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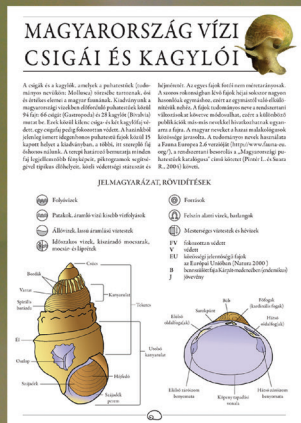
FROM CONTENTS

FURMINT: THE PHYLOSOPHICAL PRIMEVAL FORCE

NARIC RESEARCH INSTITUTE FOR VITICULTURE AND ENOLOGY, MAIN RESEARCH DIRECTIONS

THE EVALUATION OF THE GRAPE AND WINE MARKET

Kiadványaink megrendelhetőek



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National Wine Excellence – Furmint 2017 and the National Wine Treasury Programme



Dr. Eliza Kiss
Ministerial Commissioner for
Wine Sector Development

What was the divine spark, the moment that initiated the making of the book of National Wine Excellence? I would relate it mainly to two of my friends whom I wanted to involve in my mania, my passion. At first thought I wanted to compile a book for them and of course, for everyone else that would describe, show and explain, the phrases winemakers, wine experts speak in a mystical language. Of course, it did not manage to brush up the knowledge of these two individuals but instead, I received a myriad of responses from unexpected places that filled my heart and gave me even more energy to continue.

To make it more understandable for everyone, the basis of everything is the event "*Országkóstoló*" ("Country Tasting") that has become customary by now, where wines entered from different parts of Hungary are qualified by a generally accepted panel that was appointed for this task. This is the essence of our program series, and without the expert help of my many colleagues working in the background, my dream would not have been able to be realized.

„People rarely achieve success in something that they do not do gladly.”

– Johann Wolfgang von Goethe

This year, we gave the system a new twist and decided that – by establishing a tradition – we will dedicate another area to the presentation of a grape variety. The year dedicated to the vine variety began with the announcement of the Year of Furmint.

Our mindset was double-loaded, on the one hand, what we wanted to achieve that it is worth to look around the department stores' shelves for furmint, on the other

hand, to deepen the knowledge of the already dedicated fans and to provide them with new information, secrets kept behind the scenes.

In contrast to earlier books edited by the team of the National Wine Excellence Program, we established totally new graphics and form and also introduced a new editing principle. We visited known and renowned winemakers to tell us about the variety, we asked experts to recall how the Tokaj bottle was made, asked how Furmint had achieved the honor to have its own glass. We were looking for opportunities, looking for newer ideas that can make the content of the book more expressive.

The dear reader, at the end of this process, can hold the book that we hope will be a joy to read. We were very happy when we saw that the cooperation works, and the establishment of new traditions have a purpose in Hungary and in the world of wines.

Furmint has already done more than any other grape variety, since the book of National Wine Excellences – Furmint is an example of how many special personalities are able to form a community among a common goal, and this is the power of Furmint.

Based on this power and – of course – feeling the support behind us, the National Wine Treasury Programme was adopted by a government decision in November this year. This was the result of approximately one and a half years of hard work. In the beginning, many were smiling at our goals, but the endless consultations and the many adventures of our work was rewarding.

This was also a boost for the self-confidence of the National Wine Treasury Programme as the many hours spent by writing and typing on the keyboard were not in vain. Our task is not easy, as a museum wine stock must be saved and handed over to posterity which is in a deteriorated, dangerous cellar. Here, wines are exposed to constant danger.

The programme seems to be a simple task, but it has been done while we were dwelling on professional questions about a topic, that is unique in the world as such.





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National Wine Excellence –

Furmint 2017 and the National Wine Treasury

Programme

Dr. Eliza Kiss. 3

Furmint: the philosophical primeval force . . 5

Sándor Viniczai

NARIC Research Institute for Viticulture

and Enology 10

Gizella Jahnke – Attila Szabó – János Májer

Main research directions of the NARIC Research Institute for Viticulture and Enology 14

Gizella Jahnke – Krisztina Németh – Róbert Oláh –

János Májer

The evaluation of the grape and wine market. 19

Ildikó Ehretné Berczi – Zsuzsanna Ecsediné Wanek

FURMINT: THE PHYLOSOPHICAL PRIMEVAL FORCE

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INTRODUCTION

We are still in the dark about the exact origin of Furmint. Although recent years brought scientifically ground results, the many legends and misbeliefs – with earls, kings and queens – all seem to support many facts. One thing is for sure: Furmint is an ancient variety with high cultivation value that “migrated” to several wine-making nations of Europe centuries ago. There are a lot of synonymous names abroad, although these were justified genetically mostly in Central Europe.

