



AGRÁRMINISZTERIUM

*Winemaking and
wine tourism in the
light of climate
change*

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Vineyards



	2012/13.	2013/14.	2014/15.	2015/16.	2016/17.	2017/18.
Total area (1000 ha)	65.8	58.8	60.5	62.1	63.9	65.2
Grape production (1000 t)	281.7	406.3	364.3	415.1	414.9	457.7
Vineyards harvested (1000 ha)	51.2	58	59.5	59.8	60.3	57.7
Yield (t/ha)	5.5	7.0	6.1	6.9	6.9	7.9

Three EU member states have almost 75% of the total vineyards area of the EU: Spain (975 000 ha), France (785 000 ha) and Italy (690 000 ha). Hungary is among the mid-sized EU wine countries. The area of vineyards decreased after 1990, however, the tendency has seemed to turn into an increase after 2010. Since then, the area of vineyards has been emerging.

Vineyard area by wine regions



Wine region	2012/13.	2013/14.	2014/15.	2015/16.	2016/17.	2017/18.
Balaton	7.6	7.8	8.2	8.5	8.9	9.2
Duna	24	21.9	22.6	23	23.6	23.8
Felső-						
Magyarország	11.6	11.2	11.7	12	12.6	13
Felső-Pannon	4.9	5.3	5.3	5.4	5.4	5.6
Pannon	12.2	7.3	7.3	7.6	7.7	7.9
Tokaj	5.5	5.3	5.4	5.6	5.7	5.7
TOTAL	65.8	58.8	60.5	62.1	63.9	65.2

Forrás: HNT

1000 ha

In our country the white grape production is more typical. The ratio varies depending on the wine region, but at the national level about two-thirds of the yield is white wine grape, while the remaining part contains red wine grapes. The most important white grape varieties were Bianca, Cserzei Fűszeres, Olaszrizling and Furmint in 2017. All in all, however, the ratio of the Carpathian Basin varieties is the most significant, with 60% of all vineyards available.

In the case of blue grape varieties, there was a change in the proportion of varieties. Kékfrankos retained its leading role despite its decline, while the proportion of Cabernet Sauvignon, Cabernet Franc, Merlot and Pinot Noir varieties has increased since the regime change.

Wines marketed



Colour	2012/2013.	2013/2014.	2014/2015.	2015/2016.	2016/2017.
White	1 316.9	1 535.2	1 572.9	1 555.9	1 702.3
Rosé	142	206.2	231.2	223	250.6
Red	640.5	815	785	687.4	699.4
TOTAL	2 099.4	2 556.4	2 589	2 473.2	2 652.4

1000 hl

Trade



Year	Export		Import	
	Volume (1000 hl)	Value (million euros)	Volume (1000 hl)	Value (million euros)
2011.	613	78	790	39
2012.	757	74	553	39
2013.	532	73	592	43
2014.	706	80	455	28
2015.	699	83	265	23
2016.	760	90	255	22
2017.	982	104	206	21
2017. I-V.	341	38	106	9
2018. I-V.	532	50	15	3

The export of Hungarian wines has been around 532-860 thousand hectoliters in recent years, showing a significant increase in recent years.

The amount of Hungarian wine import reached its maximum level by 2011 (790 thousand hl), but thanks to successful government measures, its volume dropped dramatically since 2014, and since then it has declined steadily: in 2016 the import volume was only 250 thousand hectoliters.

Our most significant target markets are Germany, the United Kingdom, the Czech Republic and Slovakia. Czech Republic and Slovakia buy large quantities of grapes from Hungary as well.

Per capita wine consumption



Ország	2013	2014	2015	2016	2017*
<i>Hungary</i>	20.4	23.5	22.5	23.5	24.5
France	41.5	41.0	40.7	40.4	40.3
Italy	34.3	32.2	35.3	37.0	37.3
Austria	31.9	34.2	27.4	27.4	28.5
Croatia	33.7	28.9	26.5	28.9	26.5
Czech Republic	15.1	15.1	18.0	18.0	17.0
Russia	7.1	6.5	6.3	6.2	6.1
Poland	2.4	2.6	2.9	2.9	3.2

* estimation
Source: OIV

liter/fő/év

Climate regions of Hungary



Good quality grape production can only be expected between 10 to 16 ° C temperature isotherms. Our country is expected to remain within the isotherms of quality grape production even on the basis of the most pessimistic climatic scenarios, but the weather anomalies with quite extreme volumes both in quantity and quality will produce extreme vintage years.

