhodope is separated from the Serbian-Macedonian mass to the west by the Strymonian line, while at the south-southeast is bordered by the circum Rhodope zone. The main fault lines divide the Rhodope mass into two litho-stratigraphic units, the upper tectonic unit (Sideronero section) and the lower tectonic unit (Paggaietos module). These are separated from the Nestos' overthrust which has a SSE-NNW direction.

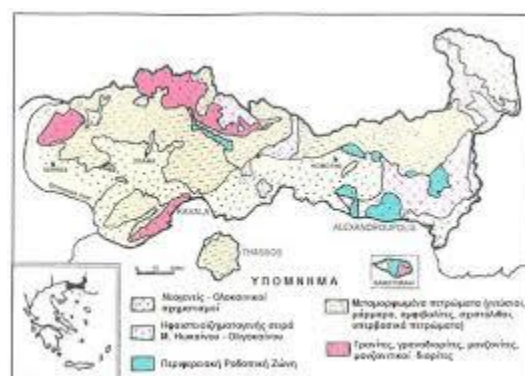


Image 4 Geological map of Eastern Macedonia and Thrace Region (Katsikatsos 2002)

The Sideronero section which includes a much higher degree of metamorphic rocks (gneisses, migmatite, amphibolite and marble) is pushed south upon the Paggaietos section

which contains interchanging patterns of marbles, micaceous schist, gneisses and amphibolites. The Protoliths of the metamorphic rocks of the Rhodope mass are considered Paleozoic.

Three main metamorphic events can describe the metamorphic evolution of the Rodopi mass:

- a pre-lowian high-pressure metamorphosis seen in the electorale and electoral ambivalences,
- a lower-to-medium - lower-pressure lowian amphibious transformation followed by
 - a retrograde greenery-shifting transformation phase observed in amphibolites, metapelites and gneiss.

According to more recent views in the Middle Miocene, a small-angle detachment fault resulted in the detachment of a section of the upper tectonic section (Sideronero section) and its westward movement. This section is what we now call Serbian-Macedonian mass. This reveals the inferior tectonic module (Pangaeus module).

A characteristic feature of the mass of Rodopi is the large, terrific sedimentary basins of the Tertogenes, which from the west to the east are: the Basin of Strymon or Serres, Philippi or Drama, Prinos, Nestos, Xanthi-Komotini, Ciris-Aisimis and Orestiada.

Within these sedimentary basins, volcanic and volcanoic rocks are interposed, while the presence of plutonic infiltrations in the regions of Vrontous, Kavala, Philippi, Elatia, Paranesti, Xanthi and Kirki - Leptokaryas is intense.

The carbonate formations of the Rodopi mass are limestones of Sulfur - Debonium - Carboniferous, marble of the Carboniferous, limestone and dolomite deposits of the Upper Paleozoic and limestones of Permian - Triadic. Classical sediments of the Molossian type (conglomerates, sandstones, marls and marble limestones) exist in the Prefecture of Evros with the age of the Hokenic - Oligocene.

This Serbian-Macedonian mass is divided into two metamorphic series, the Quercus and Vertigo. In the first among the genius rocks are usually marbles of very thick, while in the

second the marbles are limited to thin grooves. The sediments of the Iokaios - Oligokanos age group are located in the area of Lagada.

Generally the whole Region presents the greatest interest in Greece. IGME has carried out a major research project, while large areas (95.100 thousand hectares according to the Mining Law) have been allocated to individuals for exploration and exploitation of their mineral wealth, which remains largely untapped, with only few exceptions (http://www.minagric.gr/ardefatika/files/results/hydro/1.%20HYDRO_EVROU.pdf).

In the land area, a number of minerals (manganese, gold, zinc, lignite, iron pyrite etc.) and remarkable concentrations of industrial minerals (kaolin, zeolite, stardust, graphite, uranium, etc.), marbles (in exploitation), extensive geothermal fields (with direct exploitation) and significant peat deposits can be found. There are also oil and gas deposits in the Thracian Sea, with a localized exploitation in the marine area between the island of Thassos and the mainland.

2.4 Territorial characteristics of the main wine-growing areas in the Region of Eastern Macedonia and Thrace

Soil is the factor most studied, at least in terms of its effect on the nourishment of the vine. Since the time of Theophrastus (370-287 BC) it is known that "grassy and sandy soil is good for vines and generally if it is sparse, light, thin and humid." It is noted that the structure, the physical properties of soil, pH and organic matter are of greater importance for plant physiology and hence for quality than a nutrient content. Mario Fregoni (1985) states: "While chemical soil analysis tends to give priority to rich and fertile soils, viticulture has broadly demonstrated that it is preferable to cultivate soils of a certain structure and depth rather than clay soils, compact, fertile and cool. The best quality is achieved in soils that are light, gravely, poor in nitrogen and insufficiently supplied with water. "

Branas (Branas, 1974) points out that the value of soils for viticulture is composed of:

- ◆ the robustness of the vineyard,
- ◆ the characteristics of low atmospheric layers,

◆ the inorganic nutrition.

The soil characteristics should be taken into account are:

- The age and mineral composition of the parent rock.
- The relief and the exposure of the soil.
- The exploitable from the roots depth.
- Soil structure.
- pH.
- The drainage capacity, both near the surface and in the lower layers of the soil.

Soil classification was based on the Food and Agriculture Organization (FAO) classification system – UNESOS of theWorld (Soil Map of Greece, Scale 1: 30,000, 2015). This system was established in 1961 and modified in 1975 (Sinanis, 2008). It is a natural classification system based on measured morphological characteristics (which either affect the soil genetics or are derived from it), which are precisely defined in the soil horizons.

The most important for the study area of soil units are:

Fluvisols, Cambisols, Gleysols, Luvisols, Calsicols, Regosols, Vertisols and Histosols.

Table 1 FAO-UNESCO System (Sinanis, 2008)

Class	Term	Characteristics
Fluvisols	Fluvius	Soils flooded by river waters and alluvial deposits
Cambisols	Cambiare	Soils that show changes in color

Gleysols	Gley	Soils that have been affected by excess water.
Luvisols	Luvi	Soils with displacement and clay slurry concentration
Calsicols	Calcium	Accumulation of calcium carbonate
Regosols	Rhegos	Soils with a layer of loose material on a hard substrate
Vertisols	Vertere	Soils subject to crack inversion.
Histosols	Histos	Soils rich in organic matter.

More specifically, in the Regional Units of Drama and Kavala soil unit is characterized mainly by Cambisols and Fluvisols, while in the wider area of Thrace the soil units that dominate belong, apart from the categories of Cambisols, Fluvisols and also to those of Regosols and Luvisols, whose main features are listed below:

Cambisols: Soils moderately developed. Their horizons have lost a percentage of Fe and Al bases, and some of the easily disintegrated minerals, and appear in geological deposits that are younger than the most recent period. In addition, they have a pellicle composition thinner than clayey, with moderate or high cation exchange capacity. These are soils usually grown either on indigenous native materials or in alluvial deposits and are characterized by satisfactory fertility.

Fluvisols: Recent alluvial soils with little or no soil evolution. Fluvisols are soils that are capable of appearing in any climate and under any vegetation. This class includes soils which have not developed genetic horizons, which indicates that no major soil geogenetic processes have been carried out. They are also characterized by poor drainage and Fe and Mn eruptions are often seen in them

Regosols: Gravelly soils or soils rich in coarse materials. Soils formed from alluvial rendered materials or marine and lake sediments, exclusively from coarse grains with a depth greater than 100 cm. These soils usually receive new materials at regular intervals.

Luvisols: Soils with strong accumulation of clay in the B-horizon (aluminic horizon). These soils show evidence of migration of aluminosilic minerals without the excessive leaching of bases.

For more detailed information, see "Soil Map of Greece, Scale 1: 30,000", 2015. (ANNEX I).

2.5 Climate Conditions

The study area is located in the middle latitudes of the northern hemisphere, which makes it an area where opposing gas masses converge. During the winter the migration of the general air circulation brings to the area the southern branch of western winds (westerlies) which are closely related with cyclonic passages and with invasions of transformed polar air. At this zone develops the floating Mediterranean Polar Front along which the warm tropical air is encountered with the cold polar air. The presence of the Mediterranean - Polar Front and its associated recesses cause rainfalls. For this reason, the cold season is the season with the most rain. At summer, the area is dominated by the Azores' anticyclone, while at the same time there is the extensive low-pressure basin of Asia. This combination contributes to the winds of the Northern sector (annuals), which locally weaken by the effect of the sea breeze and give the climate a special character, known as the climate of the annual winds.

The predominant wind direction (mostly of northern component), the movements of gas masses and the complex morphology of the area, determine the horizontal distribution of rainfall and air temperature. The annual course of temperature is, on average, less than that of tropical climates. The average monthly air temperature during the summer months does not exceed 27 °C, although the extreme values are higher than 40 °C (Figure 2, 7, 12, 17, 22). Also, during summer, the coastal areas are not noticeably cooler than the hinterland, since the Aegean is a closed and quite warm sea.

The slight cloudiness and the low relative humidity during the midday hours prevail in the summer months above the Eastern Macedonia and Thrace, contributing to intense heating during the day but also to fast cooling at night. Average daily temperature values are quite often greater than 30° C, but go down to 15° C or 10° C at night.

All places in the area get to experience frost and snow, although the amount and duration of the snow varies from place to place. The winter frosts are frequent, but rarely severe. In some cases, night temperatures fall several degrees below zero and cause damage to vulnerable crops. Similar disasters are also observed by spring frosts which result when invading polar mass gasses lie in the lower layers of the air of the area. The intra-annual distribution of average monthly air temperature and rainfall indicates the dominance of the Mediterranean climate type in the Eastern Macedonia and Thrace. Deviations from the above type of climate may exist in areas with altitudes greater than 700meters, however there are not meteorological stations operating there. The average monthly air temperature for the cooler month of the season is above 10° C, while the temperature of the warmest month does not drop below 10° C. These limits of the average monthly temperature classify the area in the medium-temperature climates.

Considering that in all Meteorological Stations the average temperature of the warmest month of the year is around 22-23° C, the climate is characterized as Mediterranean with mild winters and a dry, warm summer (www.meteoblue.com). The following pictures 5-29 show the climate charts of the area.

Average Rainfall

The "daily average maximum" (solid red line) shows the maximum average daily temperature for each month. Similarly, "daily average minimum" (solid blue line) indicates the average minimum temperature. Warm days and cold nights (dotted with red and blue lines) show the average of the warmest day and the coldest night for each month for the past 30 years.

Cloudy, clear and rainfall days

The chart shows the number of days per month with sunny, partial cloudy, overcast and rain days. The days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as cloudy and those with more than 80% as overcast.

Maximum Temperatures

The Maximum Temperature chart displays the number of days per month, the specific temperatures are reached.

Precipitation figures

The Precipitation figures chart shows how many days per month, certain sums of precipitation are reached.

Wind Speed

The chart shows the days per month, when the wind reaches a certain speed.