Furmint is an authentic Hungarian grape variety that is suitable to show the terroir peculiarities of Hungary and the wine region in question – be it Tokaj, Somló or another region. These terroir values are those that nowadays can greatly support market entry and the optimal positioning on the world market.

THE ORIGIN OF FURMINT

A very ancient grape variety called Gouais Blanc has a key role in the origin story of Furmint. It could be the parent and the successor of Furmint, but Furmint is most likely the lineal descendant of Gouais Blanc which is from an area between Northeastern France and Southwestern Germany. In the Middle Ages, it was cultivated in the whole of Europe. Its written traces can be found as Heunisch in Germany and Austria, Gwäss in Switzerland, Liseiret in Italy and Hajnos in Hungary. Tasting the high acidity of Gouais Blanc, it is eventually possible that our Furmint is a descendant of it.

Gouais Blanc is the parent of almost 80 Western European grape varieties like Chardonnay, Riesling, Gamay and Blaufrän-

kisch, therefore these are all the half-siblings of Furmint. (Figure 1)

The first mention of Furmint is from 1611, from a Calvinist document that is related to the Gyepű Valley near Erdőbénye: “Three vineyards belonged to the parish. One of these is Bakfű, another is Furmint on Giopu Valley, the third is Hosszú vineyard.”

The description of Hárslevelű from 1744, Tokaj is much later than the description of Furmint. Furthermore, it can be demonstrated based on DNA studies that Hárslevelű is none other than the lineal descendant of Furmint. We do not know the other parent, but it is likely that it has been disappeared.

The variety that was found recently in Plantscher, Switzerland was created by crossing Furmint (in other words, it is a half-sibling of Hárslevelű) and the grape

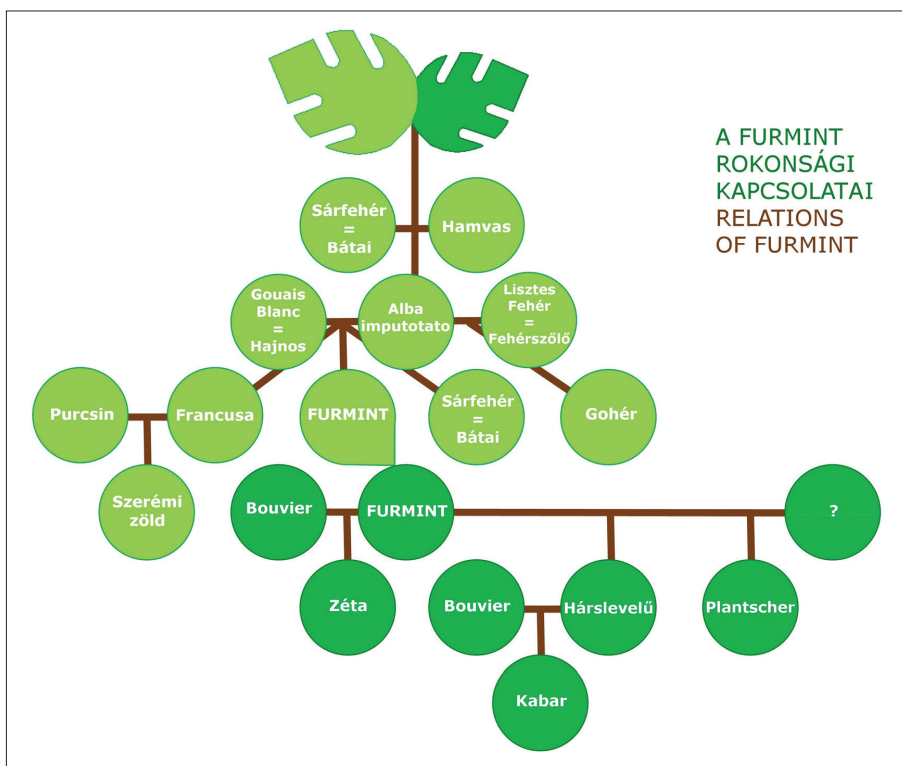


Figure 1. The relations of Furmint

variety discovered on the terraces of Swiss Vaud and Valais Cantons that originated from Hungary. In Valais Canton, the presence of Hungarian settlers was also documented during history in Val d'Anniviers and near Saint-Maurice, too. Way back, these Hungarian settlers were possibly the ones, who brought Plantscher to Switzerland. The ancestors of these varieties have become extinct long ago, but it is not impossible that they can be found in the old vineyards of Tokaj.

Today, four types of Furmint – that have been pulled out of cultivation – are distinguished in Hegyalja: "Fehér" (White), "Lazafürtő" (Loosely clustered), "Piros" (Red) and "Változó" (Varied). The DNA pattern is the same for all of them. This type of genetic variety really suggests Furmint's origin from the Tokaj at Furmint being originated from the Tokaj Wine Region. This is also supported by that DNA studies aimed at mapping relations pointed to many parent-sibling relations.