Effects of climate change on viticulture



- Rising of temperature
- Sudden heavy rainfall
- Droughts
- Frost damage
- Heat waves

As for the global climate change, one can see the rising of annual average temperature, but it also means the ever-frequent extreme weather phenomena (suddenly dropping heavy rains, drought, frost damage, heat waves). While in the Mediterranean, due to the well-known countervailing effects, it is relatively safe to grow vines, continental atmospheric conditions can cause stress effects that have negative economic consequences through quality and quantity.

Effects of climate change on viticulture



- Cooler wine regions
- Warmer wine regions

The most important role in the production of grapes is the temperature. As the average temperature rises, the sugar content of the fruit grows. Furthermore grapes have good adaptability, not least due to the different ecological needs of a wide range of varieties. Different wine regions more or less cultivate different varieties. In relatively cool areas with short breeding time, they often prefer early ripening, often fragrant, spicy varieties, whereas in warm, hotter wine regions they usually plant vine varieties that make good use of long-term growing opportunities. If, according to the Huglin index, the temperature rises only 1 ° C in 'cool' wine-growing areas currently, the change may have positive effects. However, if the temperature rises 2 ° C or above, the future of fragrant varieties (eg Pinot gris, Traminer), which have been successfully cultivated in a wine region, may become questionable because of the warming, their characteristic flavor may not apply to wine. Climate models indicating that many wine regions in Europe will become more and more hotter.

Effects of climate change on viticulture



- Earlier phenophases
- Shorter periods between them
- Growth and ripening at a higher temperature and faster rate
- Changing wine characteristics

As a result of climate change, some of the phenophases of grapes occur earlier and the periods between them are shorter. Growth and ripening will therefore occur at higher temperatures and at a faster rate. It is highly likely that the characteristics of wines change more or less.

Effects of climate change on viticulture



- Rising sugar content
- Rising alcohol content
- Decreasing Acidity
- Rising pH levels

- Harmful organisms
- UV-B radiation
- Drought stress

The sugar content of grapes and the alcohol content of the wine increase, while the acid content decreases and the pH value rises. However, crop safety can be jeopardized by increased levels of harmful organisms, increasing levels of UV-B radiation, nutrient supply problems that depend on soil and soil conditions, and more frequent drought stress.

Effects of climate change on viticulture



- Necessity of irrigation

In terms of quantity and quality, water supply and irrigation have a prominent role, although the slight lack of water may have a beneficial effect on quality.

Effects of climate change on viticulture



- Harder tasks due to earlier phenophases:
- Work force for harvest
 - Storage space
 - Cooling

Another aspect of earlier phenological phases that wine growing tasks are harder to manage (eg. finding available work force for harvest, or ensuring sufficient storage space, ensuring sufficient cooling capacity).

The future



- More resilient varieties to counter economic impact of climate change
- Irrigation

Protecting the future of our wine growing regions should be a priority. To counter potential negative effects cross-breeding of varieties more resilient to climate change is paramount since they can reduce the impending economic impact of extreme climate effects on traditional varieties. Furthermore despite the fact that grapes are not quite susceptible to droughts and therefore it is rarely irrigated, it is recommended to do so in the future to secure both the quantity and the quality of our wines.

Wine map of Hungary

The geographical indications of Felső- Pannon Wine Region

- Etyek-Buda PDO
- Neszmély PDO
- Mór PDO
- Pannonhalma PDO
- Sopron PDO
- Dunántúl PGI

Felső-Pannon/Upper Pannonia

It comprises five smaller districts of Northern Transdanubia with a total of 5,700 hectares under vines in the northeastern part of the Transdanubia Hill, including the slopes of the Vértes, Buda, Gerecse, Kőszeg, Sopron and Velence ranges, as well as in the separate Pannonhalma hills ,at altitudes of 150 m to 400m.

The essentially continental climate is shaped by cool westerly winds bringing moisture from the mountains and the Atlantic ocean to the west, and by hot and dry southerly winds from the Mediterranean sea. The region's soils predominatly consist of Ramann-type brown forest luviols.

The geographical indications of Balaton Wine Region

- Badacsony PDO
- Balatonboglár PDO
- Balaton-felvidék PDO
- Balatonfüred-Csopak PDO
- Csopak PDO
- Káli PDO
- Nagy-Somló PDO
- Somló PDO
- Tihany PDO
- Zala PDO
- Balaton PGI
- Balatonmelléki PGI

The Balaton wine region comprises the six wine districts around and near the lake, including Badacsony, Balatonboglár, Balaton-felvidék, Balatonfüred-Csopak, Nagy-Somló and Zala, with a total of some 8,600 hectares under vines.