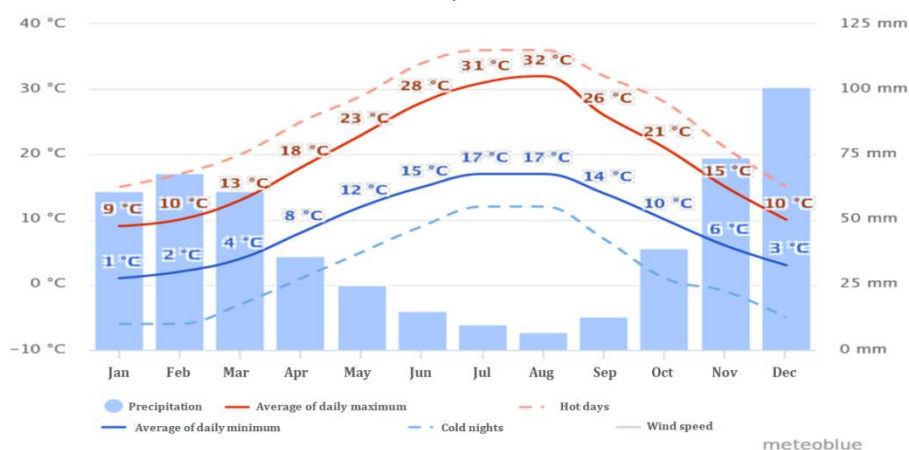


Image 5 Average Rainfall in Drama

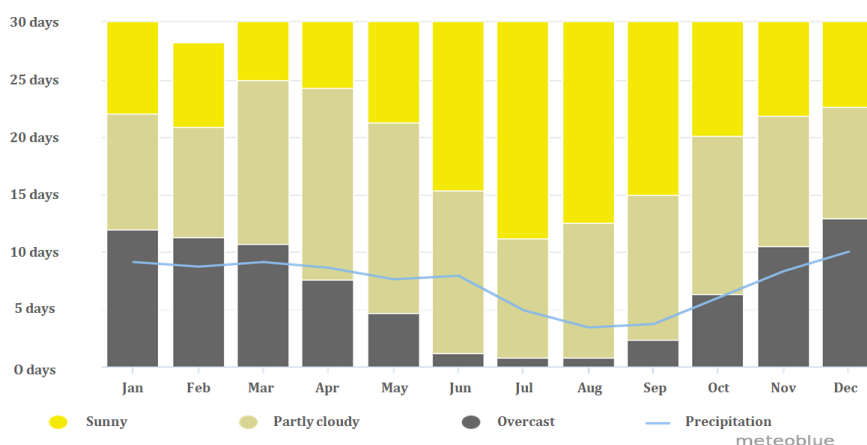


Image 6 Cloudy, clear and rainfall days in Drama

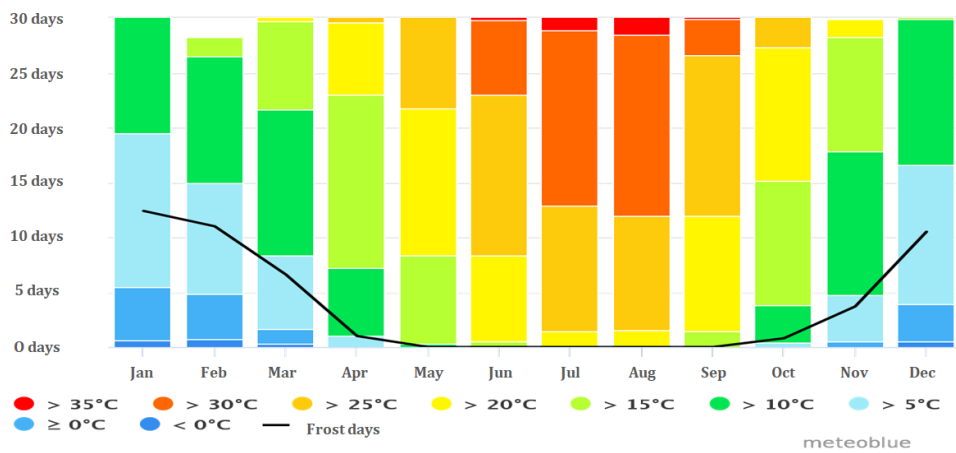


Image 7 Maximum Temperatures in Drama

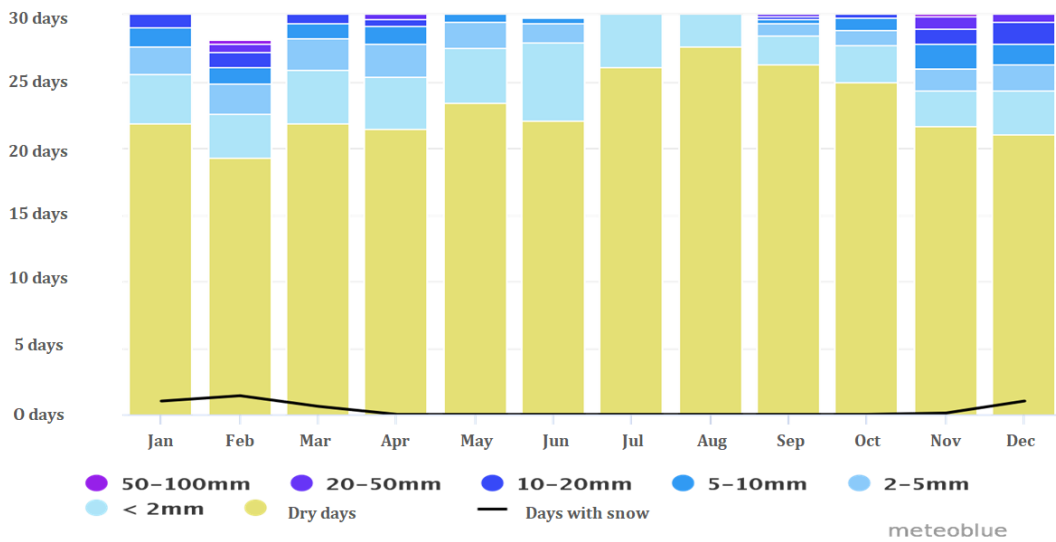


Image 8 Precipitation figures in Drama

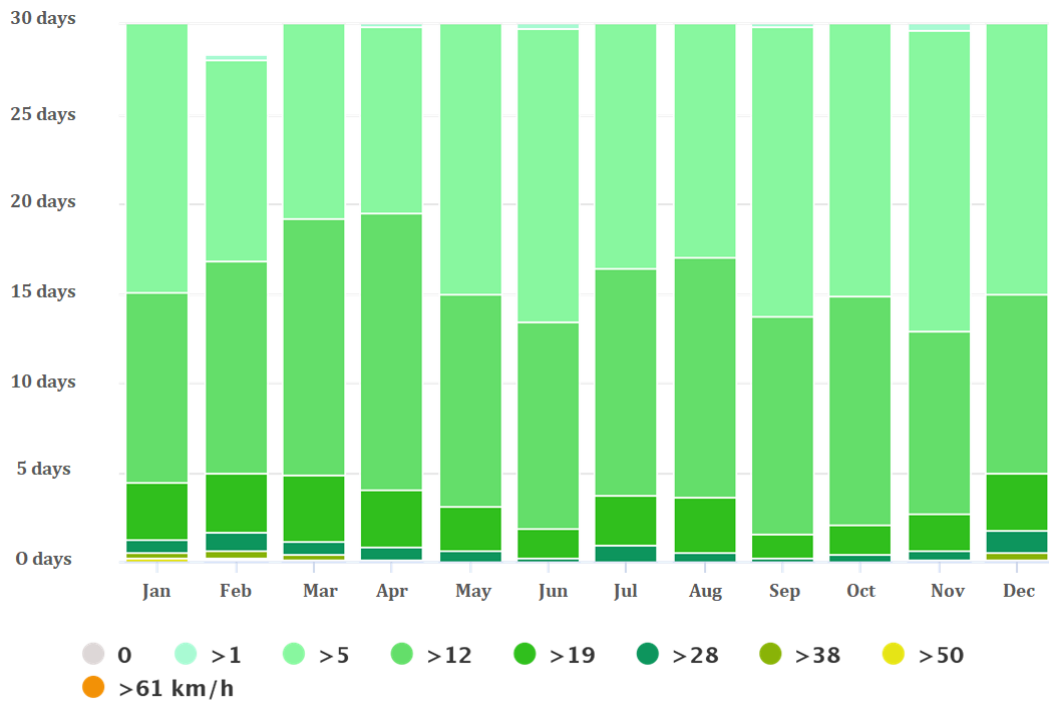


Image 9 Wind Speed in Drama

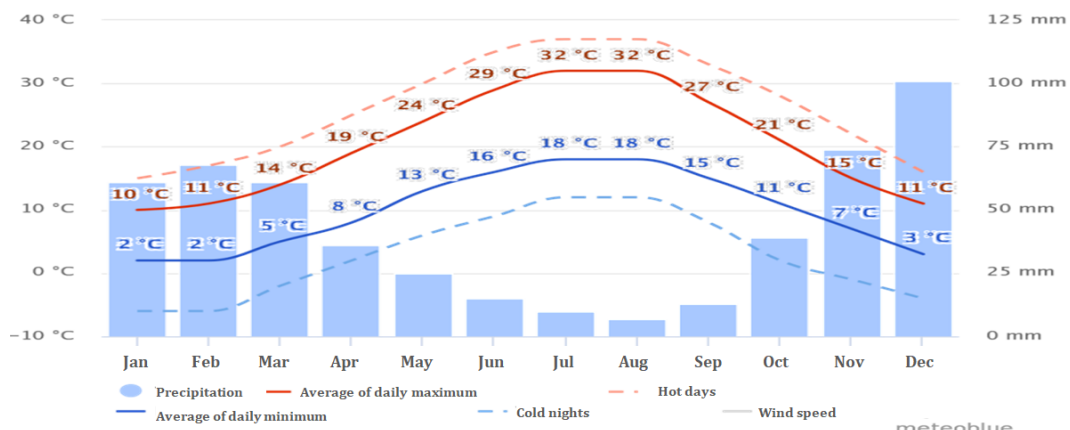


Image 10 Average Rainfall in Kavala

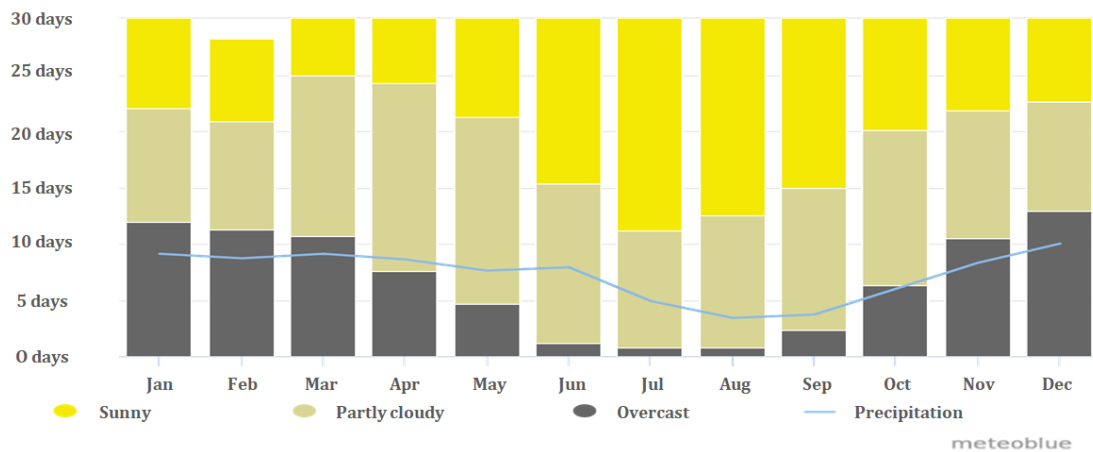


Image 11 Cloudy, clear and rainfall days in Kavala

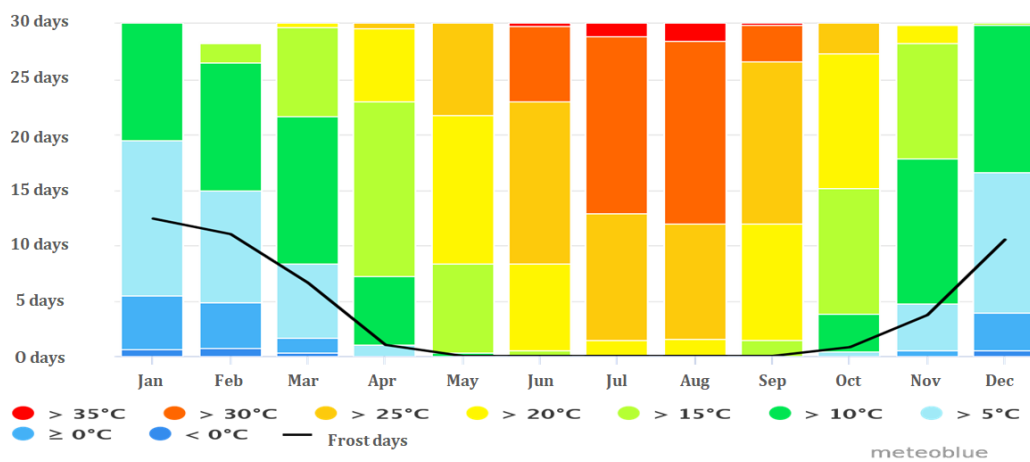


Image 12 Maximum Temperatures in Kavala

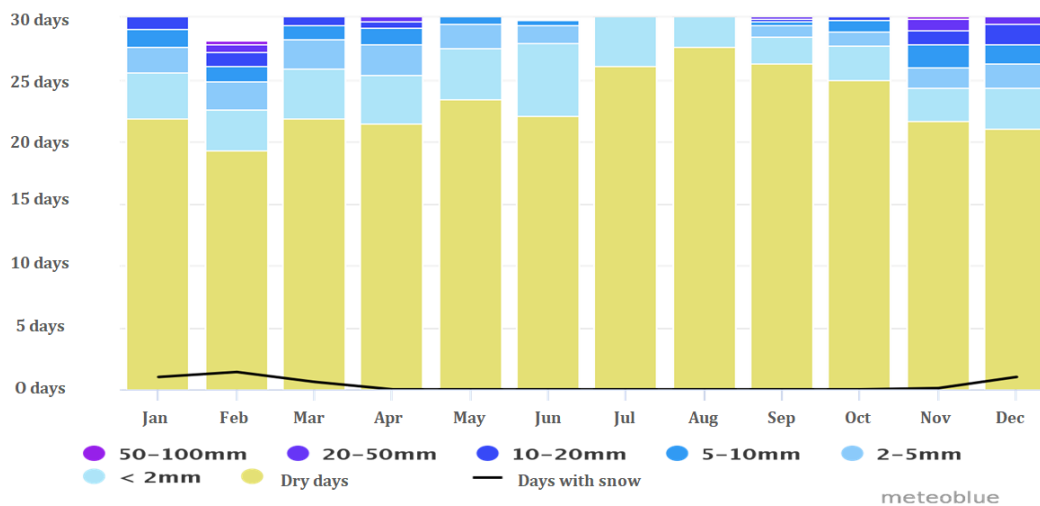


Image 13 Precipitation figures in Kavala

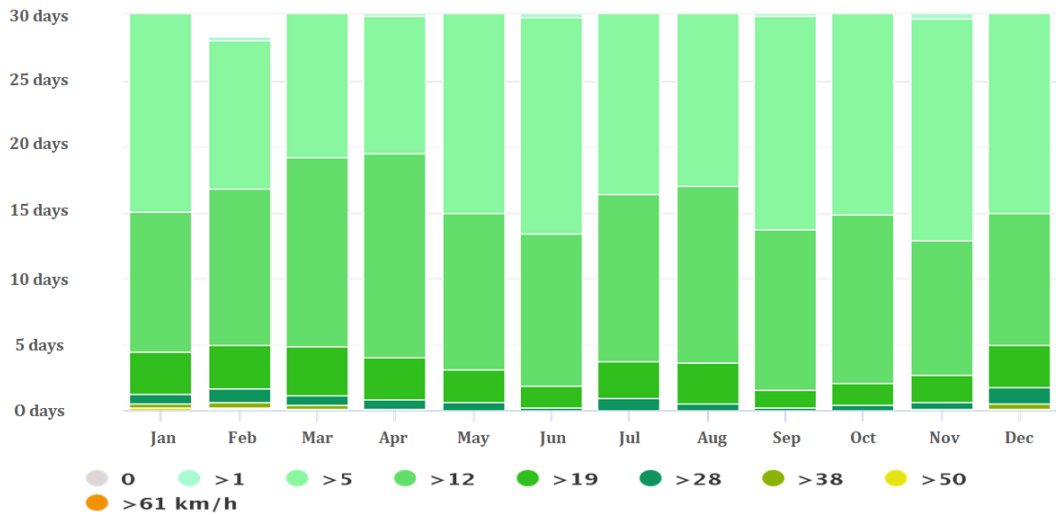


Image 14 Wind Speed in Kavala

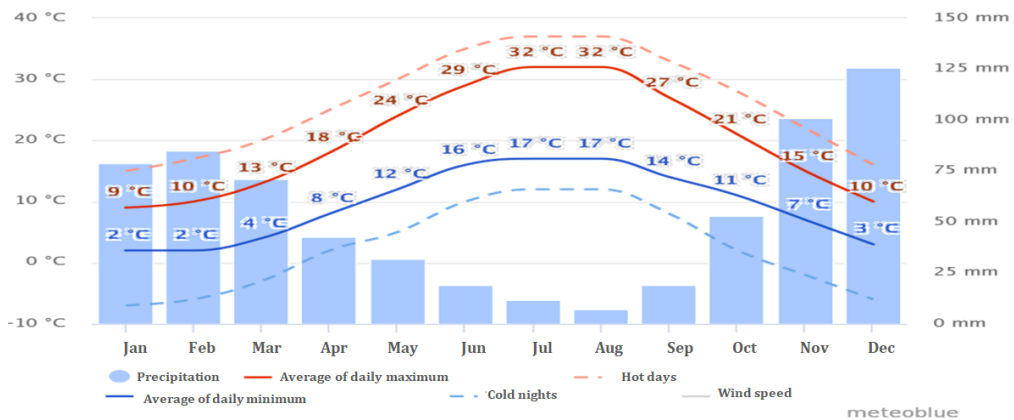


Image 15 Average Rainfall in Rodopi

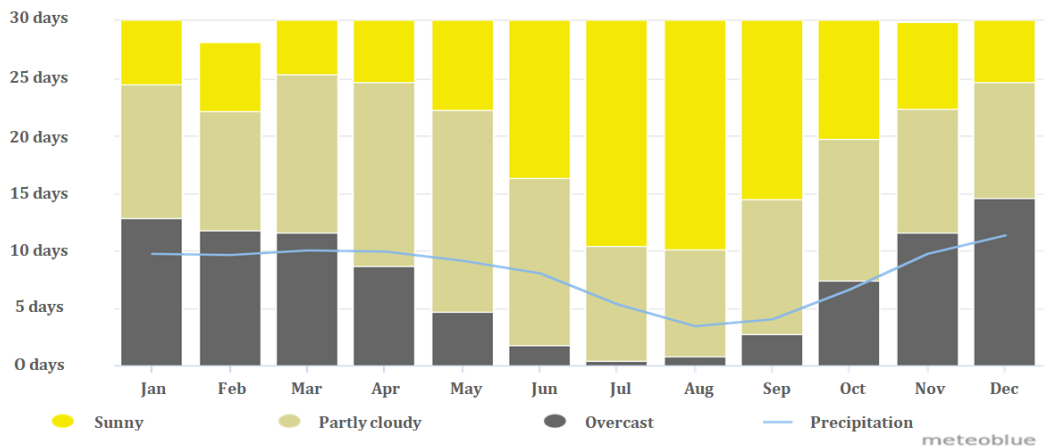


Image 16 Cloudy, clear and rainfall days in Rodopi

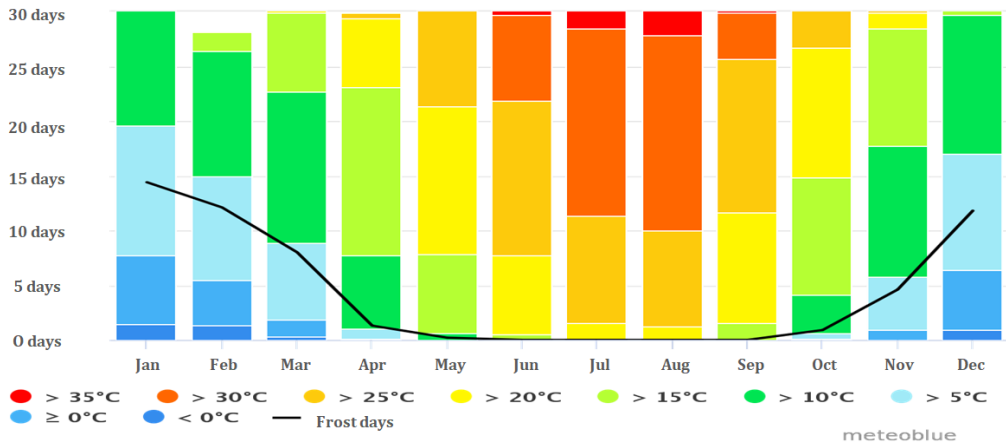


Image 17 Maximum Temperatures in Rodopi

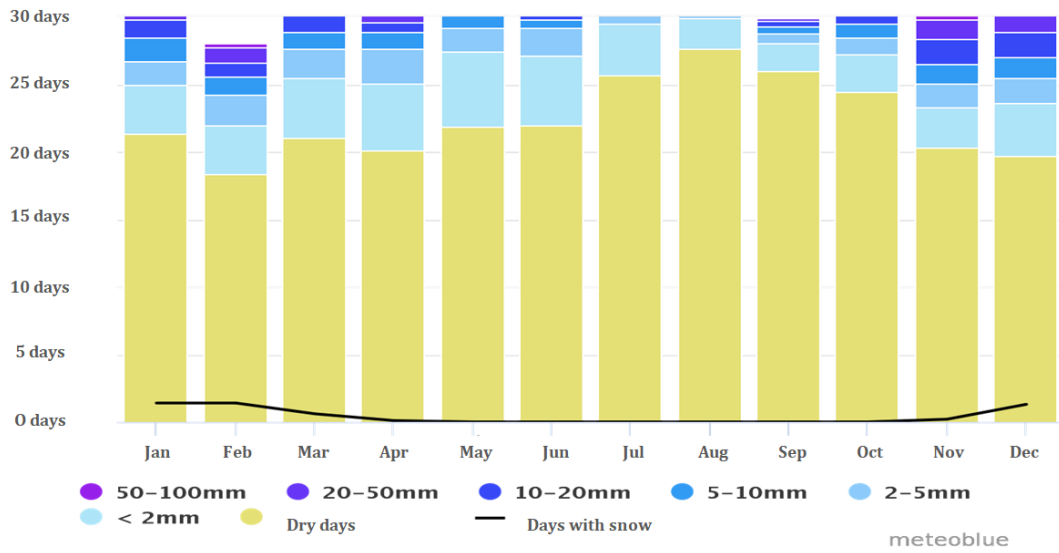


Image 18 Precipitation figures in Rodopi

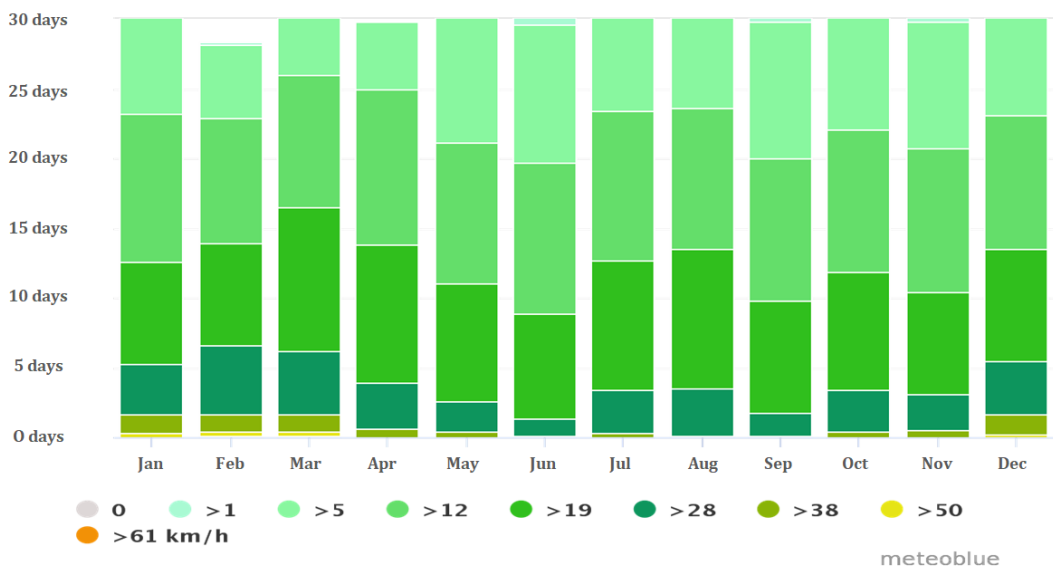


Image 19 Wind Speed in Rodopi

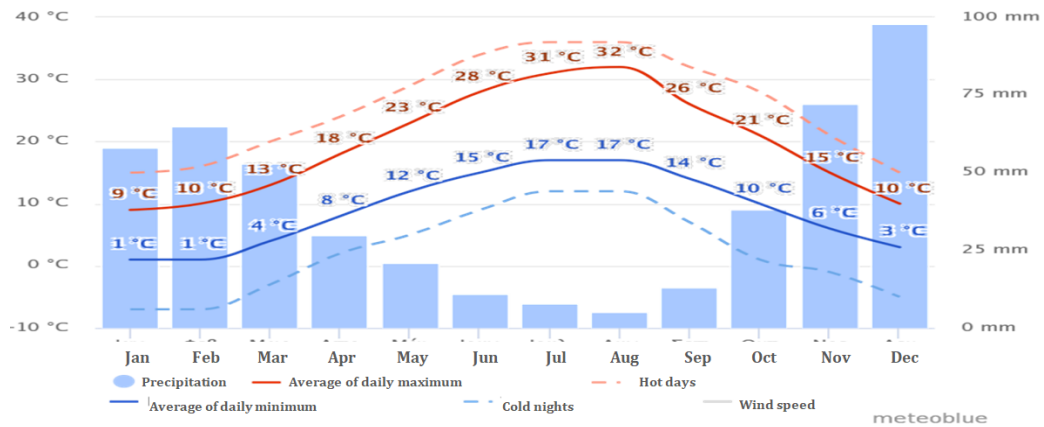


Image 20 Average Rainfall in Xanthi

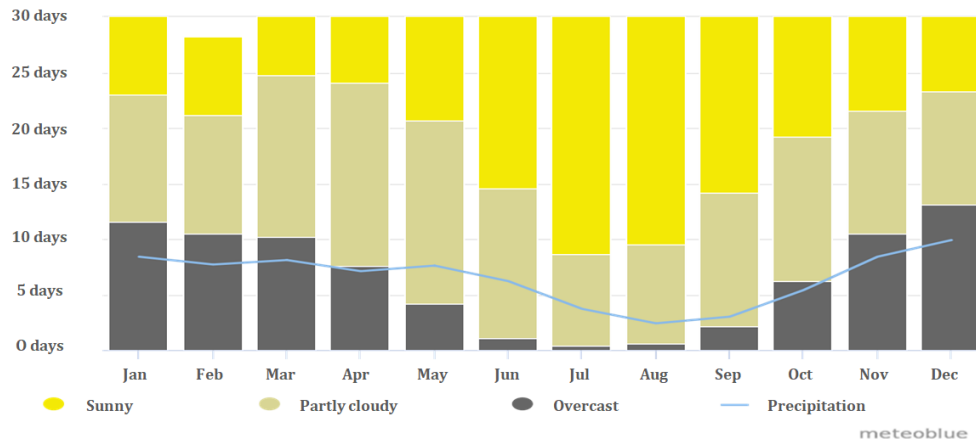


Image 21 Cloudy, clear and rainfall days in Xanthi

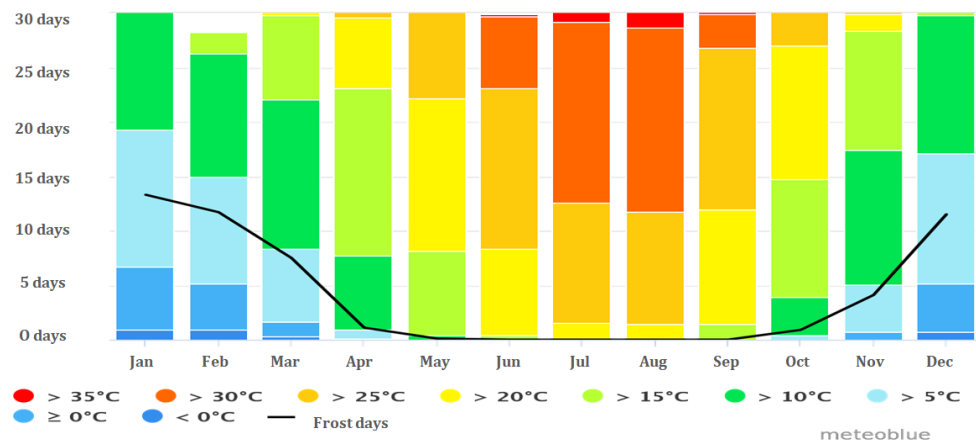


Image 22 Maximum Temperatures in Xanthi

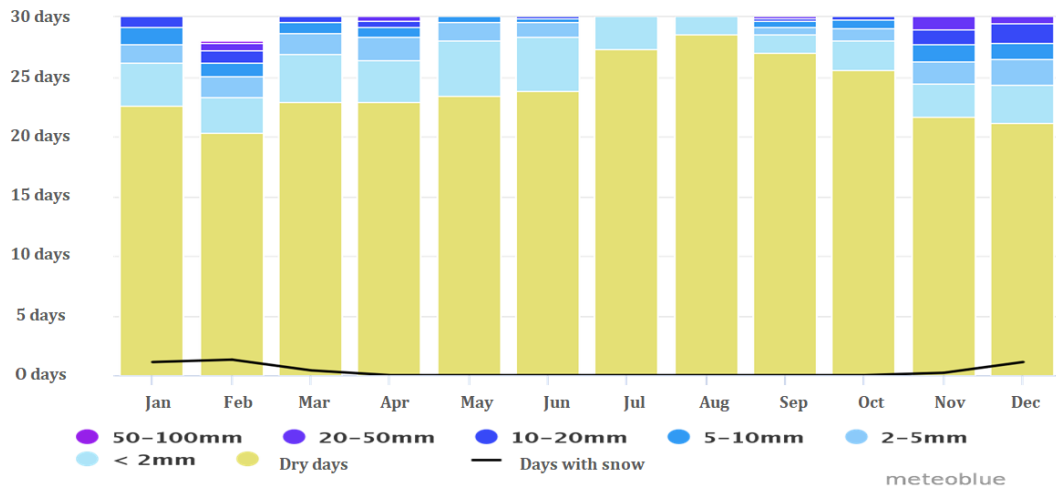


Image 23 Precipitation figures in Xanthi

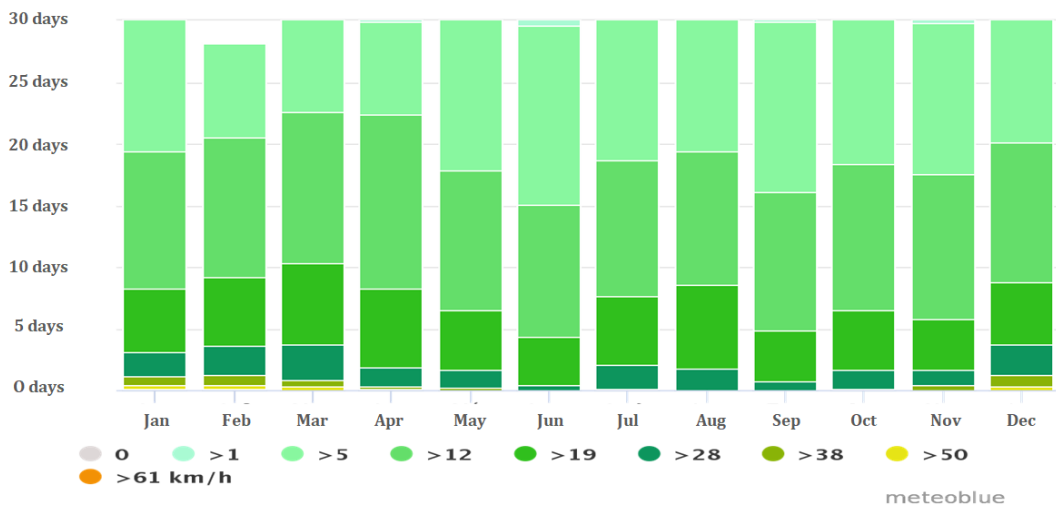


Image 24 Wind Speed in Xanthi

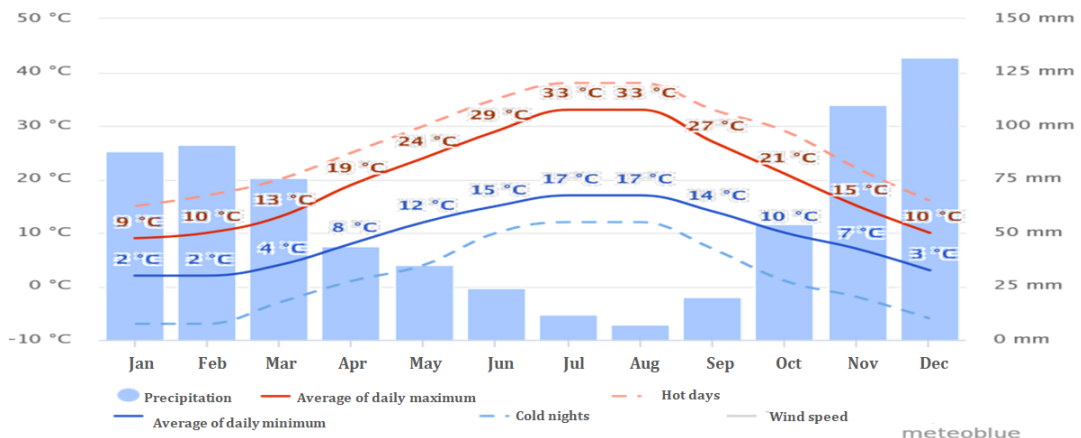


Image 25 Average Rainfall in Evros

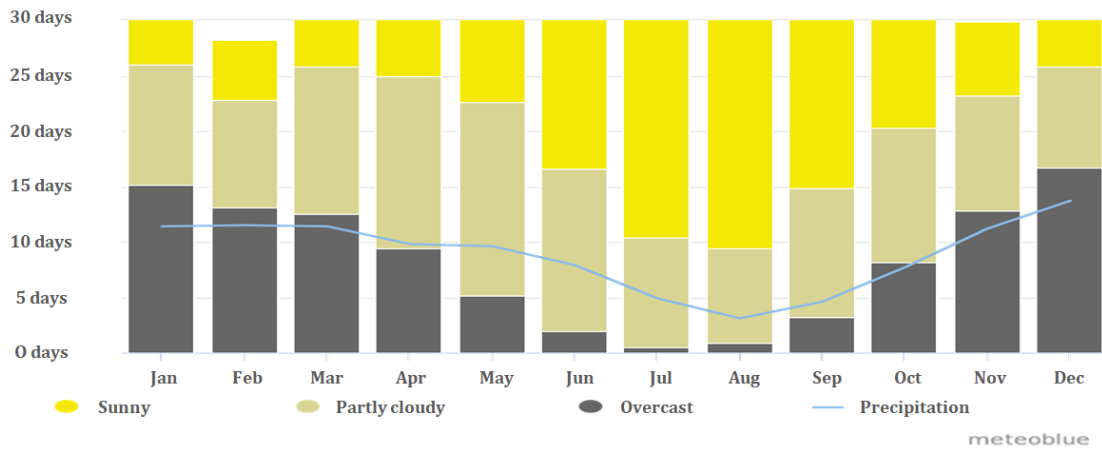