THE VARIETY

Furmint is a variety with a strong growth, thick trunk, according to the experiences, it yields best with spur pruning, low-till farming. The lamina of the leaf is barely divided, its width and length is almost the same, it is thick, a bit vesicular, its underside is slightly hairy that is characteristic of the Pontus variant group. Its cluster is loose, mid-sized (its average weight is approx. 10 dkg



depending on the clone), its grapes are mid-sized, yellowish green, they are rusty on their sunny side, have long stalks, a bit thick skin, they are crisp, juicy. It is susceptible to frosts. It can rot easily, if it is ripe it is susceptible to susceptible to the fungal infection Botrytis but in advantageous vintages, rotting is noble rotting, this what Szamorodni and aszú wines with a special quality are made of.

It is a late-ripening variety. At Tokaj-Hegyalja, its harvest traditionally starts at the 28th of October, on the day of Simon and Judah.

Just Piros furmint has four, Fehér furmint has at least nine registered sub-varieties: "Nemes", "Hólyagos", "Vigályos", "Arany", "Madárkás", "Ligetes", "Csillagvirágú", "Rongyos", "Kereszteslevelű".

The most important variety in genetics and production technology is the size of clusters and grapes, their bonding, fertilization that means inexhaustible studying of clone selections for research institutes that has been going on for decades. Therefore the variety has a very varied phenotype in itself but conforming large-scale production goals (even 130-180 quintals/ha), the research institutes of Pécs and Tarcsl supported quantity production by many clone selection series. Selections are designated by code numbers – the most common is T85 with small clusters and grapes, T92 with large clusters, P26-scrubby, white – formerly B14, after that P14, P27-noble. Even today, many producers who are dedicated to quality are searching in their wine region for tiny, thick-clustered old canopies with small grapes that can still be found and that presumably have the properties of Furmint before the industrial era. Again and again, clones drawing high hopes appear – such as 7575 -, but from the perspective of yield, the effect of the subject variety is also very important.

VINEYARDS AROUND THE WORLD

The centre of the extent of Furmint is Hungary, it is the main variety of our emblematic wine region, Tokaj-Hegyalja and also the basis of Tokaji aszú while it also plays a significant role on the Somló, too. More and more opportunities offered by it are recognised in other Hungarian wine regions such as the "Balaton-felvidék" (Balaton Uplands), Eger and the Mátra, even around Pécs and the "Alföld" (Great Hungarian Plains). In Hungary, its cultivation area is 4000 hectares, most of it – 3460 hectares – is in the Tokaj Wine Region, while there are 35 hectares on Somló mountain.(Figure 2.)

Hungarian successes – thanks to studies – reached wine nations that are surprisingly far as experiments. It is also spread in the part of Tokaj wine region that belongs to Slovakia. It is called mosler in Austria. Small plantations can be found in Slovenia, where it is called sipon. It is known in Serbia as Moslavac, and cultivated in Croatia, Romania and ex-Soviet member states, too. It also reached

