

## AMYNDEON-NAOUSA: THE TWO FACES OF XINOMAVRO

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### Abstract:

Xinomavro is the most important indigenous red wine variety grown in Northern Greece. It participates in the production of several PGI wines in Macedonia while from 100% Xinomavro the PDO "Amyndeon" and "Naoussa" are produced.

The viticultural area of Amyndeon lies in a plateau of 550 -700 m of altitude, in a semi-continental climate with mostly deep sandy loamy soils derived from limestone and marl bedrocks while in Naoussa, Xinomavro is grown in a Mediterranean climate on more heavy textured soils, sandy clay loam to clay, derived from ophiolitic, limestone and marl bedrocks, in an altitude which varies from 150 to 400 m. Different soil, climate and viticultural technique interactions, result in great variability with respect to morphological, ampelographical and physiological characters of Xinomavro as well as in the characteristics of the wines produced.

### Keywords:

### 1. Introduction

#### 1. Amyndeon

Amyndeon, a city of West Macedonia which took its name from king Amyndas the 4<sup>th</sup> cousin of Alexander the Great, is the center of the PDO zone with the same name.

The history of the vine growing and wine production in this area goes back to 3rd century BC. The wine produced in the ancient city of Kella was particularly famous. Wine production continued during the Ottoman occupation. The wine of Amyndeon was very famous in Balkan Peninsula and exported to Europe. Due to the sandy soils of the area, phylloxera which appeared in North Greece at the end of the 19<sup>th</sup> century didn't destroy the vineyard of Amyndeon. The two world wars restricted the area under vines and the revival of the vineyard started after 1955.

The Appellation Amyndeon was neglected until the creation of PDO zone in 1972 which led to a new era.

A red dry wine and a rose sparkling wine were designated by the Greek VQPRD legislation and, in 1995, a rose (still) wine became the only PDO Greek rose wine.

#### Climate

The vineyard of Amyndeon lies at an altitude of 500-700 m at the cooler edge of the Greek viticulture (Latitude: 40,39 N), one of the coolest winemaking areas of Greece. It is a mountainous area with a mild continental climate. The existence of two lakes (Vegoritisi and Petron) in the area regulates the extremities of the climate (especially during winter).

The mean annual temperature is 12,53° C while the mean temperature during vegetative period (April-October) 17,72° C and the mean temperature during maturity is 18,80° C. Heat summation is lower than 1,600 GDD.

The annual precipitation is 636 mm, 375 mm during the vegetative period, while during maturity precipitation reaches 198 mm.

#### Soils

The soils of the area are generally deep, poor, sandy or loamy on calcareous bedrock. There are some sandy-clay soils in the areas of Xino Nero and Levea.

There are three main soil types:

1. Sandy soils on soft limestone (sand > 85%), mainly on slopes near Lake Petres (alluvial soils), of low fertility and limited water reserves.
2. Sandy-loamy soils on soft limestone (sand < 70%), mainly in plains at low altitude with slightly higher fertility and depth
3. Sandy clay soils on limestone in Levea and Xino Nero villages.

### **Viticulture**

The PDO Amyndeon vineyard has a total area of 650 ha. There are also 200 Ha of white and red varieties such as Reditis, Sauvignon, Chardonnay, Assyrtiko, Malagouzia, Traminer, Merlot, Mavrodaphne, Syrah etc

Xinomavro is cordon-trained, grafted mainly on 41BM, 110R, 1103 P, but there are also some old own-rooted vineyards trained in gobelet. The density of plantation is 3000-5000 plants per Ha.

Only a small percentage of vineyards are irrigated, mostly new ones. The soil in most of the vineyards is frequently cultivated with rotary hoe.

The budburst appears in mid April, while the harvest in late September to mid October.

Due to the fact that clonal selection of Xinomavro started in 1990 most of the vineyards are planted with Xinomavro's population.

### **2. Naoussa**

The history of viticulture and wine production of the area is dated back to the 3rd century B.C, as the findings in one of the Macedonian tombs of the area indicate. It seems that vine cultivation and wine production continued also during the Ottoman occupation of the area. The wine of Naoussa was very famous in 17<sup>th</sup> century and according to Cousinery: "The wine of Naoussa in Macedonia is as the wine of Bourgundy in France". Later in 1826 Pouqueville documents: "*These are thick, acidic, tannic wines, consumed after 4-5 years from production, considered to be among the best of the Ottoman Empire*". By the end of the 19th century, the wine from Naoussa was exported to Central and Eastern Europe, Egypt and Eastern Mediterranean. In the beginning of the 20<sup>th</sup> century, vine growing was the main cultivation of the area. More than 2000 Ha were under vines and most of the wine produced was exported to North Africa and Europe.

In order to protect wines of Naoussa from fraud, barrels containing authentic Naoussa wine had the label of the community of Naoussa and they were sealed with authentic stamp of the vine growers and pruners of Naoussa.