Image 26 Cloudy, clear and rainfall days in Evros

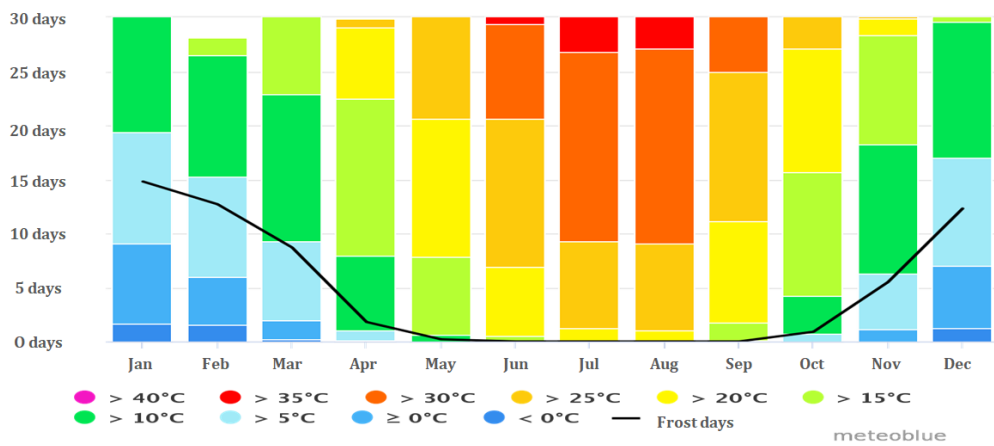


Image 27 Maximum Temperatures in Evros

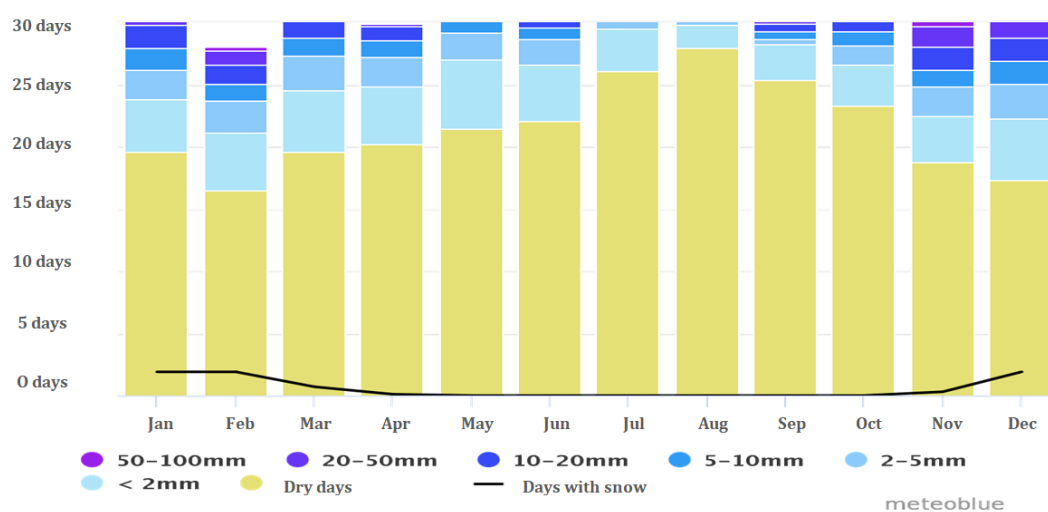


Image 28 Precipitation figures in Evros

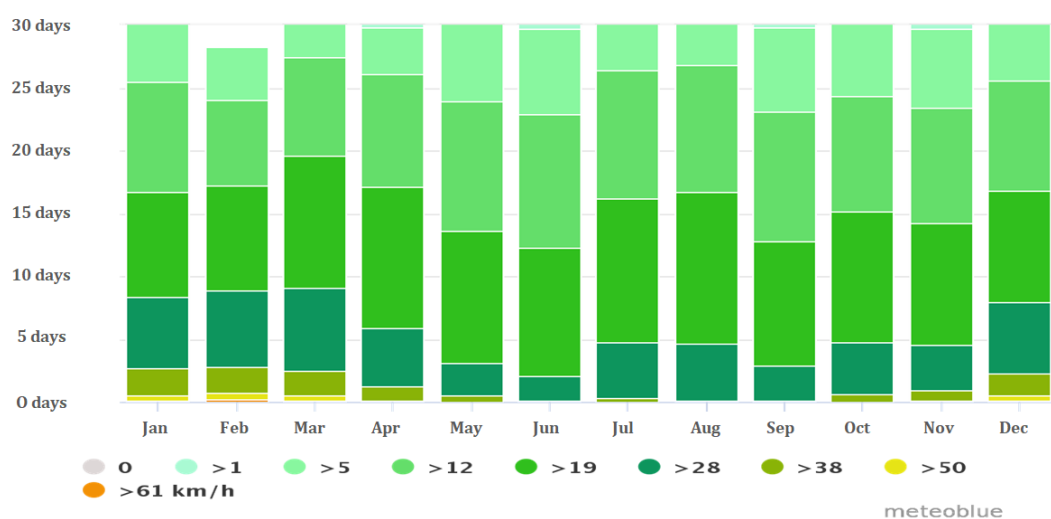


Image 29 Wind Speed in Evros

2.6 Bioclimatic features

The climate and especially the microclimate of an area, is directly related to the phenological stages of the vine and the presence of diseases (downy mildew, mildew, phomopsis). The organoleptic characteristics of wines are always the result of microclimate and soil.

Bioclimatic indicators such as temperature, light, rainfall etc. are used in viticulture. However, at the level of a broader research area like the Region of Eastern Macedonia and Thrace, it is very practical to exploit the existing microclimates depending on the intended purpose and not the general measurements of the different climatic parameters. It is noted that the annual climatic conditions are completely out of control for the producer and especially the extreme weather conditions. The fact that many years are characterized by favourable climate conditions, resulting in productions that are both rich and of good quality, is pretty well known.

These favourable conditions rarely coexist and these years are characterized by the French as millesimes. On the contrary, there are years that are critical at the same time both in terms of quality and production.

The following table (Table 2) lists the bioclimatic characteristics of the area of Alexandroupolis, where the characteristic wine varieties Bougialamas, Karnakalas, Zoumiatiko, Pamidi, Shefka are cultivated. The table also lists the bioclimatic characteristics of the area of Komotini where the wine varieties Pamiti, Zoumiatiko and Roditis are cultivated.