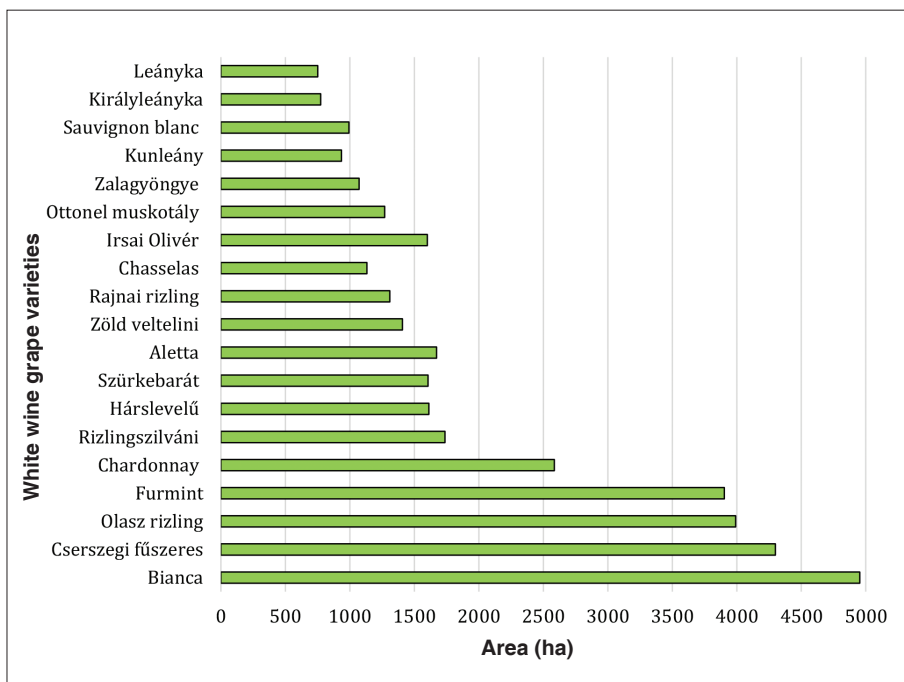


Figure 2.: The territorial distribution of white wine grape varieties in Hungary

- Somló/basalt: saltiness, longevity, peculiar, firm acids even in warmer years, too, “Somlóness” that overrides varieties.
- Csopak/limestone-marl: softer, lighter structure, rounder, thinner and shorter acids, more fruit.
- Mád/rhyolite tuff with zeolite: strong, warm character, complexity, round but firm acids.
- Bodrogkeresztúr/layered rhyolite: clearer, more modest structure, a lot of fruits.
- Tállya/andesite: more characteristic acids, tautness, colder character.
- Tokaj-Tarcal/loess: flowery, honey-like, a whole lot of fruits, more ethereal structure. (Beside this, it gets warm more easily, the root of the vine has a freer way to the deep of the 10-metre-thick loess cover, grapes can get noble rot excellently).

other continents, it is not unknown for the grape producers of USA (Sonoma Valley) and South Africa (Swartland, Stellenbosch).

THE SOIL AND FURMINT

It is said that Furmint is distinguished from other grape varieties by being able to convey the terroir authentically. It can be heard a lot of times that “this Furmint is so full of minerals... mineraly... full of stoniness” etc. But how should this be understood?

If one is taking a walk on the vineyards, one can see stones between the rows at a lot of places: multicoloured stones at Hegyalja, white at Csopak, mostly dark grey at Somló and Badacsony. Are the roots of the vines able to absorb them and present them in the grape and later in the wine, too? Well, the situation is that minerality is one of the most divisive topics today among wine experts. Minerality is exclaimed mostly in acidic wines showing little of the fruitiness and the wooden barrel. Neutral varieties like Chardonnay or Furmint “can” take a similar nature on themselves a many more times. The most recent studies suggest that even if the wine invokes a mineral taste in the mouth, this can only be indirectly deduced from just the minerals. Grape also gets the most important ions mostly from the humus content of the soil, therefore these do not have an inorganic but an organic source and the metal ions mostly connected to minerality – K, Na, Mg – get into the fruit via a multitude of processes.

But let’s see some very typical aromas and tastes that are present in Furmint from different terroirs:

REDUCTIVE OR OXIDATIVE?

As all of the white wines of the world, Furmint demands the barrel but if we want to emphasise the often-quoted terroir nature, then – as winemakers quickly realised – barrel use should not be overdone. In the case of ideally matured material for dry wine, the creamy or even roasted traits of the barrel can only serve to hide faults, deficiencies, exaggerations but the requirement of keeping wines longer is barrel treatment, therefore the wine is “trained” by encountering oxygen.

As wine trends started to change to tilt towards the direction of balance and fresh fruitiness, more and more people started to dress Furmint with reductive, steel-



barreled traits lacking wood but neutral varieties do not really have a characteristic smell, therefore it is very hard to show the advantageous face of Furmint without a barrel (in contrast with the e.g. elderberry-like Sauvignon, taut Rhine riesling or crisp Grüner (Green) Veltliner). In the case of reductive Furmint, even bottled ageing does not provide a really characteristic end result, therefore rational barrel use presumably provides much more opportunities for this variety.

Due to its complexity and structure, Furmint can provide dry wines with a very long lifetime, all the way to immortal Tokaji essences. It would be a sin to believe that a really good wine cannot be enjoyed in all of its development states. Let us not fool ourselves: a Furmint that has an unpleasant taste will not be really better in its old age and there is no such rule that this or that Furmint has to be rested in a bottle for years to worth its five-figure price in Forints but over-oxidation, being old does not suit the variety. After a while, only empty, uncharacteristic acids remain in our Furmint.

It is without a doubt that Furmint can undergo a very exciting metabolism if it is kept properly (we should pay attention to keep its temperature constantly around 13 Celsius and to keep it away from light and if our Furmint is bottled with a cork, to store it horizontally). In the case of champagnes, making the bubbles finer can only be achieved with longer bottled ageing.

Therefore there is no single rule to how long Furmint has to be sentenced to bottled captivity but it is worth getting more bottles of it at once: therefore we can enjoy its young primer traits and keep following up their exciting development in the bottle.