The appearance of phylloxera after 1920, the wars (the Balkan and the two world wars) as well as the appearance of other cultivations in the area (mainly peaches, apples and cherries) resulted in the decline of the vineyard which in 1960 had only 50 Ha

In 1971 the recognition of the PDO Naoussa wine from 100% Xinomavro leads to the revival of Naoussa's vineyard.

### **Climate**

The viticultural zone of Naoussa (latitude 40-41°N) lies at an altitude ranging between 100-400 m. at the foot of Mount Vermion on east-facing slopes, in Central Macedonia.

The climate is Mediterranean with continental influences. Mount Vermion offers protection from cold winds and adequate rainfall.

The mean annual temperature is 15,22° C, the mean temperature during vegetative period (April-October) 20,7° C and the mean temperature during maturity is 22,09° C. Heat summation is higher than 2000 GDD.

The annual precipitation is 754 mm, 380 mm during the vegetative period, while during maturity precipitation reaches 218 mm.

### **Soils**

The soils of Naoussa generally have a more heavy structure compared to those of Amyndeon. They derived from different bedrocks such as ophiolitic, marl, red schist, marl, old deposits of conglomerate, limestones, etc. They are divided in 5 groups on their texture and their active CaCO<sub>3</sub> concentration basis

- Loamy soils (SCL, L), without CaCO<sub>3</sub> (23% of total)
- Loamy soils (SCL, L), with CaCO<sub>3</sub> > 4% (15% of total)
- Clay soils (SC, SL, C) without CaCO<sub>3</sub> (25% of total)
- Clay soils (SC, SL, C) with CaCO<sub>3</sub> > 4% (30% of total)

- Clay acidic soils (pH<6) (7% of total)

### **Viticulture**

The PDO Naoussa vineyard covers around 480 Ha with Xinomavro in cordon- trained systems most of them in double Royat, spur pruned with approximately 3000-4000 plants per Ha. There are also around 100 Ha of Assyrtiko, Malagouzia, Roditis, Merlot, Syrah etc.

The main rootstocks used in the past were 110 R, 41 B, while 1103 Paulsen, SO4 and 140 Ru were recently introduced. Almost 90% of the vineyard is irrigated and around 20% is organically cultivated. About 50% of the vineyards are not cultivated but have a permanent natural herb cover.

The budburst in Naoussa appears in early April, while the harvest in mid September to early October.

Most of the new vineyards are planted with 2-3 clones of Xinomavro.

### **3. Xinomavro**

#### **The plant**

Xinomavro is the main and noblest indigenous red grape variety of northern Greece and one of the four flagship Greek grape varieties. Its name reveals its basic features: high in acidity (*Xino-*, sour or acid), red skin color (*-mavro*, black), with powerful tannins.

As a variety, Xinomavro presents a high genetic variability with 5 identified clones and more yet to come. It is a vigorous, fertile and productive variety, with medium sized clusters (2-3 per shoot) of variable density (depends on vine vigor and clone) and medium berry size of fair thick, blue-violet skin.

It is very sensitive to high temperature and drought, medium sensitive to mildew, powdery mildew and botrytis, sensitive to potassium deficiency, the low availability of which leads to high acidities, mainly to low pH in wines (pH<3).

Canopy management practices are very important for the attributes of the grapes and the quality of the vintage.

As a variety it is of extremely importance to control its vigor in order to produce less than 10 tones/Ha which is the highest level permitted by the legislation for the production of both "Naoussa" and "Amyndeon" red dry wines. When grape production is below this level, both skin and seeds' maturity can be achieved.

The quality of ripening depends also greatly on climate and soil. There is a strong correlation between soil type and characteristics of the wine. Xinomavro in soils with a heavy texture (SC, SCL) accumulates easily anthocyanins and generally presents a better level of phenolic maturity which is lower on soils with lighter texture. It seems that the worst expression of this variety is on heavy acidic soils, while the best expression for the production of "Vins de Guardie" is on calcareous sandy clay to sandy clay loam soils.

#### **The wine**

Xinomavro as a versatile variety has the potential of producing blanc de noir, rose, red, still and sparkling, dry and sweet wines, with the reds being the most famous and appreciated.

The flavor profile of Xinomavro is consisted of fruity (strawberry, sour cherry, plum, blackberry), flowery (violet), vegetal (tomato, olive, mushroom, tobacco, tar) and aged aromas (dried plum, fig, dried tomato, olive pate, truffle).

Concerning its phenolic profile, the red PDOs have an intense red cherry color with a pale hue during aging and characteristic dry, chalky and angular tannins especially from high yielded vineyards. If vigor and productivity is controlled at the suitable soil and microclimate, Xinomavro reaches a perfect level of sugar –acids concentration and at the same time a perfect level of both seeds' and skin's maturity.

The combination of high acidity and phenolic richness results in wines with the ability to age for many years. These wines have the highest ageing potential of all Greek wines.

The PDO Naoussa wines have a heavier structure and a more complicated pallet of matured fruits, vegetal and aged aromas, compared to those of Amyndeon which have a more fine structure and a more fruity character.