Table 2 Bioclimatic characteristics of the Alexandroupolis and Komotini wine-growing area (Michailidis, 2010)

Bioclimatic characteristics	Alexandroupoli vine area	Komotini vine area
Zero germination	11,0° C	11° C
Active Thermal Sum	2100,8 °C	2050,8° C
Sunshine	2180,4 hours	2100 hours
Solar Index	4,576	4,576
Duration of favourable germination period	247 days	248 days
Rainfall	163,1 mm	204,6 mm
Dew	6,8 days	84,6 days
Frost	0,5 days	0,4 days
hoar-frost	-	0,1 days
Relative humidity	63 %	63 %
Hydrothermal Index	3840,8	4933,8

2.7 Land use

The total area occupied by the Region of Eastern Macedonia and Thrace amounts to 1.414,5 thousand hectares, which corresponds to about 10.7% of the total area of the country. That makes it the fourth largest Region of Greece its intraregional distribution is presented in the table 3.

In terms of land-use, the agricultural sector covers about 96% of the total area of the Region. In particular, based on mapping data from the General Secretariat of Forests, as presented in the Operational Program of the Region of Eastern Macedonia and Thrace for 1994, 35.2% of the total area is covered by farm fields (agricultural land), 37.68% by forests, 15.07% of forest land (scrubland), 8.0% of forest land (pastures), 2% of arid land, while settlements and water occupy 1.46% and 0.59% of the total area respectively.

Table 3 Land Use in Eastern Macedonia and Thrace (ELSTAT)

(Census of Agriculture and Livestock 1999/2000) *																				
Land in thousands of hectares																				
Regional Unit	Number of municipalities / communities	Total area of Land	Agricultural areas						Forest semi-natural areas				AREAS COVERED BY WATER			ARCHITECTURAL AREAS				
			Arable land	permanent crops	Pasture - Transitional woodland / shrubland	Pasture Brush and / or herbaceous combinations	Pasture Areas with sparse or no vegetation	Ετερογενείς γεωργικές περιοχές	Forests	Transient woodland-shrubland	Mixtures of shrub and / or herbaceous vegetation	Areas with sparse or no vegetation	Terrestrial waters	Indoor wet zones	Coastal wetlands	Urban building	Industrial and commercial areas	Transport networks	Mines, waste disposal sites and construction sites	Artificial, non-agricultural green areas, sports and cultural activities
Region of Eastern Macedonia & Thrace	55	14.179,6	4.388,7	148,7	412,6	476,1	50,0	794,6	4.151,2	1.535,1	1.273,7	409,5	129,8	0,7	219,7	151,8	26,1	1,8	9,1	0,4
Regional Unit of Drama	9	3.468,9	652,8	0,6	157,0	128,2	28,6	80,0	1.537,0	372,4	293,9	165,4	18,3	0,1	0,0	30,5	2,7	0,0	1,4	0,0
Regional Unit of Kavala	11	2.116,6	503,5	74,0	54,5	132,3	1,3	148,2	507,5	203,0	326,8	80,6	8,2	0,6	36,5	29,6	3,3	0,6	6,1	0,0
Regional Unit of Evros	13	4.248,0	1.799,0	53,5	49,0	126,2	7,3	365,0	998,4	372,9	267,4	23,0	35,4	0,0	93,4	45,9	9,1	1,2	1,3	0,0
Regional Unit of Xanthi	10	1.795,8	486,4	1,8	67,6	42,3	9,2	90,1	607,4	256,1	102,9	34,9	34,4	0,0	40,7	18,3	3,6	0,0	0,1	0,0
Regional Unit of Rodopi	12	2.550,3	947,0	18,8	84,5	47,1	3,6	111,3	500,9	330,7	282,7	105,6	33,5	0,0	49,1	27,5	7,4	0,0	0,2	0,4
TOTAL OF GREECE	1.035	131.981,80	21.181,4	7.491,8	880,0	9.151,7	4.420,5	22.011,0	22.411,6	11.606,9	23.949,7	4.509,9	1.196,9	108,2	484,5	1.913,0	212,6	156,3	270,5	25,3

The Project is co-funded by the European Regional Development Fund and by national funds of the countries participating in the Interreg V-A “Greece-Bulgaria 2014-2020” Cooperation Programme.

In terms of land-use, the agricultural sector covers most of the Region's total area. In particular, based on mapping data from the Greek Statistical Service, 44.22% of the total area is covered by fields (agricultural land). Out of this percentage, 32% refers to arable land and permanent crops, while the remaining 12.2% is on pasture land. 52.89% of land belongs to forests and semi-natural areas, while the rest includes land covered by land (2.47%) and man-made projects (1.33%). Forest lands are mainly located in the Rhodope Mountains starting from the Prefecture of Drama to the eastern part of the Prefecture of Evros. The agricultural land used in the Region decreases from year to year, which is mainly attributed to fallowing. According to ELSTAT data, within 5 years from 2011 to 2016, agricultural land decreased from 316079 hectares to 299439 (Table 4).

Table 4 Comparative data 2011 - 2016 for cultivated land (ELSTAT)

1. Categories of crop areas						
Table 1a. Crop areas and fallow land, by categories, regions and regional unities: 2011						
Areas in hectares						
Regions and Regional Units	Total crops and fallow land	Crops				Fallow land
		Crops on arable land	Garden area	Vines (grapes and raisins)	Areas under trees (compact plantations)	
TOTAL OF GREECE	3.566.298	1.947.826	100.456	114.721	1.022.447	380.846
Region of Eastern Macedonia & Thrace	378.746	316.079	8.679	5.548	27.317	21.122
Rodopi	73.233	69.274	1.213	217	1.988	538
Drama	56.494	50.844	863	790	1.301	2.694
Evros	152.736	126.361	2.643	598	7.961	15.171
Thasos	7.881	106	78	56	7.639	1
Kavala	45.524	30.469	2.858	3.788	6.973	1.434
Xanthi	42.877	39.023	1.021	97	1.453	1.282

1. Categories of crop areas

Table 1a. Crop areas and fallow land, by categories, regions and regional unities: 2011

Areas in hectares

Regions and Regional Units	Total crops and fallow land	Crops				Fallow land
		Crops on arable land	Garden area	Vines (grapes and raisins)	Areas under trees (compact plantations)	
TOTAL OF GREECE	3.254.078	1.724.043	63.428	122.515	91.131	352.959
Region of Eastern Macedonia & Thrace	377.531	299.439	5.521	4.684	27.137	40.749
Rodopi	78.267	67.890	926	292	2.487	6.670
Drama	55.610	45.213	625	655	1.334	7.782
Evros	154.540	123.723	1.742	593	8.282	20.199
Thasos	6.364	100	39	34	6.111	78
Kavala	38.267	25.418	1.201	2.957	6.315	2.370
Xanthi	44.481	37.092	987	151	2.606	3.644

The Project is co-funded by the European Regional Development Fund and by national funds of the countries participating in the Interreg V-A "Greece-Bulgaria 2014-2020" Cooperation Programme.

CHAPTER 3. The viticulture in the Region of Eastern Macedonia and Thrace nowadays

3.1 Censuses and statistics

The Region of Eastern Macedonia and Thrace is the smallest wine-growing Region in Greece (Graph 1). The cultivated vineyards in the Region account only for 2% of the total vineyards of Greece (ELSTAT-Hellenic Statistical Authority, 2016). In addition, until recently wine growing was not a basic pillar of local economy and as a result, wine production is limited and consumed mainly at a local level.

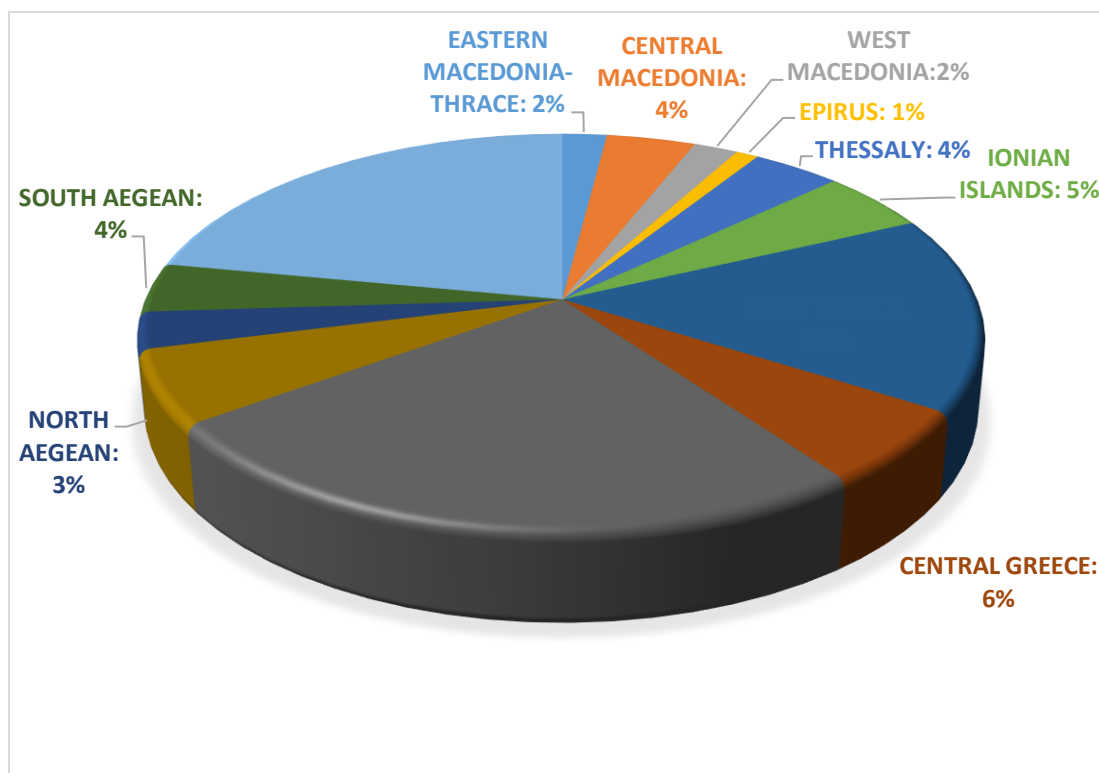


Image 30 Allocation (%) of Total Vineyard Area per Region (<http://www.statistics.gr/el/home>)

From the 1950s onwards, the few vineyards existed in the wider region were uprooted as they were of no particular economic interest. This process was halted in the early 1990s, with the

abandonment of the cultivation of tobacco, where farmers turned again to the cultivation of the vines.

The change in the areas cultivated on wine grape varieties in the period 1989-2013 is shown in Image 31 where the growth of vineyards has been observed in some periods of recession (1998 and 2003-2004). For the same period, throughout the territory (Image 32) there is a rather steady course with fluctuations in the different regions.

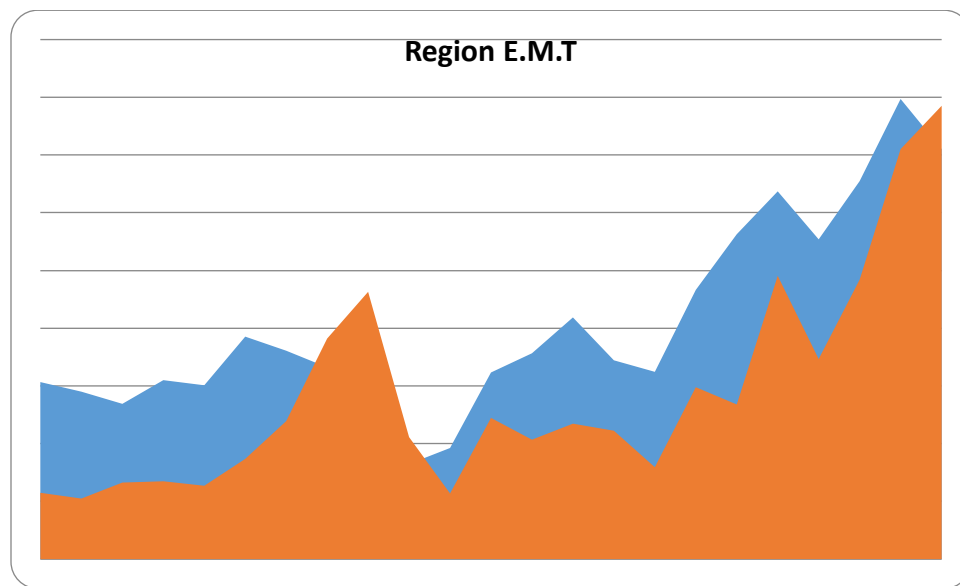


Image 31 Change in the area of wine and wine production 1989-2013 in the Region of Easter Macedone-Thrace. Blue: vine land (stremma), Orange: Total wine production (tn) (ELSTAT)

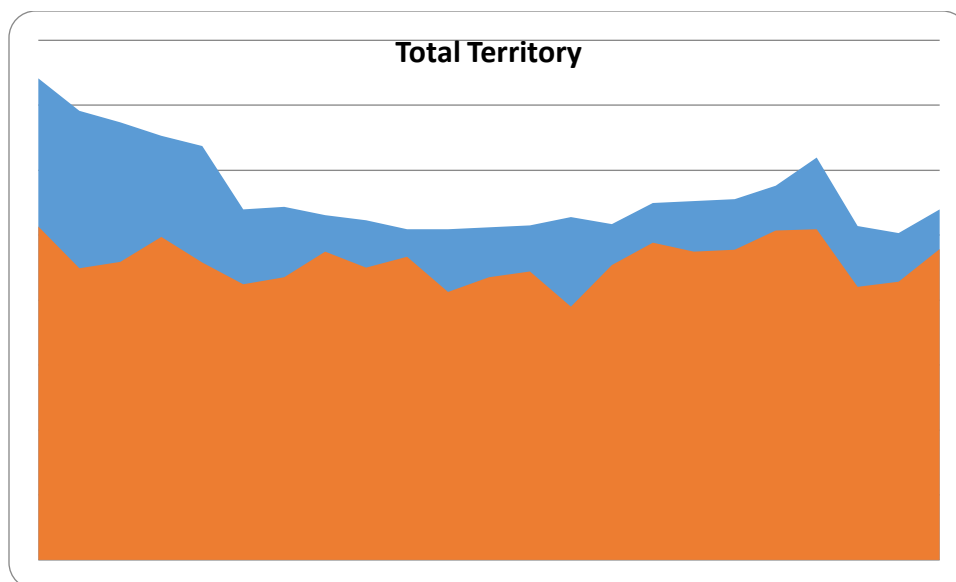


Image 32 Change in the area of wine and wine production 1989-2013 in Greece (ESLTAT)

In the year 2014, and in the framework of the Ministry of Rural Development for the Restructuring and Conversion of the Wine Register, the areas classified as "abandoned", ie having legal rights but for which no harvest declaration was made, amounted to 49,2 hectares, of which the highest concentration of 17,1 hectares was observed in the peripheral section of Kavala (Table 5).

Table 5 Area of vineyards with wine grape varieties classified as "abandoned" per Regional Unit (in hectares)

REGIONAL UNIT	AREA
DRAMA	12,4
ERVOS	16,9
KAVALA	17,1
XANTHI	1,3
ORESTIADA	1,4
TOTAL	49,18

Nevertheless, in 2014, the total area of the vines with wine grape varieties amounted to 1,714 hectares, with 3,441 growers active, while in 2015 the vineyards for wine production reached 2,113 hectares. The upward trend continued in 2016 (Table 6), boosting the sector and reinforcing the position of the Region in Greece's wine and oenological map. The effort made over the last 30 years for the renewal of the historical vineyard of the area, with privately-

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owned vineyards in which both indigenous and international varieties are cultivated, proved to be of great importance. Considering that the majority of the cultivated areas of the Region are flat, the largest concentration of land is found in the prefectures of Evros and Xanthi, for the residents whose occupation with vine and wine is one of the main sources of income.

Comparing the data provided by ELSTAT over a five-year period (2011-6), land coverage of vines and raisins, following a downward trend, fell from 5,548 to 4,6841 hectares. However, it is worth mentioning the increase in the yields of wine grapes from 22.543 to 24.692 tones compared to table grapes which dropped from 59.023 to 53.934 tones (Table 4). Rhodopi Population recorded the largest increase of 109%, while the Kavala region decreased by 24%. The differences, even with a positive sign, are even greater given the production of winemaking which, in the Region, has shaken from 13,608 tons to 21,692, showing an increase of 59%. However, since this increase is not accompanied by a corresponding increase of vineyards in the area, care must be taken to ensure that the yields are not at the expense of the quality of the raw material.

3.2 Vineyard Holdings

From the data of the previous inventories for the viticulture sector, we conclude that there is an opposed course of crop growth in different geographical areas. In most areas of the country there is a dramatic decrease in cultivated land. The largest decrease is recorded in Crete, Central Greece and Western Greece, while a significant increase is recorded in the study area (Image 32). The last few years, with the beginning of implementation of the National Reserve (2004-2015), over 5,400 hectares of cultivated land were spread. Most of them were distributed and planted in the Regions of Eastern Macedonia and Thrace, Central Macedonia, Thessaly, Central Greece and the Peloponnese (Grammatikos 2016).