WINE STYLES, WINE TYPES

Since this variety is still really dominant in Tokaj, we outline its versatility on the example of this wine region.

The ordinary dry wine from Tokaj or Somló also had its role in the past, it was called *ordinarium* in Hegyalja although due to the mixture of plantations, Furmint was surely unable to constitute 100 percent of the wines of that time (just as it did not do so in other wine regions either). According to the definition of Tokaj today, selection is a base wine from more vineyards, but usually from the same variety without Botrytis or being raisined that is mostly totally dry. Furmint – which is the most dominant in the wine region – is the most typical, the basis. Due to the contents of the plantations and for easier palatability, sometimes a more fragrant variety can be placed beside it. The selection of Tokaj gets a more and more prominent role. The goal is that it should convey the philosophy of the cellar and Tokaj that is able to address a wider group of consumers at the bottom of the product pyramid.

Sweet wines are also not exclusively made of Furmint but here, the acids of the variety and its excellent susceptibility



to get noble rot have an especially important role. The high production cost of aszú types and the dubious fame of Szamorodni called the category of late harvest into being in the '90s as the pair of modern dry wines mentioned earlier. The picture has become quite colourful by today. Szamorodni is traditionally a natural sweet wine made of clusters that partly have noble rot. Its characteristics are a higher alcohol content (>12 %) and ageing in a wood barrel. It is important to mention that the name "main wine" has much older roots in Hegyalja as Szamorodni although the effort to revive the name has sadly not reached its goal.

In the case of these wines, the share of botrytis varies from cellar to cellar: somewhere it is almost negligible while sweet wines made of unraised grapes represent an obvious alternative precisely in years without noble rot. The more serious representatives of this style can elevate the concentration of the cuvée even with selected grapes with noble rot for the sake of higher concentration.

As even the name signifies it, these wines generally consist of more varieties but typically, Furmint provides its backbone while the more fragrant Hárslevelű and Sárgamuskotály makes it more likeable for the consumer. Good acid-sugar rate and youthfulness provide the merits of these wines that easily became popular by the public, presented more modernly and with a consumer-friendly price.

Aszú wines have always been deemed to be luxury items, especially a long time ago when sugar was a rarity. Aszú – made since 1631 – has undergone a significant change during its last two and a half decades. After banning fortifying in 1991 – again and finally –, it was possible to begin placing the world-renowned aszú of Tokaj onto a high-quality basis. An indispensable condition of noble rot on the grapes of Tokaj is the mist that descends from the nearby rivers on cold autumn mornings. What is grey mould on unripened grapes is noble rot on raisined ones. Only special varieties such as Furmint are able to do so with an exceptional vintage and microclimate. Cracked aszú grapes that lost water by the work of the fungus and

concentrated in sugar are selected in place among the rows of grape vines which is unique in the world and processed separately. Partly this is why we can regard it to be one of the most expensive wine-making procedures. It was due to the high sugar content gained thusly that wines did not start re-fermentation in the bottle.

Today, aszú grapes are typically soaked in fermenting must. Due to this, the base wine/must and the aszú grape can originate from different vineyards. Some soak in wine but the most radical ones do it in the most concentrated sugar solution, in other words, in must. Of course, the base wine and the aszú grape has to be produced in the same vintage today. After the heavier aszús of more characteristics from the barrel and with a higher alcohol content, today they have less alcohol, more sugar and acid that gives them a nice balance and of course a longer life. (Michael Broadbent who is an expert Christie's Auction House found the aszú wines of 1906, 1811 and even 1648 to be absolutely living wines).

Higher-placed leptosols and lower loessy areas that are – traditionally – more important for aszú hide exciting style differences. The picture completed with the characteristics of single-vineyard aszús made beside vineyard-selected dry wines (see Lapis, Betsek, Kapi).

For a long time, the classification of aszús was based on their remaining sugar content, according to how high it reached on the "puttonyos" (basket) scale (it traditionally meant the multiplier of a basket of 28-30 litres of aszú grapes added to one "barrel of Gönc" meaning 136-140 litres).

According to the new order, the category of 3 and 4 puttonyos aszú and aszú essence was abolished, today only wines with a sugar content above 120 g/l can be called aszú. The designation of 5 or 6 puttonyos is not compulsory, thereby simplifying information for the consumer and getting the "Tokaji Aszú" brand into the spotlight.

Centuries ago, the tradition of making the wine speciality with one of the most valuable and concentrated tastes of the world, the essence was established. This nectar – that has an even more concentrated sweetness than honey – can be dripping at the bottom of the collecting tub of the aszú grapes sorted during harvest season, therefore it means the pure juice that is pressed by the own weight of aszú grapes. It is usually aged in glass demijohns, has a low alcohol content – just a few volume percents – because yeast cannot work in a solution with such a high concentration. Beside a high rate of natural residual sugar, the unparalleled balance with which this drink can be enjoyed can be realised due to its very high acid content. Earlier, it was in circulation only as a medicine or it was used to ameliorate weaker vintages.