The largest lake in Western and Central Europe, Lake Balaton has a powerful influence on the overall continental climate of the area, making summers cooler, the air more humid, and the winter milder than is the norm at the same latitude elsewhere in Europe. Just as importantly, the Bakony range at a distance from cold northerly and westerly winds. The area has extremely diverse soils including basalt, red forest soil and redzina, formed over dolomite-based Pannonian clay, weathered sandstone, loess, Pleistocene loess mantle, cerithium and Triassic limestone, marl, Pannonian sand, clay, and basalt mixture, as well as lassivage brown forest soil, brown earth, chernozem, and erosional soils, both lithic and earthy.

The geographical indications of Pannon Wine Region

- Pécs PDO
- Szekszárd PDO
- Tolna PDO
- Villány PDO
- Pannon PDO

Pannonia consists of the undulating country in the southwestern part of Hungary delimited by the Danube and Drava rivers and Lake Balaton, including the more southern slopes of the prominent ranges of Villány and the Mecsek. The region's 7,500 hectares of vines are shared by four wine districts: Pécs, Szekszárd, Tolna and Villány. The continental climate is shaped under Mediterranean influences from the south. The bedrock underneath the hills in Tolna and Baranya consists of clayey sedimentary rocks overlain by loess and adobe. These same soil types also often occur over the limestone corpus of the taller Villány and Mecsek ranges.

The geographical indications of Duna Wine Region

- Csongrád PDO
- Duna PDO
- Hajós-Baja PDO
- Izsáki Arany Sárfehér PDO
- Kunság PDO
- Monor PDO
- Soltvadkerti Ezerjő PDO
- Duna-Tisza közti PGI

The Duna (Danube) wine region is the largest wine producing area in Hungary. Occupying the plain between the Danube and Tisza rivers in the central south of the country, it comprises some 23,000 hectares of vines, and is divided by 3 wine districts: Csongrád, Hajós-Baja and Kunság. The climate here is quintessentially continental, as it is in much of the country, with hot summers and cold winters. The soil patterns show little variation: the bulk of the region has calcareous sandy soils, although here and there brown forest soils, chernozem, meadow and alluvial soils occur as well. Most of the sand consists of alluvium deposited by the meandering Danube over the millennia.

The geographical indications of Felső- Magyarország Wine Region

- Bükk PDO
- Eger PDO
- Mátra PDO
- Debrői Hárslevelű PDO
- Felső-Magyarország PGI

Felső-Magyarország/Upper-Hungary

Most of the growing area occupies altitudes of 200 m to 300 m on the slopes and plateaus of the Mátra and Bükk mountains overlooking the Great Plain. Although, in some places such as the Nagy -Eged Hill, the vineyards are planted at elevations as high as 500 m above sea level. Comprising a total of some 12,000 hectares planted with vines, the region includes the Bükk, Mátra and Eger wine districts. The climate is shaped under the main influence of the mountains which make up Hungary's Northern Range, whose peaks shelter the vineyards from cold northerly winds. The predominant soils are diverse brown forest soils, as well as loess, black erubase and brown forest soils evolved over volcanic rhyolite tuff. Some locations are characterized by sheet alluvial sands or brown forest soils over calcareous marine sediments.

The geographical indications of Tokaj Wine Region

- Tokaj PDO
- Zemplén PGI

Tokaj processes a globally unique microclimate. Its ability to encourage the grapes to contract botrytis. As a result, naturally sweet noble wines, as well as superb quality dry wines, have been an unbroken tradition since 16th century. Tokaj boasts natural conditions and centuries of wine tradition so unique that it was named a UNESCO World Heritage Site in 2002. One of the main resources that has helped this treasure of a wine region to sustain a distinct culture and create value over the ages is the local climate. Shaped to a large extent by the region's two rivers, the Tisza and the Bodrog, along with their wetlands and moors, make a major contribution to weather conditions, enabling the reliable occurrence of botrytis in the fall. Another key factor is the terrain, notably the sheltered slopes on the southeastern fringe of the district relies on the extraordinarily colourful palette of bedrocks and soils, although most of them are volcanic in origin. The vineyards occupy altitudes of 100 to 300 m. At present, some 6,000 hectares are planted with vines.