Table 6 Comparative data 2011-2016 for vineyard cover and grape production in Eastern Macedonia & Thrace and other regions (ELSTAT)

4. Wines (grapes and raisins)												
Table 4a. Areas and production by Region and Regional Unity: 2011												
Areas in acres, production in tonnes												
Regions & Regional Units	Total of vineyards				Grapes for wine				Table grapes			
	Areas	Production of grapes for:			Areas	Production of grapes for:			Areas	Production of grapes for:		
		wine	table use	raisins		wine	table use	raisins		wine	table use	raisins
TOTAL OF GREECE	765.097	538.849	120.794	86	661.567	506.295	5.931	43	103.530	32.554	114.862	43
Region of Eastern Macedonia & Thrace	55.483	22.543	59.023	0	19.168	13.608	375	0	36.315	8.936	58.648	0
Rodopi	2.175	1.128	263	0	1.636	1.116	17	—	539	11	245	—
Drama	7.905	5.401	277	0	7.260	5.171	76	—	645	230	201	—
Evros	5.984	2.710	786	0	4.633	2.322	243	—	1.351	387	543	—
Thasos	562	263	42	0	434	226	5	—	128	38	37	—
Kavala	37.888	12.515	57.606	0	4.297	4.257	7	—	33.591	8.257	57.599	—
Xanthi	969	527	50	0	908	515	28	—	61	12	22	—
Region of Central Macedonia	92.418	61.359	26.782	42	72.250	56.521	1.880	27	20.168	4.838	24.902	15
Region of Epirus	8.014	5.307	223	0	7.714	5.296	122	0	300	11	102	0
Region of Thessaly	54.698	85.355	6.627	2	40.656	71.079	732	2	14.042	14.276	5.895	0
Region of Central Greece	83.547	60.876	1.306	5	81.869	60.441	324	5	1.678	435	982	0
Region of Ionian Islands	38.674	21.620	491	0	38.068	21.605	84	0	606	15	408	0
Region of Western Greece	95.787	108.265	2.911	0	92.871	107.192	1.081	0	2.916	1.073	1.830	0
Region of Peloponnese	104.689	68.331	8.461	1	99.485	68.320	225	1	5.204	11	8.236	0
Region of Attica	61.049	25.299	269	1	60.693	25.299	8	1	356	0	262	0
Region of North Aegean	33.465	20.074	1.545	2	30.206	20.031	200	2	3.259	42	1.345	0
Region of South Aegean	46.437	15.441	2.975	4	42.733	15.335	202	2	3.704	106	2.773	2
Region of Crete	90.836	44.378	10.179	30	75.854	41.566	698	4	14.982	2.812	9.481	26

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4. Wines (grapes and raisins)

Table 4a. Areas and production by Region and Regional Unity: 2016

Regions & Regional Units	Total of vineyards				Grapes for wine				Table grapes			
	Areas	Production of grapes for:			Areas	Production of grapes for:			Areas	Production of grapes for:		
		wine	table use	raisins		wine	table use	raisins		wine	table use	raisins
TOTAL OF GREECE	911312	534770	245692	53383	517181	470295	13975	11	96152	14590	138163	152
Region of Eastern Macedonia & Thrace	46841	24692	53934	0	20854	21692	1027	0	25986	3000	52906	0
Rodopi	2919	2360	1058	0	2196	2017	260	—	723	344	797	—
Drama	6556	7718	408	0	6202	7707	70	—	354	10	338	—
Evros	5932	3728	1575	0	4307	3665	223	—	1624	62	1351	—
Thasos	342	528	9	0	320	518	—	—	22	10	9	—
Kavala	29575	9505	50734	0	6428	6937	420	—	23147	2568	50314	—
Xanthi	1517	854	150	0	1401	848	54	—	116	6	97	—
Region of Central Macedonia	56298	47833	21642	53	41103	44234	514	0	15069	3581	21125	0
Region of Western Macedonia	17724	14514	1008	0	16743	14327	349	0	981	187	659	0
Region of Epirus	7588	4157	124	1	7517	4137	78	0	65	20	46	0
Region of Thessaly	52856	44798	22439	43	41689	42522	6191	0	11123	2276	16226	1
Region of Central Greece	57738	54563	2611	38	55844	54463	654	0	1846	100	1949	0
Region of Ionian Islands	33233	13049	338	2657	19702	13029	90	0	362	19	171	0
Region of Western Greece	122663	57610	3816	24657	53043	56852	1389	0	2254	719	2385	0
Region of Peloponnese	210770	84546	93647	15530	83252	75124	926	11	7526	308	10819	0
Region of Attica	52712	54570	630	0	52494	54507	466	0	218	64	164	0
Region of North Aegean	27657	15760	918	1	26154	15752	284	0	1501	8	634	0
Region of South Aegean	35610	15113	2568	1	33763	14847	577	0	1846	266	1988	1
Region of Crete	189622	103564	42018	10404	65023	58809	1430	0	27375	4041	29089	151

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However, the problem of Greek viticulture does not concentrate only on the shrinkage of the country's viticultural potential. The size of the viticultural areas per beneficiary is particularly small, making most cultivations unsustainable. Table 7 below shows the stratification (per percentage) per Region of lands for the year 2016 (Grammatikos) and gives a detailed reference of the viticultural areas, a plot of land per county in the study Region. In terms of the surface area of cultivated land it is noted that in many areas, areas of up to 0,5 hectares, exceed 80% of the total cultivated areas, while those over 2 hectares account for just 3.9%. For most regions, the largest area of land is of 0.1-1 hectare (Table 8). Exceptions are the Kavala and Drama region, but also Rodopi, where vineyards of 2 hectares can be found.

Table 7 Stratification of vineyards (percentage) in 2016

Region	0-0,5 hectares	0,5-2,0 hectares	2,0-5,0 hectares	5,0> hectares
EASTERN MACEDONIA-THRACE	80.71	15.39	2.9	1
Total	81.07	16.1	2.4	0.43

Table 8 Stratification of viticultural areas per county

REGIONAL UNIT	NUMBER OF AREAS <=0,1 hectares	TOTAL AREA	NUMBER OF AREAS OF 0,1 <AREA<= 0,5 hectares	TOTAL AREA	NUMBER OF AREAS OF 0,5<AREA <=1,0 hectares	TOTAL AREA	NUMBER OF AREAS OF 1,0<AREA <=1,5 hectares	TOTAL AREA	NUMBER OF AREAS OF 1,5<AREA <=2,0 hectares	TOTAL AREA	NUMBER OF AREAS OF 2,0<AREA <=5,0 hectares	TOTAL AREA	NUMBER OF AREAS OF 5,0<AREA <=7,0 hectares	TOTAL AREA
DRAMA	99	76,1	198	512,8	71	509,8	13	162	4	68,6	8	220,9		
EVROS	94	73,3	144	408,5	21	151,6	12	153,1	6	117	2	60		
XANTHI	20	13,5	120	335,1	34	238,3	10	126,3	2	36,3				
ORESTIADA	60	44	110	306,9	29	203	4	56,1	5	88	3	70,9		
RODOPI	49	37	133	417,7	62	461,2	15	186,9	15	263,6	6	150,8		
KAVALA	137	117,8	1024	2934,3	268	1953,5	76	957,4	19	337,1	19	512,1	1	50,5

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In conclusion, to a large extent, the vineyard cultivation in the Region appears with vineyards of 1 to 5 acres. There is no extensive stretch of land, resulting to a high cost in cultivation and the production of the raw material for winemaking, while the organizational requirements for obtaining high-quality grapes are also increased.

According to the Registry of Approved Operations of PDO, PGI and Varietal Wines of the Region of Eastern Macedonia and Thrace of the Greek Ministry of Agricultural Development, the registered enterprises with their head offices, broken down by regional unit, are shown in Table 9. The superiority of the Municipalities of Drama and Kavala is distinguished. Of course the recovery for the area of Thrace follows the above mentioned, but the dynamics being developed is positive. Contrary to the tendency to reduce vineyards in the largest proportion of Greece, the upward trend in the area of Thrace is striking.

Table 9. Register of approved PGI and Varietal Wines of the Region of Eastern Macedonia and Thrace for the year 2018

	#	Name / Company Name	HEAD OFFICES
R.U. OF XANTHI	1	VOYRVOUKELI N. & F.	AVDIRA, 67061
	2	CHOURZEMANOGLOU ELISAVET	AVDIRA, 67061
R.U. OF EVROS	1	EVRIKA KELARIA A.E -	MARASIA / MUNICIPALITY OF OERSTIADA
	2	RAPTI THEODORA	MUNICIPALITY OF SOUFLI, VAS. GEORGIU 15, 68400
	3	BELLA BROS O.E	ALANIA, SOUFLI
	4	MELMAR AE	DAFNES, SAMOTHRAKI
R.U. OF RODOPI	1	KARROS CHRISOST.	KOSMIO, RODOPI
	2	KIKONES – TASSOU MELACHRINI	MUN. ROAD OF KALAMOKASTRO-SIDIROCHORI
	3	MARONIA A.E	MARONIA, RODOPI
	4	L.K PAPANIMOS	SIDIROCHORI
	5	PAPAVASILIOU PANAGIOTIS	IASMOS
	6	TSORLIANOS AGGELOS	PROSKINITES
R.U. OF DRAMA	1	KLONARIDIS CHRISTOS	NEROFRAKTIS, 66031
	2	DOMAINE COSTA LAZARIDI	ADRIANI, 66100
	3	DOMAINE PAVLIDI	KOKINOGEIA, 66200
	4	LAZARIDIS NIKOS	AGORA, 66032
	5	MANOLESAKIS	ADRIANI, 66100

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	#	Name / Company Name	HEAD OFFICES
	6	MICHAILIDIS IORDANIS	AGIOS ATHANASIOS, 66300
	7	INOGENESSIS O.A.E.A.E.	ADRIANI, 66100
	8	PAPADOPOULOS - KALAITZIDIS O.E.	MIKROCHORI, 66100
	9	AMALAGOS IKE	ADRIANI
R.U. OF KAVALA	1	ABELOEIS A.E.	FOLIA KAVALAS, 64007
	2	APOSTOLIDIS TOYROUNDIDIS O.E.	DIALEKTO KAVALAS, 64200
	3	IOANNIS & CHRISTOS GIANNAKIS OE	SKALA SOTIRA, THASOS KAVALA, 64010
	4	IOANNIDIS O.E.	ELAIOCHORI, KAVALA, 64007
	5	KARABERIDOU CHRISOULA	NEA PERAMOS, KAVALA, 64007
	6	WINERY TSAKSARLIS - GEROVASILIOU	KOKKINIOCHORI, KAVALA, 64007
	7	LAZARIDIS NIKOS	PLATANOS, KAVALA, 64008
	8	LALIKOS KONSTANTINOS	PALAIKA KAVALA, 64003
	9	WINES SGOYRIDIS	MANDRA, XANTHI
	10	PROTOPAPAS ATHANASIOS	KARIANI, KAVALA, 64008
	11	SEITANIDIS VASILIS	FOLIA KAVALAS, 64007
	12	POLICHRONIS	ELAIOCHORI, KAVALA, 64007
	13	TAOUKTSIS KONSTANTINOS	SIDIROCHORI, KAVALA, 64007
	14	TRIANTAFILIDIS	KOKKINIOCHOMA, KAVALA,64100
15	TSIKRIKONIS STATHIS	MIRTOFITO, KAVALA,64007	
16	FELACHIDOU ELENI	AGIOS ANDREAS, KAVALA,64007	
17	CHATZIGEORGIU	KARIANI, KAVALA,64008	
18	PANGEON	SIDIROCHORI, KAVALA	

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3.3 Varietal potential of the area

The great upheaval in the varietal potential of the Eastern Macedonia – Thrace region occurred at the end of the 19th century with the destructive spread of phylloxera. During the last decade of the 19th century, phylloxera also appeared in Greece (the first incident found in Macedonia), destroying the existing vineyard and exacerbating the already tense situation. But the destruction does not stop there, the first half of the 20th century makes the situation even more dramatic for Greek wine: phylloxera, the disappearance of some historic vineyards and varieties of vine, loss of export markets, immigration, inadequate state care, millions of uprooted Greeks from Asia Minor and the Pontus. Although the refugees arriving from the East and the North bring with them grafts, knowledge and techniques concerning the cultivation of vine and wine production and the use of tools and utensils, until 1929 the vineyard has been almost completely destroyed. The successive devastating wars (the Balkan wars and the civil war) are the result of remaining and overturning the agricultural map of the Region. The inhabitants abandon the vineyard cultivation for the benefit of tobacco growing or other products.

In the early 1990s, the first steps to recover and historically restore the area as it was entitled, to the wine map of Greece began to take place. But varietal potential has changed. The native varieties have been minimized while the political-economic line is towards planting of varieties. The acclimatization of the new, red and white varieties proves to be excellent and their prevalence is almost complete. In today's vineyard, according to the ELSTAT statistics (2016), the main winemaking variety in the region of Eastern Macedonia and Thrace is Sauvignon blanc, which accounts for 14.9% of the total area of the olives (source: <http://www.statistics.gr/el/home>).

During the past decades efforts have been made to rescue and develop indigenous varieties that have survived mainly in mountainous and inaccessible vineyards. The most characteristic are: Zoumiatiko, Mavroudi, Karnakalades, Keratsouda, Bogalamades, Pamiti, Sefka, Moshomavro, Batiki, Fokianos etc. The information available for these varieties is incomplete but attempts are made to record the genetic characteristics and the oenological their potential.

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The Central Cooperative Union of Wine Producers (KEOSOE) proceeded in the year 2016 to a national recording of all cultivated varieties in all areas, as well as their yield. The data concerning the Region of Eastern Macedonia and Thrace are shown in the following tables:

Table 9 Kilos and areas per variety in the Regional Unit of Drama

Variety	Kilos (kg)	Hectares
MERLOT	251,486.00	28,6
CABERNET SAUVIGNON	219,605.00	29,7
SAUVIGNON BLANC	217,215.00	30,0
MOSCHATO OF ALEXANDRIA	104,766.00	10,2
ASSYRTIKO	89,834.00	9,5
CABERNET FRANC	57,254.00	5,6
SYRAH	54,544.00	6,3
CHARDONNAY	45,150.00	5,0
MALAGOUZIA	38,755.00	8,3
MOSCHOMAVRO (MOSCHOGALTSO)	24,490.00	2,6
CINSAUT	22,670.00	2,7
AGIORGITIKO (MAVRO NEMEAS)	22,590.00	2,6
UGNI BLANC	15,170.00	1,3
SANGIOVESE	15,020.00	1,3
SEFKA	9,400.00	1,0
GRENAGE ROUGE	8,480.00	0,9
RODITIS (ALEPOU)	5,000.00	1,0
GEWURTZTRAMINER	4,430.00	0,8
VIOLENTO	2,365.00	0,3
NEBBIOLO	1,900.00	0,2
LIMNIO(KALABAKI)	1,150.00	0,7
PAMIDI	500.00	0,2
KOUKOULI	200.00	0,04
MAVRODAFNI	200.00	0,04
VIDIANO	0.00	1,8
MAVROUDI	0.00	0,4
MALVASIA DI CANDIA AROMATICA	0.00	0,1
MAVROTRAGANO	0.00	0,1
RIESLING	0.00	1,7

Table 10 Kilos and areas per variety in the Regional Unit of Kavala

Variety	Kilos (kg)	Hectares
SAUVIGNON BLANC	1,328,559.00	161
PAZAKI (KEPINO)	1,020,199.00	228
MERLOT	716,977.00	83,5
CHARDONNAY	380,092.00	44,7
CABERNET SAUVIGNON	350,827.00	44,6
SYRAH	175,182.00	20,7
ASSYRTIKO	124,560.00	16,8
MOSCHOMAVRO (MOSCHOGALTSO)	112,535.00	22,2
MALAGOUZIA	96,608.00	13,9
AGIORGITIKO (MAVRO NEMEAS)	57,579.00	7,9
MOSCHATO OF ALEXANDRIA	54,585.00	11,0
GRENACHE ROUGE	44,570.00	4,6
SEMILLON	28,060.00	2,3
GEWURTZTRAMINER	27,850.00	4,9
RODITIS (ALEPOU)	22,080.00	4,7
MAVRO OF NAOUSA, XINOKALTSO, XINOMAVRO, POPOLKA	18,157.00	3,6
VIOGNIER	14,565.00	1,7
CABERNET FRANC	13,500.00	4,2
PINOT NOIR	9,850.00	2,4
VIDIANO	8,360.00	0,9
TANNAT	6,000.00	0,7
UGNI BLANC	2,350.00	0,3
LIMNIO(KALABAKI)	1,800.00	0,6

Table 11 Kilos and areas per variety in the Regional Unit of Xanthi

Variety	Kilos (kg)	Hectares
MERLOT	125,850.00	16,3
SYRAH	92,454.00	13
RODITIS (ALEPOU)	54,453.00	5,9
PAMIDI	44,094.00	6,8
ASSYRTIKO	43,101.00	7,2
CABERNET SAUVIGNON	36,959.00	9,9
MOSCHATO OF ALEXANDRIA	16,210.00	2,3
MAVROUDI	14,536.00	2,2
LIMNIO(KALABAKI)	12,604.00	1,9
SAUVIGNON BLANC	11,286.00	2,4
CHARDONNAY	8,736.00	2,8
CINSAUT	8,250.00	0,6
MALAGOUZIA	4,023.00	1,4
SEFKA	3,500.00	0,3
GRENACHE ROUGE	2,600.00	0,5
UGNI BLANC	1,091.00	0,2
ZOUMIATIKO (DAMIATIS)	800.00	0,08
ATHIRI	0.00	0,3

Table 12 Kilos and areas per variety in the Regional Unit of Rodopi

Variety	Kilos (kg)	Hectares
SYRAH	290,851.00	32,6
CHARDONNAY	257,745.00	22,8
MAVROUDI	204,752.00	23,2
MERLOT	145,160.00	14,6
CABERNET SAUVIGNON	141,729.00	18,0
MALAGOUZIA	133,189.00	11,8
LIMNIO(KALABAKI)	39,758.00	5,1
MOSCHATO OF ALEXANDRIA	24,402.00	3,9
PAMIDI	24,340.00	2,2
ASSYRTIKO	14,672.00	1,9
RODITIS (ALEPOU)	12,750.00	4,8
GRENACHE ROUGE	8,609.00	1,6
MOURVEDRE	4,410.00	0,8
SAUVIGNON BLANC	3,000.00	7,5
ZOUMIATIKO (DAMIATIS)	1,500.00	0,1
ATHIRI	500.00	0,2

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Table 13 Kilos and areas per variety in the Regional Unit of Orestiada

Variety	Kilos (kg)	Hectares
ALEPOU	242,314.00	21,2
MERLOT	64,589.00	11,0
SAUVIGNON BLANC	39,884.00	5,3
CABERNET SAUVIGNON	37,014.00	13,2
MOSCHOMAVRO (MOSCHOGALTSO)	25,110.00	3,5
ASSYRTIKO	18,459.00	3,4
CINSAUT	17,350.00	2,3
SYRAH	15,080.00	3,7
PAMIDI	12,400.00	1,9
MAVROUDI	10,861.00	3,0
LIMNIONA	6,572.00	2,0
CHARDONNAY	6,330.00	1,3
MALAGOUZIA	5,510.00	2,3
LIMNIO(KALABAKI)	3,900.00	0,3
ATHIRI	2,140.00	0,4
UGNI BLANC	1,640.00	0,2
GRENACHE ROUGE	1,540.00	0,1
MOSCHATO OF ALEXANDRIA	0.00	0,2
MOSCHATO OF HAMBURG	0.00	0,7

Table 14 Kilos and areas per variety in the Regional Unit of Evros- Alexandroupoli

Variety	Kilos (kg)	Hectares
CINSAUT	119,376.00	13,5
MOSCHATO OF HAMBURG	85,108.00	12,6
MERLOT	77,438.00	14,9
CABERNET SAUVIGNON	68,221.00	11,6
SYRAH	68,151.00	8,4
ASSYRTIKO	51,900.00	4,6
MAVROUDI	46,683.00	7,4
PAMIDI	33,620.00	4,1
MALAGOUZIA	24,160.00	2,8
KERATSOUDA	22,865.00	1,7
RODITIS (ALEPOU)	19,295.00	2,9
OPSIMOS SOUFLIOU	17,700.00	1,7
SAUVIGNON BLANC	16,200.00	1,7
LIMNIO(KALABAKI)	12,700.00	3,3
MOSCHATO OF ALEXANDRIA	8,220.00	1,9
GRENACHE ROUGE	7,500.00	0,7

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Variety	Kilos (kg)	Hectares
ZOUMIATIKO (DAMIATIS)	5,214.00	0,9
BOGIALAMADES	4,150.00	0,3
KARNACHALADES	3,797.00	0,3
ATHIRI	3,000.00	0,4
SEFKA	2,520.00	0,2
CHARDONNAY	1,400.00	0,2
MOSCHOMAVRO (MOSCHOGALTSO)	1,000.00	0,1
LIMNIONA	1,000.00	0,1
CARIGNAN	200.00	0,1

A common place for every Regional Unit is that international varieties have prevailed at the expense of the indigenous ones, both nationally and locally. This phenomenon can be explained by the fact that the area revived vine cultivation in the 1990s, where the trend in consumption, as well as in the possibility of addressing the international wine market has shifted to international varieties. However, there are still some cases such as those of Xanthi and Orestiada, where native varieties such as Alepou, Pamiti, Moshomavro and others are found in the top five of the most widely cultivated varieties. This demonstrates the shift that has been made at international level but also within the framework of Greek wine producers to explore and disseminate the special characteristics of indigenous varieties that have to offer something different and remarkable beyond the "classical" European varieties.