If we are in Tokaj anyway, we cannot miss other wine specialties. In the case of dry Szamorodni, the type is not that important, only in exceptional years, made of

fruit with parts of noble rot. Since it ferments for a long time and requires long ageing, we can barely encounter it with its rareness and the spreading of dry wines without botrytis. "Máslás" is a wine type known since 1759. Wine was poured on the pomace of the aszú or szamorodni, in a way making a "copy" ("másolat" in Hungarian) of the higher-value wine that had been made earlier. We can encounter the name "fordítás" ("turning") first in 1826. The principle and goal is similar to máslás but the wine is gained by the secondary aszú from soaking the aszú grapes from the pressing bag turned inside out, with which a lot of flavour and aroma materials could have been saved earlier and even today from the valuable aszú remainder.

SUMMARY

The government declared 2017 to be the year of the Furmint to draw the attention of Hungarian and international professionals as well as consumers to one of our most important native grape varieties. In recent years, Furmint had an unprecedented career outside our borders in international competitions. It is almost unbelievable that in 2010, the variety was practically unknown in the world while in 2015, Master of Wine Cristopher Burr who is the director of the wine department at Christie's Auction House said about it that "Furmint has its place among the most expensive wines of the world."

Furmint has the potential to compete with the most expensive Burgundian Chardonnays of the world or Rieslings from Rhineland. According to international experts, it has everything that is typical of the best varieties: it is fruity but provides serious wines while its unique acid structure guarantees the opportunity for long ageing. It is also an important aspect among the top wines of the world that the variety should project the characteristics of the terroir well and Furmint is outstanding from this perspective, too.

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NARIC RESEARCH INSTITUTE FOR VITICULTURE AND ENOLOGY

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The Institute – the first established of its kind and still functioning as a research station – is the successor to the Central Experimental Station for Viticulture and Institute for Ampelology founded in 1896. It has been operating – comprising of two research stations (in Badacsony and Kecskemét) – as an R&D institution within the network of the National Agricultural Research and Innovation Centre since 2014.

The fundamental task of the Institute is to provide research and advisory services to the wine industry parallel with carrying out educational activities in institutions of higher education which it was attached to earlier. In the frame of its research activities, it focuses primarily on applied research topics. Among those, research on cultivars is considered to be an important field having long traditions and outstanding results at the Institute. The research on cultivar value and selection carried out at the Institute played a crucial role in reintroducing the cultivation of several Hungaricum type local cultivars e.g. Kéknyelű, Juhfark, Kövidinka, Ezerjő. Hallmarks of the most recent results of cross-breeding are wine grape cultivars Zeus, Generosa and Rózsak as well as fungal disease resistant table grape cultivars Fanny, Teréz and Esther. Successful clonal selection work going back to several decades is illustrated by a number of state-approved clones of regional cultivars (Olasz rizling, [Riesling Italic], Szürkebarát [Pinot Gris], Kékfrankos and Irsai Olivér) which are playing a significant role in Hungarian grape and wine production. The sustainment and development of genetic stocks (1,600 items) serving cultivar research as well as their description by means of molecular genetic techniques are important tasks of the institute. For the major part of the cultivars in the National Grapevine Catalogue, the Institute fulfils the role of the sustaining organisation. As part of cultivar sustenance, it provides propagation material of high biological value (PBVT, BVT) for production on 14 ha of nursery stock. As a result of our complex pathogen elimination programme, 180 items of initial rootstocks (not exclusively of the cultivars cultivated by the Institute) are maintained in isolation houses, thus at the service of the whole industry in Hungary.

In the field of research on growing technologies, the successful adaptation of the D. M. R. method, the results in developing humate-based fertilizers as well as achievements in developing table grape growing technologies deserve to be highlighted. Expert tasks in maintaining the national vineyard cadastre are by law delegated to the Institute but it also contributes to the conception or modification of product specifications. Substantial aid to wine production was provided by the development of optimal wine-making technologies for the Hungaricum-type cultivars (e. g., Olasz rizling, Kéknyelű, Juhfark and Generosa).

Consulting and advisory activities are considered to be extremely important. Outstanding programmes are wine appreciations and professional presentations. Within the framework of consulting activities, a large number of bud examinations are carried out and a plant protection forecasting system is operated to help the producers of the Badacsony historical wine district. In the accredited laboratory of the Institute, soil and plant samples are analysed, soil conservation and nutrition plans are drawn up related to agro-environmental management programmes. The Balaton Wine Region Wine Quality Commission also holds its organoleptic tasting sessions there, taking advantage of the Institute's expert staff and infrastructure.