To this end, the Ministry of Rural Development and Food, by Ministerial Decree 2919/95506 / 13.09.2017, classifies the cultivated varieties of the area as recommended and permitted, giving space between the foreign varieties and many natives as follows:

In Thrace (including the regional units of Evros, Xanthi, Rodopi) the recommended varieties are:

Athiri B, Assyrtiko B, Limnio N, Limniona N, Malagouzia B, Moschomavro N, Roditis Rs (Alepou), Cabernet Sauvignong N, , Carignan N, Chardonnay B, Grenache Rouge N, Merlot N, Sauvignon Blanc B, Syrah N.

And permitted varieties:

Agiorgitiko N, Aidani white B, Vidiano B, Zoumiatiko B (Damiatis), Karnachalades N, Keratsouda N, Mavrotragano N, Mavrouda N(2), Moschato of Alexandria B, Moschato

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white B, Mpatiki B, Mpogialamades N, Pamidi N, Rompolá B, Sefka N, Fokiano N, Cinsaut N, Mourvedre N, Ugni Blanc B (Trebiano). Moschato of Hamburg N, Opsimo Soufliou B are permitted only in Evros regional unit, while Razaki B (Kerino) is permitted in Xanthi regional unit.

In Macedonia (including the total of the regional units of Macedonia, ie Grevena, Drama, Imathia, Thessaloniki, Kavala, Kastoria, Kilkis, Kozani, Pella, Serres, Chalkidiki, Florina) the recommended varieties are:

Athiri B, Assyrtiko B, Limnio N, Limniona N, Malagouzia B, Moschomavro N, Negkoska N, Xinomavro N (Xinogaltso, Popolka, Mavro Naousis in the PGI are of Naousa), Roditis Rs (Alepeou), Cabernet Franc N, Cabernet Sauvignon N, Chardonnay B, Gewurztraminer Rs (1), Grenache Rouge N, Merlot N, Riesling B, Sauvignon Blanc B, Semillon B, Syrah N.

And permitted varieties:

Agiorgitiko N, Agoumastos B, Asprouda Serron B, Vidiano B, Boidomatis N, Zoumiatiko B (Damiatis), Koiniariko N, Korithi N, Kidonitsa B, Koukouli B, Liatiko N, Mavrodafni N, Mavrotragano N, Mavroudia N(2), Moschato white B, Mpatiki B, Pamidi N, Priknadi B, Robola B, Savatiano B (Doubraina white, Kontoura white, Perachoritiko, Sakeiko), Sefka N, Stavroto N (Ampelakiotiko black), Fokiano N, Chondromavro N(2), Aglianico N, Barbera N, Cinsaut N, Ct (Malbec) N, Malvasia di Candia Aromatica B, Montepulciano N, Mourvedre N, Nebbiolo N, Negro Amaro N, Petit Verdot N, Pinot Noir N, Refosco N, Sangiovese N, Sylvaner B, Tannat N, Tempranillo N, Touriga Nacional N, Verdicchio Bianco B, Viognier B, Ugni Blanc B (Trebiano). Moschat of Hamburg N is permitted only in the regions of Imathia, Thessaloniki, Kozani, Serres and Chalkidiki. Razaki B (Kerino) variety is permitted in the regions of Thessaloniki, Chalkidiki and Kavala. The variety Opsimo Edessis B (Amassi, Karatzovas, Foustani) is permitted in the region of Pella. Moschato of Alexandria B is permitted in the regions of Drama, Thessaloniki, Kavala, Chalkidiki and Serres. The variety Tsapournako N is only permitted to the vineyards existed in the region of Kilkis and not to be expanded further due to its poor quality yield.

With this research program and through the genetic identification of indigenous varieties in the region, it will be possible to record them but also to assess their wine production potential, which may contribute to the establishment of PDO wines for this region.

3.4 Protected Geographical Indication Wines

The Region of Eastern Macedonia and Thrace does not have wines with a Protected Designation of Origin (PDO), despite the fact that the European Union has allocated to it new planting rights for vineyards of VQPRD (PDO) wine production zones and local as well of a total of 1.098,0 hectares, based on Article 6 of Regulation (EC) 1493/1999. However, it has nine Protected Geographical Indications (PGIs) varieties either identified from their municipal district, such as the Evros PGI established in 2010, or identified by the area, such as Ismaros PGI. PGI wines were created with the aim of enhancing authenticity and own the right to mark the vintage, the varietal composition and the geographical limits.

Based on the geographical areas, PGI wines are divided into three categories, which in the area under investigation are specified as follows:

3.4.1 PGI wines of the Region

3.4.1.1 PGI Thrace

Thrace is the smallest and least developed wine-growing territory in Greece. An important percentage of Thracian residents are refugees from Eastern Romelia, but also from other regions and they have transferred the tradition of vine cultivation and wine production to all three regions. Viticulture, until recently, was of little importance to the local economy, resulting to a limited wine production which is consumed locally. However, recently the situation has been reversed. In the early 1990s, the establishment of "Maroneia Ambelourgiki-Oinonopoiitiki SA" by Tsantali Winery in cooperation with a local entrepreneur was the starting point for the development of modern viticulture and wine production in the Region. Established in 1994, the first winery in the Region producing bottled wine was the Bellas Winery. The Region has been in the production of bottled wine in embryonic condition compared to other wine-producing Regions of Greece, but has made steady steps towards modernization. Today there are at least

6 wineries producing bottled wine with quite valuable reviews, both domestically and internationally.

Both indigenous varieties producing wines with special characteristics and international varieties that produce modern wines are cultivated in the region. With regard to the white varieties, the local Zoumiatiko, Malagousia, Roditis, Moschato of Alexandria, Sauvignon Blanc, and Chardonnay stand out. Regarding the red varieties, from the indigenous ones Mavroudi, Pamiti and Limnio are of major importance and from the international ones, Cabernet Sauvignon, Syrah, Merlot, Sangiovese and Cinsault. Also remarkable is the production of distillates such as Tsipouro and Ouzo (<http://winetuned.com/Θράκη>).

There are no Protected Designation of Origin (PDO) wines in Thrace region. However, there are 4 Protected Geographical Indications (PGI): PGI Thrace covering the whole region, PGI Evros that was established in 2010, PGI Ismaros and PGI Avdira.

The PGI Thrace zone was established in 1997 and includes the Regional Units of Evros, Rodopi and Xanthi, which together designate the autonomous Thrace wine-growing area. The defined zone of production of PGI Thrace wines was recognised by Ministerial Decision no. 259741 / 19.2.1997 (Government Gazette 140/B/3.3.1997), which was subsequently corrected by the Government Gazette 419/B/20.4.1999) and includes all the regions of Thrace which are described in the Ministerial Decisions (PGI-GR-A1611).

The main wine-growing regions in Thrace are Soufli and the northern part of Evros, Maroneia in Rodopi and Avdira in Xanthi. Given that PGI wines must be produced from grapes of PDO and / or PGI areas within the region and that only two small zones (PGI Avdira, PGI Ismaros) have previously been established in Thrace, it is clear why PGI Thrace is the least represented PGI wine at a regional level. At present, PGI Thrace is only produced by 2 wineries within the zone. The introduction of PGI Evros is expected to further reduce its presence. The types of wines that are produced as Regional Wines of Thrace are the following:

- White dry, semi-dry, semi-sweet, sweet
- Rose dry, semi-dry, semi-sweet, sweet

- Red dry, semi-dry, semi-sweet, sweet
- Liquor wine white and red

3.4.2 PGI of Regional Units (former Prefectures)

The PGI wines are limited to the geographical boundaries of a regional unit, that is to say a certain former prefecture. PGI wine grapes must come from this regional unit, which also applies to their vinification. Varietal blends of wines are more stringent in principle, while the types of wines that can be produced are more limited. However, at the specific level of PGI wines, wineries of neighboring regional units also have the right to produce them.

3.4.2.1 PGI Drama

The PGI Drama area in the northern eastern end of Macedonia was established in 1995 and is surrounded by the boundaries of the homonymous Regional Unit. The defined zone of production of Drama PGI wines was recognised by Ministerial Decision no. 413011 / 30.11.1995 (Government Gazette 1023/B/12.12.1995), which was subsequently amended by the Law no. 235258/6.2.2002 (Government Gazette 190/B/20.2.2002), the no. 278473 / 26.2.2008 (Government Gazette Issue 363/B/ 05.3.2008) and no. 280933 / 16.7.2010 (Government Gazette 1125 / B / 23.7.2010) (PGI Drama Technical Documentation, YPAAT).

The area of Drama is a remarkable case of the wine section of Greece, as it has started almost from scratch and has made a tremendous progress, over the past 20 years, both in the cultivation of vineyards and in the production of wines. This progress is formalized by the 2008 amendment regarding the varieties and the widespread widening of wine types of 2010. One of the most acclaimed PGI wines, at a Regional Unit level, the PGI Drama is produced by all 7 wineries of the zone.

Although there has not been established any PDO zone in Drama as in Kavala, it is considered to be one of the most important wine producing regions in the country. There are many leading producers who have created excellent quality wines. The dry and relatively warm climate of the

region allows the cultivation of red international varieties such as Cabernet Sauvignon, Merlot and Syrah, as well as the fine white variety of the Cyclades, Assyrtiko which in the conditions of Northern Greece found a second place of establishment, giving more aromatic and elegant wines. The vineyards of Drama and Kavala, which are linear, are among the most modern and well organized vineyards in Greece and mostly irrigated. The vineyards are located at an altitude ranging from 80 to 1000 meters and the soils are mostly sandy.

The cultivated varieties are: Assyrtiko, Roditis, Malagouzia, Moschato of Alexandria, Robola, Agiorgitiko, Limnio, Chardonnay, Sauvignon blanc, Semillion, Trebbiano, Viognier, Cabernet Franc, Cabernet Sauvignon, Merlot, Nebbiolo, Refosco, Syrah, Tempranillo. The wine types are the following:

- White dry, semi-dry, semi-sweet, sweet
- Rose dry, semi-dry, semi-sweet, sweet
- Red dry, semi-dry, semi-sweet, sweet

It is also allowed to produce wines from sun-dried grapes. For the production of rosé wines it is allowed to use red varieties and Roditis. The high temperatures towards the end of the summer are favourable for drying the grapes and in combination with the great sunshine, they contribute to the production of high quality and high commercial quality sun-dried wines. The fact that the harvest in the prefecture of Drama is early allows the grapes to be sunburned and at a time when the conditions are very good without rains and extreme weather phenomena so that very favourable Baume is obtained and high quality wine can be produced.

3.4.2.2 PGI Kavala

PGI Kavala, was established at the end of 2010. The defined wine production zone with PGI Kavala was designated by Ministerial Decision no. 310946 /24.12.2010 (Government Gazette 2042/B/29.12.2010). As in Drama, a PDO zone has not yet been established. The trellis system is linear and irrigated in its majority. The vineyard is one of the most modern and well organized in Greece, offering excellent quality wines.

The vineyards of the area are situated on sloping slopes and slopes. The soils are mainly limestone, with a pH of 6.5-7.5 and an average amount of calcium carbonate. Their organic substance is medium or low in content. The climate of the region is Mediterranean for the vineyards near the sea and continental for those who are in high altitude areas (e.g. Municipal District of Kavala, Dialectos etc). The average annual temperature is of 14,2°C. The average temperature during the summer months is 24°C, while in the winter months 5°C. The average maximum temperature is recorded in July, while the minimum in January. The average annual rainfall is 640 mm and its distribution is characteristic of the Mediterranean climate, i.e. with increased rainfall in the months of October to April (Technical File of PGI Kavala, Ministry of Agricultural Development).

In the area of Kavala, the particularly mild and humid climatic conditions, formed in the valley and the hilly lands between the sea coastline and the Pangaio Mountains, combined with deep, fertile soils, have been an ideal place to adapt early foreign whites varieties, mainly Sauvignon Blanc, but also Chardonnay and Semillon. This is also supported by the finest wine-growing of the region's producers, known for its table grapes.

The zone includes vineyards located at altitudes above 50m. The decision refers to "grapes from vineyards located in the Prefecture of Kavala" but obviously practically means the land part except Thassos, which with the same Official Gazette (B2042, 29-12-2010) acquired its own PGI, Thassos wine. Given the fact that in the western area of Kavala there has been for years the most successful PGI wine at a region level, the PGI Pangeo wine, it is obvious that the establishment of PGI Kavala wine comes mainly to cover the wine and wine growth recorded in the remaining part of the area of Kavala, the central and the eastern. PGI Kavala has the same varietal composition as PGI Paggaios, but a wider range of wine types. So, not only can it cover the total wine production of the area of Kavala, but it can also give extra potential to the producers of the Pangaio area.

The cultivated varieties are: Assyrtiko, Malagouzia, Moschat of Alexandria, Roditis, Viognier, Gewurstaminer, Chardonnay, Semillon, Sauvignon blanc, Trebbiano, Agiorgitiko, Limnio, Moschomavro, Pamidi, Grenache rouge, Cabernet Sauvignon, Cabernet franc, Merlot, Syrah.

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The wine types are as follows:

- White dry, semi-dry, semi-sweet, sweet
- Rose dry, semi-dry, semi-sweet, sweet
- Red dry, semi-dry, semi-sweet, sweet

3.4.2.3 PGI Evros

The zone of PGI Evros, set up in 2010, is confined to the borders of the homonymous Regional Unit, on the eastern edge of Thrace.

A special place in the wider region of Eastern Macedonia and Thrace has Soufli in the Prefecture of Evros, as the second most important activity in this area following sericulture, and even older than that, was viticulture. The art of viticulture and winemaking is lost in the depths of the ages. Indicatively, wine production in Soufli in the 19th century was about 2,000,000 liters. From data preserved until now, it is observed that winemaking at Soufli, together with silk production, was the two main activities of the locals, which led Soufli to a high economic and social status and famous throughout Europe, with wine exports across the Haemus Peninsula and France from 1880 until the Balkan wars. After the construction of the railway network, the French chose Soufli because of its peculiarity (knowledge of the cultivation of the unique winemaking method, the climate of the region and mainly thanks to a unique local variety, Carnahala, giving balanced wine in body and color), in order to import grapes in France and enrich their own red wines. With that progress, a chemist-oenologist from Soufli named Papisilekas, one of the few of that time and unique in the Ottoman state, opened an oenological laboratory in Soufli in the late 19th century, bringing into light the scientific method of the grapevine cultivation and winemaking. After the liberation of Greece, he moved to Athens with his entire scientific group. He was one of the proponents of the production of Greek wine and viticulture and was one of the founders of the Greek union of oenologists in 1927 (Thrakikos oionos, 1998, Politis, 2014).

However, the development of sericulture and the extension of the mulberry tree resulted in the reduction of viticulture, but its elimination was not possible, due to the fact that silk and sericulture were characterized by their seasonality. Today, after many years of recession, the

tradition combined with the new cultivation techniques give to the PGI Evros wine a new dynamic and impetus.

The defined zone of the wines of PGI Evros was designated by Ministerial Decision No. 280935 / 16.7.2010 (Government Gazette 1125 / B / 23.7.2010). The vineyards of Evros are located mainly in the central (Soufli district) and northern part, on the borders with Bulgaria (Trigonos area). It is a semi-mountainous wine-growing zone. Most of the area's vineyards stretch on slopes. The vineyard soils are of medium mechanical composition (SL, SCL) with neutral pH and little calcium carbonate. The climate of the area is characterized by its proximity to the sea, with intense continental climate and with cold winters. The average temperature in the summer months is 26,3°C while in the winter months it often goes below 0°C. The average maximum temperature is recorded in August, while the minimum is December. The average rainfall is around 620 mm and its distribution is typical of the Mediterranean climate, i.e. with increased rainfall during October and April. The theoretical evapotranspiration is at the same level as the rainfall during the winter, while it excels the germination period. The winds prevailing in the area, particularly in winter, are strong north-east, while in the spring and summer have a small to medium intensity (PGI Evros Technical File, Ministry of Agricultural Development).