Figure 1: The central building of the Badacsony Research Station of the NARIC Research Institute for Viticulture and Enology in the Ramassetter –Ibos building



Figure 2: Long-term soil-cultivating experiment in Badacsony

Staff members participate in national and international educational programmes on all levels from basic vocational education through secondary and tertiary education, as well as conducting professional trainings and postgraduate training courses. PhD students are provided the opportunity to participate in our research projects. Institutes of higher education as well as professionals are welcome to use the facilities of the Institute as experiential venues and presentation areas.

RESEARCH STATION OF BADACSONY

The Badacsony Experimental estate for Viticulture and Enology, the predecessor of the Badacsony Research Station of the Research Institute for Viticulture and Enology of the National Agricultural Research and Innovation Centre (NARIC) was established in 1951. That institution had developed into a Research Station by 1972 and achieved considerable success in the fields of research and consultancy. The development opportunities of the institution were halted by reorganization as well as by it being joined to the Badacsony State Farm that jointly led to substantial decline. After the liquidation of the State Farm, research activities were reorganized by the Pécs Research Institute for Viticulture and Enology.

Based on a decision taken by the Ministry of Agriculture and Rural Development, the newly established Badacsony Research Institute for Viticulture and Enology of the MARD started its autonomous operation on January 1, 2002. As of March 15, 2008, the Institute was integrated to the Pannon University and continued to operate as part of the Centre for Agricultural Sciences. Since January 1, 2014, the Research Station has been reintegrated into the research network of the Ministry of Agriculture and has carried out research activities under the name NARIC Research Institute for Viticulture and Enology Research Station of Badacsony (Figure 1.).

Today, the mission of the Research Station is twofold: research and consulting in the field of viticulture and

enology, primarily in the Balaton Wine Region. These activities are based on 18 hectares of vineyards situated in the heart of the Badacsony wine district, on the slopes of the Badacsony hill, as well as a modern grape processing plant, wine cellar and an analytical laboratory specialized and accredited in the domains of soil, plant and wine analysis.

Experiments and research activities focus on the following topics:

- Maintenance and development of biological resources
- Assessment and research of the quality of grape cultivars (with focus on the Balaton Region)
- Examination of the autochthonous grape cultivars (Kéknyelű, Juhfark, Pintes, etc.)
- Breeding by clone selection, the assessment and spreading of clones
- Research on environment-friendly ecological grape growing (Figure 2.) and wine-making technologies
- Analysing wine marketing strategies in the Balaton Wine Region

The Research Station carries out a wide range of consulting activities. Among the outputs are soil protection and nutrient management plans. Activities range from the examination of buds to providing back-office work to the official organoleptic assessment carried out on regional level.

The most important achievements of the Badacsony Research Station were attained in grape-breeding,



Figure 3: Zeus, the promising white wine grape cultivar of the Institute

assessment of grape cultivars and examining environment-friendly grape-growing methods. Results in the field of grape breeding are highlighted by several clones of Olasz rizling (Riesling Italico), Szürkebarát, Rajnai rizling (Rheine Riesling) and by some new cultivars, e. g. Zeus (Figure 3.), Zefír, Zervin, Vulcanus and Rózsakő (Figure 4.).

Viticultural and oenological examination of the typical cultivars in the Balaton Wine Region is being carried out in the framework of assessment and research of the quality of grape cultivars. The recognition of 'Juhfark' and 'Budai' cultivars indicates the results of these activities.

The Laboratory of the NARIC Research Institute for Viticulture and Enology functions as an autonomous organizational unit within the structure of the Badacsony Research Station (Figure 5.).

On December 16, 2014, the Laboratory was reaccredited by the National Accreditation Board under NAT-1-1496/2014.

Accreditation covers the following fields:

- physical and chemical soil analysis;
- physical and chemical analysis of plant samples;
- physical and chemical analysis of wine products.

RESEARCH STATION OF KECSKEMÉT

The Research Station of Kecskemét has a long history. In 1883, government commissioner Gyula Miklósvári Miklós established the first "state model vineyard" in the district of Kecskemét now called Miklóstelep at the



Figure 4: Rózsakő, a new staminate cultivar to Kéknyelű in Badacsony.



Figure 5: The accredited laboratory for soil, plant and wine analyses at Badacsony Station



Figure 6: The Mathiász House in Kecskemét-Katonatelep

centre of the vineyard school "Hungarian Royal Vineyard and Horticultural Vocational School" (established in 1860s). The main objective of this state domain was to reduce the damage of the phylloxera epidemic through the production and development of grape-propagating material.