The long tradition of Evros in wine growing and wine production is justified by the introduction of the PGI Evros, where the presence of the red native varieties of Karlachanades, Mavroudi, Bogialamas and the rose Pamidi is remarkable.

The cultivated varieties are:

Athiri, Assyrtiko, Zoumiatiko (Damiatis), Malagouzia, Chardonnay, Sauvignon blanc, Tempranillo, Karlachanades, Keratsouda, Limnio, Mavroudi, Moschomavro, Bogialamades, Pamidi, Sefka, Grenache rouge, Cabernet Sauvignon, Carignan, Merlot, Cincout, Syrah.

The wine types are:

- White dry, semi-dry, semi-sweet, sweet
- Rose dry, semi-dry, semi-sweet, sweet

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- Red dry, semi-dry, semi-sweet, sweet
- White and red liquor wines

3.4.3 Wines of PGI Areas

The PGI wines established at the boundaries of the Eastern Macedonia-Thrace region are listed alphabetically below:

3.4.3.1 PGI Avdera

In the Regional Unit of Xanthi, at the western end of Thrace, the PGI Avdera zone, established in 1997, constitutes the boundaries of the areas of Avdera, Mandra and Myrodatos, the municipal district of Abdera and the Manganos area of the municipal community of Topeiros. The vines must be at altitudes up to 300m. The area was designated by Ministerial Decree 269490 / 24-1-1997 (Government Gazette 126 / B / 26-2-1997), which was subsequently amended from 313009 / 20-9-2006 (Government Gazette 1436 / B / 29-09-2006). The wider area of Avdera is of great archaeological interest, with a long wine and winegrowing tradition.

This is a semi-lowland zone. Most of the area's vineyards extend into slopes and hillsides. The vineyard soils are of medium mechanical composition (SL, SCL) with neutral pH and little calcium carbonate. The climate of the area is characterized as Mediterranean with light continental climate trends. The average temperature in the summer months is 24°C while in the winter it is 6°C. The average maximum temperature is in July and the minimum in January. The average rainfall is around 850 mm and its distribution is increased in December, until April. The theoretical evapotranspiration is at the same level as the rainfall in the winter months, while it excels the germination period. The winds prevailing in the area, especially during the winter, are strong northeastern, while in the spring and summer they are of small to moderate intensity (PGI Avdira Technical File, Ministry of Agricultural Development).

Today, it is one of the most dynamic wine-growing regions of Thrace. PGI Avdira wines are produced from 3 wineries, but others are expected to be established. The cultivated varieties are: Athiri, Assyrtiko, Zoumiatiko, Malagouzia, Moschat of Alexandria, Roditis,

Chardonnay, Sauvignon blanc, Trebbiano, Limnio, Mavroudi, Pamidi, Grenache rouge, Cabernet Sauvignon, Merlot, Syrah.

The wine types are:

- White dry, semi-dry, semi-sweet
- Rose dry, semi-dry, semi-sweet
- Red dry, semi-dry, semi-sweet

3.4.3.2

PGI Agora

In the Regional Unit of Drama, at the eastern end of Macedonia, the PGI Agora zone, established in 1996, is the border of the areas of Agora and Pigades of Alexander the Great in the municipal district of Doxato. It was designated by Ministerial Decision no. 317164 / 30.4.1996 (Government Gazette 383 / B / 24-5-1996), which was subsequently amended by the Council of Ministers' 235252 / 6.2.2002 (Government Gazette 190 / B / 20-2-2002) and No. 278467 / 26.2.2008 (Government Gazette 391 / B / 07-3-2008).

Agora is only 15 minutes away from the ancient city of Philippi. Large quantities of charred grape grains of about 6200 years have been recently found, just a short distance from Philippi, indicating that fresh fruits have been pressed for juice extraction and proof of the ancient wine history of the area.

The soil of the PGI Agora area is of unique morphology. During the mid-frost years, the smooth flow of the rivers and streams flowing through the area led to the erosion of deposition materials and the creation of terraces over time, resulting in the enrichment of the subsoil with a variety of deposited materials, which ensure the health of vineyards. The consequence of these long-term natural processes is the creation of soils of both calcareous and shale-like quality, ideal for viticulture of high quality. At the same time, the prevailing Mediterranean and Continental climate offers the ideal temperature conditions for proper grain physiology,

cultivation and maturation, while the surrounding mountains provide protection from heavy rainfall and winds that could be devastating to crops (<https://pgiagora.gr/discovery-pgi-agora>).

The vines from which the PGI Agora wines are produced are at an altitude of 175-250 m and their total area covers about 54 hectares and at an average altitude of 175m are the vines that give the PGI Agora, which wines are produced by 1 winery.

The cultivated varieties are: Moschat of Alexandria, Roditis, Chardonnay, Sauvignon blanc, Trebbiano, Grenache rouge, Cabernet Sauvignon, Cabernet franc, Merlot.

The wine types are: White dry, Rose dry and red dry.

3.4.3.3 PGI Thassos

The Wine of Thassos was one of the most well-known of antiquity. The oldest sign that records wine trade has been found there. During the Ottoman domination, the production of Thassos was so great that the tax to the sultan was paid with wine and not with money. After phylloxera, Thassos' replanting was mainly made with table grapes and its production was feeding Kavala, which had not yet developed its own vineyards. Nowadays, the area of wine grapes in Thassos is small but still capable of producing high quality wines, following the example of the well-known PDOs of Thassos olives and PGI Thassos olive oil.

The PGI Thassos zone was designated by Ministerial Decision no. 310941 / 24.12.2010 (Government Gazette 2042 / B / 29.12.2010). The PGI Thassos wine zone extends to the boundaries of the homonymous island and its autonomous Regional Unit at the northern tip of the Aegean Sea. The vines must be at altitudes above 50 m.

Most of the island is covered by a mountainous mass that rises sharply on the eastern side and very smoothly on the other side reaching 1100 meters. Vineyards today are located in a 350-450 meter zone. This zone, more or less far from the sea (in our case 3 km away), consists mostly of terraces with stone walls due to the viticulture developed there. The composition of the soil is clayloam and sandy clay with good drainage on a deep subsoil with limestones and iron ore. The pH ranges from 7-7.5 with a total CaCO₃ of 2.2-2.3% and an organic substance that reaches 3% due to the cultivation practices applied. The island receives 400-600 millimeters of rain distributed in the first half of the year.

The winds blowing are mostly northern in the summer, with yards coming from and to the sea. The flowering season is always at least +15 degrees. Spring is usually wet. Burns that have been absent in recent years in July pose a problem we would say about a late harvest, but the forest satisfactorily balances the situation for an earlier harvest. It is obvious that this vineyard is fed with moisture and the grapes reach to a smooth maturity, but we can also see the influence of the geographical environment on the quality of the produced wine, making the PGI Thassos unique (PGI Thassos Technical File, Ministry of Agricultural Development).

The cultivated varieties are: Assyrtiko, Moschato of Alexandria, Chardonnay, Limnio, Cabernet Sauvignon, Merlot. The wine types are: White dry, Rose dry, Red dry.

3.4.3.4 PGI Ismaros

In the central section of Rodopi, at the central part of Thrace, the PGI Ismaros zone, established in 1997, is the boundaries of Maroneia, Xylagani, Proskiniton of the municipal district of Maroneia and Krovili, Sapon, Strymis of the municipal district of Sapon. The zone was designated by the Ministerial Decision no. 269489 / 24.1.1997 (Government Gazette 126 / B / 26-02-1997), which was subsequently amended by the European Commission, 207683 / 23.01.2003 (Government Gazette 79 / B / 27-01-2003), No 301037 / 14-10-2004 (Government Gazette 1588 / 21-10-2004), No.316843 / 29-11-2011 (Government Gazette 1850 / B / 14-12-2004) and no. 278475 / 26-2-2008 (Government Gazette 391 / B / 7-3-2008.) Ministerial Decisions.

In the south-eastern part of Rodopi, the area of Maronia has a long history of viticulture and wine production. Archaeological researches have brought to light a multitude of ancient presses, produced by the famous Maronios or Maronite wine, the legend of which refers to Cyclops Polyfimos of the Homeric Odyssey.

Today, wine growing in the area is experiencing a new boom and PGI Ismaros wines are produced by 2 wineries.

The area's vineyard extends to the area of Ismaros, at an altitude of 50-300 meters. The southwestern side of the vineyard, the terrain, as well as the proximity to the sea, plays a vital role in the predominance of a terrestrial Mediterranean microclimate, characterized by mild winter and cool summer with a large daily thermometric range. The combination of these climatic conditions, with the diversity of the soil in the region, the cultivated vine varieties, the applied vine cultivation and the wine-making techniques, contribute to the quality characteristics of the PGI wines of Ismaros. The vineyards of the area are basically a "balcony" overlooking the Aegean Sea. During the summer, the northwest wind (Samothrakiotis) prevents the development of high temperatures, creating a special microclimate that contributes to the better maturation of the grapes, to their better composition at the stage of "technological maturation" (acidity, color, flavorings, sugars etc.) that give excellent quality wines. Moreover, the combination of these climatic conditions, with the diversity of the territory of the area, the cultivated vine varieties, the applied vine cultivation and the wine-making techniques, contribute to the quality characteristics of the Ismaros PGI wines.

The cultivated varieties are: Moschat of Alexandria, Reditis, Chardonnay, Sauvignon blanc, Limnio, Mavroudi Grenache rouge, Cabernet Sauvignon, Merlot, Syrah.

The wine types are:

- White dry, semi-dry, semi-sweet
- Rose dry, semi-dry, semi-sweet
- Red dry, semi-dry, semi-sweet

3.4.3.5 PGI Pangeo

In the Regional Unit of Kavala, on the eastern edge of Macedonia, the PGI Pangeo zone, established in 1995 with the Ministerial Decision no. 396581 / 12-10-95 (Government Gazette 886 / B / 25-10-95), which was subsequently amended by Commission Regulation 313008 / 20-9-06 (Government Gazette 1436 / B / 29-9-06) and No. 280934 / 16.7.2010 (Government Gazette 1125 / B / 23.7.2010), is the boundaries of the municipal districts of Eleftheres, Eleftheroupolis, Orfanos, Pangeos and Piereon. The vines must be at altitudes above 50m.

In the south-western part of Kavala, on the slopes of Mount Pangeo and its southern end, mount Semvolo is the vineyard that produces the PGI Pangeo. The vineyard tradition of the area is long and directly related to the cult of Dionysus, as documented by archaeological findings. PGI Paggiao wines, first by far, are produced from 12 wineries within the zone. With the 2010 amendment that widened both its varietal composition and the types of wine that can be produced, many other PGI Pangeo wines are expected to consolidate its first place. The vineyards of the area are situated on slopes at an altitude of more than 50 meters and less than 500 meters. The soils are mainly limy-clayey, with a pH of 6.5-7.5 and an average amount of calcium carbonate. Their organic substance is medium or low in content. The climate of the region is mediterranean for vineyards near the sea and continental for the ones in high altitude areas.

The cultivated varieties are: Assyrtiko, Malagouzia, Moschat of Alexandria, Roditis, Viognie, Chardonnay, Gewurstarminer, Semillion, Sauvignon blanc, Trebbiano, Limnio, Agiorgitiko, Pamidi, Grenache rouge, Cabernet Sauvignon, Cabernet franc, Merlot, Syrah.

The wine types are:

- White dry, sweet
- Rose dry, semi-dry
- Red dry, semidry

3.5 Known and unknown indigenous varieties of the region

In the attempt to register the more or less rare varieties of the region of the Eastern Macedonia-Thrace region, "AMPELOGRAFIA" by D. Stavrakas (Stavrakas, 2010) and the collection of "Wine varieties of the Greek Vineyard" by X. Spinthiropoulou (Sprintropoulou, 2000) were used as bibliographic sources, while the photos are from the winealker and oikopraxi websites. The varieties were divided into White and Red in an alphabetical order.

3.5.1 White varieties

Alpounoura (Alepounoura)

Few plants of this variety are scattered in old vineyards of Soufli. There is also another variety in Kozani, using the same name, but it has table grape characteristics.

It is productive plant of lively, moderate fertility. It is shaped into a bowl and a linear double-sided cord (Royat) and receives pruning at 2 eyes. It matures at the end of September. Its rails are moderate to large, ellipsoid, with medium thick bark, yellowish-white, with crisp and sweet flesh. Its must is medium in sugar and moderate in acidity.

Zoumiatiko (Zoumiatis, Damiatis, Smederevka)

It originates from the coasts of Thrace, towards the Black Sea. It is a white variety of all the Balkans (Bulgaria, former Yugoslavia, Romania, and Turkey). In Greece, it is cultivated throughout the Macedonian and Thracian areas. According to the current legislation, it is a variety allowed in the wine-growing districts of Macedonia and Thrace.

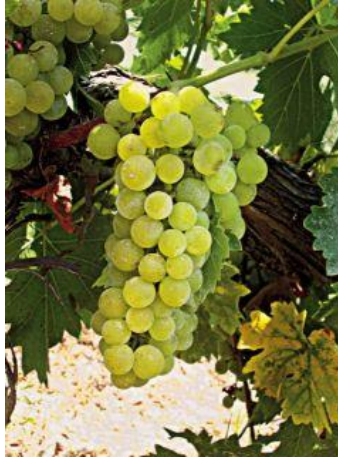
It is a variety of medium liveliness, robust, productive and resistant to most diseases (except mildew). It shows good affinity with most subjects. It is formed into a Royat bowl or Royat with a short fruiting pruning at 2-3 eyes. In rich and cool soils it produces greater production but of inferior quality. It matures in mid-September. If the yield per vine is small, it gives wines of moderate alcoholic strength, medium to low acidity, slightly aromatic. It participates in blends with other varieties for the production of wine in the growing areas (Avdira, Ismaros). With Limnio and Mavroudi he gives rosé or red wines, with Rhoditis white.



Moschato of Alexandria (Moschato, English, Zibbibo)

Originally coming from Africa and possibly from Egypt, a variety of triple-use (vinification, shelf, table). Cultivated throughout the Mediterranean and in Greece, it is found in Thessaly, Ionian Islands, North Aegean (Lemnos) and Thessaloniki. According to the legislation in force, it is a recommended variety in the Drama Peninsula and allowed in the Kavala Peninsula and the Thracian wine-growing district.

It is a variety of medium liveliness, high productivity and sensitive to most diseases. It shows good affinity with most subjects, although it avoids the most vivid, especially in fertile soils (cyanobacteria, microarrays). It is shaped into a cup or Royat with a short pruning on 1-2 eyes. It reaches technological maturity at the end of August with the beginning of September. It participates in blends with other varieties for the production of wine in the growing areas (Drama, Kavala). It gives wines high, moderate to good acidity, with a delicate fragrant aroma.



Batiki (Dimi batiki, Deve batiki, debatiki)

Coming from Asia Minor, it is growing in Thessaly (Tyrnavos), Northern Evia and Macedonia. It is an authorized variety for the wine-growing districts of Macedonia and Thrace. It is a variety of lively, productive, sensitive to mildew, mildew and botrytis, with good affinity to the subjects used. It matures, depending on the area, from early September until early October. It participates in the production of white wines of low alcoholic strength, low acidity, slightly aromatic.



Tsaousi (Tsaousis, tsaousia, tsaousiko white)

A variety of Egyptian origin growing in the viticultural district of the Ionian Islands and scattered in various areas of Macedonia and Thrace. The name Tsoussi is also found in a table variety, but their ampelographic features differ (the table has female flowers while the wine-making hermaphrodites ones).

Its stalk is lively, medium-sized, shaped into a bowl and linear Royat or Guyot, and receives trimming fruit medium (3-4 eyes), long (6-8 eyes) or mixed. It shows good affinity with ordinary subjects. It matures in the first ten days of September. Its rail is moderate to large, round to oval, with a skin resistant and of medium thickness. It has a yellowish-green color, with firmness and flesh resistant, pleasant, with a sweet taste.



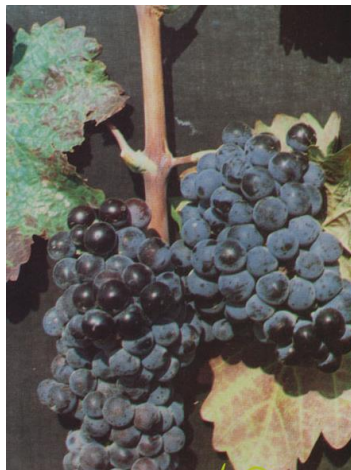
Tsougianides

The few plants of this unknown native variety are found in old vineyards of Soufli. Its stump is lively, fertile and productive and it matures at the end of September. Each fruitful vine has 1-2 grapes moderate, conical and relatively thin. The rails are large, spherical, with rather thick yellowish peel to whitewash on the side exposed to the sun. Its flesh is fleshy, sweet, and slightly sour, with 2-3 slices.

3.5.2. Red varieties

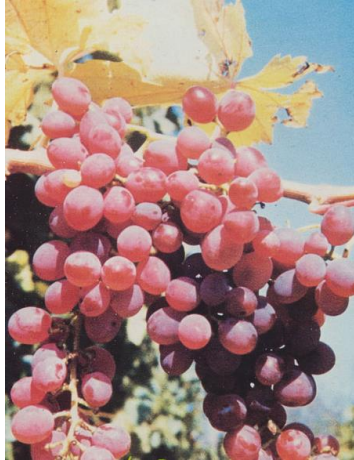
Karnachalades

It is a red native, forgotten variety that is sporadically encountered in old vineyards of Soufli. In recent years efforts have been made to revive the variety by planting new areas. It is a lively, fertile, moderately productive plant. It is shaped into a bowl and a linear double-sided cord (Royat) and receives prune pruning at 2 eyes. It matures from late September to early October. The rails are large, spherical, with relatively thin red-eyed bark. The flesh is colorless, supple, sweet, and slightly sour. The resulting grape is poor in sugar and low in acidity. It gives wine tannic, balanced, with good body, satisfying color and light aromas.



Keratsouda

An indigenous rare variety found in vineyards of Soufli. It is a lively and productive plant, maturing towards the end of September. Its rails are large, ellipsoid, with a medium-thick bark, pink coloration and a fleshy, crisp and sweet flesh with 2 large grains. It is mainly involved in white blends.



Limnio (Kalampaki, Dourou kara, Limniona, Limnia)

Most likely coming from the Lemnian grape, as reported by Isiodos and Aristotle. It is considered, if not the oldest, one of the oldest varieties of grapes in the world. Although its name comes from Lemnos, it is not widespread there. Its local name is placed in the area of Macedonia-Thrace is Kalambaki. Although it meets the same name it is not the same with the Limniona variety.

Its stalk is medium to lively, yields mean yields, is formed in a Royat cup, two or one-sided, and has a good affinity with common subjects. It thrives on flat, deep, moist soil, but also on dry, poor and rocky ground. It is not particularly susceptible to diseases and is maturing towards the end of September.

It gives wines of relatively high quality, moderate acidity, special aroma and moderate tannins. Single varietal wines from Limnio usually have a very light style, and do not mature in a barrel. In comparisons with international varieties of growing areas (Cabernet sauvignon, Cabernet franc) it gives excellent PGI wines usually maturing in a barrel.



Mavroudi (Mavrouli, mavro, mavraki, mavrostafilo)

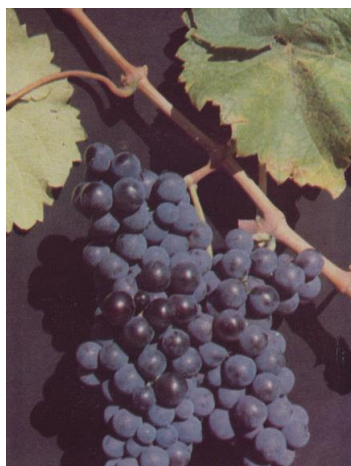
It is an old Greek variety cultivated throughout the area south of the Aimos. Although, in various areas of Greece, many varieties are characterized Mavroudi, this one should be separated from the rest. It is mainly located in Thrace where it is legally recognized and authorized. Its name derives from the dark (black) color of the bark of its rails, which is why it is mainly used to produce dark red wines.

It has a lively and productive stubble formed in Royat cupped and roe-shaped, with short fruiting pruning. It has a good affinity with ordinary subjects and prefers clay soils. It matures in the second ten days of September. It participates in red and rosy dry wines of the growing areas. Its wines usually have a somewhat heavy aroma, sweet and rich flavor and quite robust tannins. Therefore, medium-term aging is necessary in order to reach their maximum quality.



Moschomavro (Moschogaltso, xinogaltso, moschomavro, moschoxigaltso)

An indigenous variety of Northern Greece, cultivated scattered in Thrace, where under the current legislation, it is described as 'recommended'. Its stalk is lively and productive, while its spherical, soft, juicy, slightly aromatic rag with thick reddish-like skin. It is formed in Royat cupola and linear and matures in mid-October. It participates in the production of reddish and red wines of moderate intensity, good acidity, slightly aromatic, high quality. Although it is bottled giving single varietal wines, it is not rare to mix this variety with others such as Xinomavro.

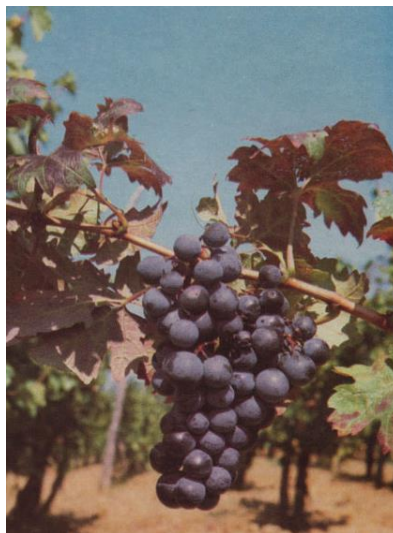


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Bogialamades (Vafsa, Vafissa, Vaftra, Bogia, Boyamas)

Cultivated throughout Macedonia and Thrace, it is one of the most colorful varieties with a stunning lively, robust, productive, very sensitive downy mildew, the leeward and the 'leaf scrolling'. It is shaped into a bowl and a linear double-sided cord (Royat) and receives pruning at 2 eyes. It matures early September and its rails are of medium size, spherical, black skin and colored flesh.

The must of Vapsa is rich in sugars, moderate in acidity and used in blends with other varieties to improve the color of wines. Abundantly it looks like the Alicante bouchet variety grown in southern France. Its DNA study will prove the truth or not.



Pamidi (Pamiti, pamit)

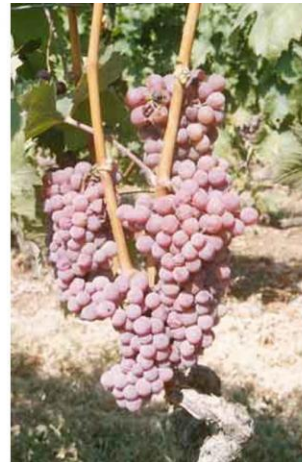
It is a local variety of Northern Greece, originally coming from Eastern Thrace. It is grown in central and eastern Macedonia and Thrace as a 'permitted' variety.

Its stalk is of moderate to intense liveliness, robust, fertile. It's a productive plant, very sensitive to botrytis and acidic rot, but with relative resistance to downy mildew. It is shaped into a cup or Royat with a short pruning on 1-2 eyes. It prefers soils of good drainage and areas of sloping, reduced atmospheric humidity, not to rot. It shows good affinity with most subjects. It is a

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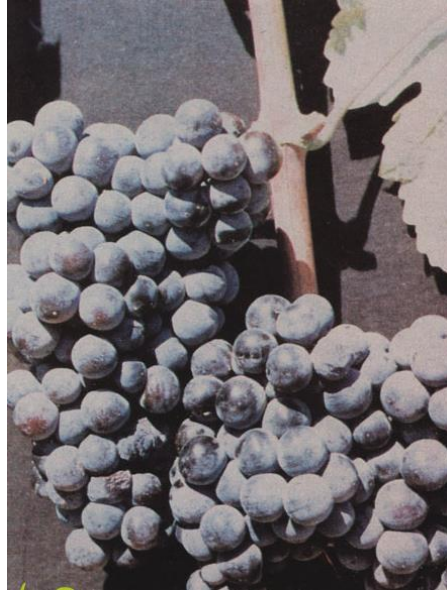
variety with short stem circle and late budding. This avoids spring frosts, while ripening is relatively early at the beginning of September.

Its rails have a thin pink bark and flesh colorless, slim and sweet. It gives light, single varietal rosé wines of low acidity. At the same time it participates in blends with other varieties for the production of red and rosé PGI wines in the cultivation areas (Thrace, Avdira, Evros, Pangeo).



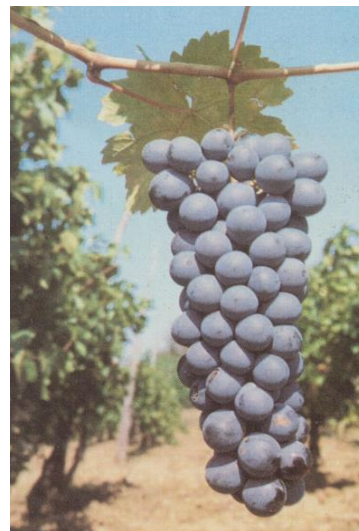
Papas-Karas (Papas-Kari, Karapapas)

A relatively unknown native variety found in Thrace and Epirus. It is a variety of sturdy, productive, shaped Royat cupola and ripen, beginning to mature in early September. Its rail is medium-sized, dark in color, with intense flourish.



Shefka (Sefko, Mavrouti, Nitcefika, Nichevka)

A variety of Bulgarian origin, cultivated in Macedonian and Thrace vineyards as 'allowed'. It is sturdy, productive and is shaped into a Royat cup and roe and is maturing in early September. Its rail is of large size, spherical, ink-red, with intense flourish, slightly shiny. It gives wines of moderate intensity, low to moderate acidity and average alcoholic strength. Participates in PGI Evros wines.



Fokiano mavro (Erikaras)

A red variety coming of an Asia Minor origin cultivated in the Aegean islands, Macedonia, Thrace and Peloponnese. It is moderately lively, fertile, and productive, with good resistance to fungal diseases and drought. It shows good affinity with the subjects used. It is shaped into a bowl and a linear double-sided cord (Royat) and receives prune pruning at 2 eyes. It matures at the beginning of September. The snakes are large, with large spherical rails. The bark is red-eyed and the flesh is juicy and sweet. It gives wines poor in alcoholic strength, acidity and color.



CHAPTER 4. Conclusions

Any attempt to record the history of Macedonian and Thracian wine, although it is an exciting journey in time, is an extremely complex task as if it were to record the very history of Greece. The reference only to the key points of its history requires a long-term interdisciplinary study. It involves the writing of dozens of volumes in order to cover countless sources, archaeological finds, historical references, scientific research, studies and publications on viticulture, wine making, wines, as well as the timeless value and importance that they have for Greece and its people.

Wine has been a common constituent and a consistent reference point for the Region of Eastern Macedonia and Thrace even before the ancient Greek period and until modern times. Throughout its long history, the vine-wine relationship is inextricably linked to the inhabitants of the particular Region. It defines the Region both at a cultural level, mythology, food, religion, customs, but also at an economic level, since it is a significant productive activity over time, opening channels of communication with other areas through its trade.

The history of wine covers an extremely long period, the largest in the world, with regards to the continuous cultivation of the vine and the timeless wine production. The beginning of viticulture in the Thracian area exceeds historical times and is lost in the depths of the ages. Since then, the vine and the wine have accompanied the area and its inhabitants to this day with no interruption. Sometimes they are glorified, and others remain in the shadow of the events of the plentiful land that gave birth to them. In any case, the dive deep in time demonstrates the maturity of the vineyards and their producers, towards the creation of new wines of the region and Greece.

The objective of this study is not to prove that some areas of the Eastern Macedonia and Thrace Region can or cannot produce wine, but given the ease of vineyard adaptation, wine can be produced even in the most adverse conditions, with only a few exceptions where the plant is visibly stressed. It might be more useful for a producer to know the threshold of production

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over which the crop stands out economically or even to determine precisely whether the characteristics of a particular area can direct the professional to a type of wine whose quality remains stable. For example, wines produced in sloping slopes with low yields may be qualitative, recognized and rewarded as such, and thus be the spearhead of quality gaining. But this data should not be a panacea and therefore an obstacle to creativity and experimentation in the industry, but a tool and a yeast for further improvement and achievement of excellence.

In order for the quality and promotion of the wines in this Region to take place, the following conditions must be met:

- Clear definition of the target, both by the producers and the winemakers.
- Combining the experience of wine-growers and winemakers in the region with scientific data
- Satisfy the requirements of each variety.
- Correct cultivation techniques.
- Sometimes limiting the area yield to the benefit of the quality of the raw material.
- Authenticity: distinct Greek terroirs and remarkable native varieties.
- Innovation: developing new wine products that meet the needs of the modern consumer.
- Wine tourism: creating distinct, high quality, integrated wine experiences in the main touristic and wine-producing areas.
- Promotion of a branded product.

In conclusion, the above-mentioned data show the need, both at central level and at the level of local government, for a local strategy to make wines of high quality competitive products based on the economic viability of the sector. This local strategy should take into account both the experience of wine growers and winemakers in the area gained throughout the centuries, but also to combine it with scientific data to draw the right directions.

The use of foreign varieties should mainly aim at improving the indigenous ones and participate in a small percentage in the final blend and not exclusively in the production of wines with French varieties, a tendency which has prevailed over the past two decades. It is therefore recommended that foreign varieties be involved in the production of a small or large percentage of wine, always with the provision that varieties from the northern areas produce degraded products when transported to southern and warmer areas.

In a country with a Mediterranean climate, such as Greece, the vineyard needs are increased, compared to northern or wet climates. Particular care must be taken in order for the sun, the great ally of the Greek land, not to turn into an enemy. This difficult project is called upon to bear innovations in wine-growing. An important role in this area can be played by the cultivation technique of managing the foliar wall of the vineyard, an area in which Greece's viticulture is becoming increasingly important. The height, shape and proportion of the foliage in relation to the fruit lead to the protection of the grapes, but also to the proper photosynthesis, a prerequisite for an excellent grape.

Another piece of wine-growing innovations is experimental planting. Both varieties and individuals (or collaborations of the two) should systematically test new varieties: native varieties, from the multitude of existing ones (such as Karnahalas, Bougialamas) whose dynamics are still unknown and can hide much more treasures from those who have already been discovered. It is probably the most important part of this project, Dionysos, which is responsible for the evaluation and the beginning of the use of such varieties by local winegrowers.

In wine-growing innovations, it is also possible to include the identification and selection of the most suitable clones for many native varieties. Some of the viticulturists and Research Laboratories have already found their way into new plantings, which are the spearhead of viticulture innovations and promise to further enhance the uniqueness of the wines.

Towards the same direction, new ways of shaping many vineyards are also contributing. Taking into account changes in climatic conditions, linear plantings are tested and, where proven more appropriate, replace other types of shaping. Since they are effective, they remain alongside innovations in viticulture, marrying them with the unique Greek wine tradition. At the same time, the density of planting in many Greek vineyards is increasing, leading to low yields per stump, which is mostly a prerequisite for the production of high quality wines.

Let us not forget that, although some people refuse to believe it, the climate change of which a significant part is due to human activity, it is now supported by the scientific community with more and more evidence. This is an existing problem that also concerns wine producers on a worldwide scale. It is a challenge and a necessity to gradually adapt or change the vineyards to varieties resistant to new climatic conditions.

The vineyards of the Eastern Macedonia and Thrace Region, play a key role in shaping a wide range of unique and different wines. In general, vineyards can be divided into the following major categories:

- Mountain and semi-mountainous (Pangaio mountain)
- Mainland (Vineyard of Soufli)
- Seaside (Avdira, Maroneia)

Mountain and semi-mountainous vineyards are the most widespread. In the first case, the vineyards are located in deep soils of alluvial origin, while in the second one they are found in surface soils with low fertility. An altitude rise ensures a reduction in the average daily temperature of about 0.5 to 0.9°C per 100m, modifying the overall climate. This creates local climatic conditions (mesoclimate), favorable for the adaptation and thriving of a wider range of vine varieties. In the case of sloping vineyards, the exposure of the slope (orientation, slope) plays an important role as it affects the amount of solar radiation that the vineyard receives. In the conditions of the Greek climate, the southern orientations, which heat the grapes more, are usually avoided.

Mountain and semi-mountainous vineyards, especially in warm climates, also have the significant advantage of a more favorable water regime due to less loss (due to evaporation and transpiration) of soil moisture and higher cloudiness and rainfall. At the same time, they benefit from the meridian and night auras of the mountains and valleys that cool the stumps and contribute to their normal physiological function. This facilitates the maturation of production and the emergence of varietal potential while ensuring that the harvest is carried out under more appropriate conditions with regard to post-harvest treatment of grapes.

The climate of the Macedonian and Thracian areas is typically Mediterranean. However, within this continental area and particularly away from the shores and other large water bodies, the climate has strong continental features. Therefore, even if there are no purely continental vineyards in this Region, there are vineyards with continental climate characteristics, the main ones being the large temperature changes during the vegetation period and, above all, the intense daily temperature variation, with a drastic drop during the night.

On continental vineyards, summer rainfall is usually low, so irrigation is usually necessary during the critical months of ripening. Vineyards are usually located in deep, fertile soil with a smooth relief. Where the altitude is low, the long blooming season favors late, mostly red varieties. On the contrary, in higher altitudes, lower night temperatures favor the cultivation of white varieties, such as the fine white variety of the Cyclades, Asyrtiko, which in the conditions of Northern Greece / Kavala found a second place of establishment, giving more aromatic and elegant wines. Major climatic changes on continental vineyards lead to more pronounced variations among crops than coastal vineyards.

In coastal vineyards, the favorable effect of the sea is due to the high thermal inertia of water, its ability to store heat (high heat capacity). Therefore, the proximity to the sea reduces daily temperature excursions, creating more favorable mesoclimates for the vine, compared to the continental areas of the same latitude and altitude. On the other hand, the permanent passage of the cool and moist sea breeze during the hot hours of the day reduces the temperature in the grape environment and improves their lighting, helping them to mature more smoothly.

The effect can even be hundreds of kilometers from the coast, since it is not hindered by mountainous formations, favoring even distant coastal areas (non-seaside vineyards).

The stakes of the winemaking world for the Region of Eastern Macedonia and Thrace as well as for the rest of Greece are how to produce a product that can be distinct, distinguish and stand in a permanent and stable way in the world wine industry. In the context of globalization and the constant rise of consumer interest in wine, only quality products can give impetus, a present and a future to the industry.

From what appears on the horizon, the solution is, in principle, to the constant production of quality wine, but which will have a distinctive sensory profile that will differ from the "common and trivial" of the international varieties. These wines, always combined with the particular terroir of the areas, should have "exotic" attributes with added value. Perhaps the international varieties, which have been accustomed to the particular environment of the Region, do not hide surprises. The native varieties are an unexplored national treasure and can open new flavors among the Old World wines.

Achieving the production of superior quality wines requires a vision and systematic organization based on the combination of centuries of experience at a practical level with scientific research and the data extracted from it. Therefore, for the Region of Eastern Macedonia and Thrace, wine producers should take soil and climatic data into account by applying innovative cultivation techniques to address any shortcomings in the organization of their vineyards.

Combined with the specific characteristics of indigenous varieties, they can achieve the production of raw material, highlighting both the characteristics of the variety and the terroir. Therefore, having a raw material of constant and superior quality, the winemakers need to explore the various winemaking and aging techniques and experiment with the maximum expression of the above characteristics. It is the stage where vision, creativity and mood for innovation and excellence must coexist. Through this scientific and productive process, new horizons can be opened and a brilliant prospect for the Greek but especially for the Macedonian and Thracian vineyards.

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