János Mathiász, the most productive Hungarian vine-breeder, moved to Kecskemét in 1898 and began building his estate in today's Katonatelep (also a district of Kecskemét). Mathiász was engaged mainly in breeding and in addition to that, he produced propagating material, table grapes and wines. After his death in 1921, the estate was purchased by the Hungarian State (1926) and followed to work as the "Royal Hungarian János Mathiász State Vineyard". The station continued the work of the founder in grape breeding and became the national centre for the breeding of table grapes.

The two stations were incorporated into the Research Institute for Viticulture and Enology in 1950. The centre of the Institute was transferred to Kecskemét in 1983 and the work continued on three stations. During further reorganizations, the research centre worked under the guidance of the University of Horticulture and Food Industry and later of the Ministry of Agriculture and Rural Development. Since 2008, the Research Institute has been working as a part of the Corvinus University of Budapest.

The National Agricultural Research and Innovation Centre was established on January 1, 2014 and the Research Station of Kecskemét (Figure 6.) together with the Research Station of Badacsony forms a unit of it as the Research Institute for Viticulture and Enology.

The Research Station carried out R & D tasks in almost all areas of the wine sector since the existence of the institution. The Station is the basis of research, innovation and consultancy for viticulture and enology in the Danube Wine Region nowadays. Furthermore, the institution cooperates with producer and civil organizations of the region as a kind of "professional intellectual centre".

The Station has about 40 hectares of land, of which approx. 18 ha of grapes. There are 6 ha of various collections (species and cultivar collections, virus bank, about 1.600 units). In addition, there are various plantations on the vineyard: certificated rootstock and noble stock plantations and other experimental plantations. There is an appropriate infrastructure for the basic programmes:



Figure 7: Experimental cellar in Kecskemét



Figure 8: Maintaining of pathogen-free grapevine stocks in isolator house at Kecskemét Station



Figure 9: Generosa, a new cultivar of Kunság and Mór Wine Region



Figure 10: Fanny, a new resistant table grape cultivar

laboratories for making grapes pathogen-free, professional isolator houses, a greenhouse, climatic chamber, micro- and mezo-vinification basement (Figure 7.).

The main areas of the research and development tasks of the station are:

- maintaining and developing biological bases;
- research on values of cultivars (wine and table grapes);
- national programme for the complex pathogen-freeing of grapes (Figure 8.);
- clone selection and evaluation;
- development of vine-growing technologies;
- research on environmentally friendly viticulture and viticulture methods
- evaluation and analysis of wine sector economy, legislation and strategies, ecological classification of vineyards.

The service activities of the station (and *ad hoc* consultancy): bud examination to forecast their productivity, technological consultations, wine analysis, production of propagating material, vineyard classification.

The Station achieved numerous results in the breeding of wine and table grapes, selection of clones and the production of healthy stocks. Prospective grape cultivars are suitable for varying market demands (e. g., Generosa – Figure 9., Gesztus, Szirén, Trilla, etc.). Several clones have been selected from many traditional cultivars (e. g., Arany Sárfehér, Ezerjő, Kadarka, Kövidinka).

Recent table grape cultivars satisfy many consumer expectations (colour, size, ripening time, etc.) and their tolerance is also recommended for environmentally friendly cultivation (e. g., Eszter, Fanny - Figure 10.), Lidi, Teréz, etc.). More than 110 cultivars and clones have been released over the past few years as a result of the pathogen-free program and this number is increasing from year to year. The colleagues at the research station have extensive national and international relations and cooperation in all fields of the sector of viticulture and wine industry (research, education, producers).

MAIN RESEARCH DIRECTIONS OF THE NARIC RESEARCH INSTITUTE FOR VITICULTURE AND ENOLOGY

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ABSTRACT

During the last decades, grapevine-growing and wine production in Hungary has been facing new challenges because of the changing economical environment and climate change as well. The NARIC Research Institute for Viticulture and Enology focuses its research on the most important aspects for the practice considering these factors. In this paper, we describe our recent results on two of our research fields that include grapevine pathogen elimination to produce healthy propagating stocks, and the application of the so-called DMR method to improve grape quality for wine industry.

keywords: grapevine virus elimination; DMR

METHODOLOGICAL IMPROVEMENTS IN GRAPEVINE VIRUS ELIMINATION

Several pathogens including viruses, phytoplasmae, bacteria and fungi infect grapevine propagating material in latent form resulting in serious economic losses. Thus, production of healthy stocks has a basic importance. The selection of virus-free propagating material was started in 1972 at our institute. Since the eighties, thermotherapy and *in vitro* micropropagation has been also introduced into the freeing work. At present, we start it with hot water treatment as a preliminary step to eliminate certain pests followed by initiation of *in vitro* shoot tip (meristem) cultures for the production of pathogen-free material. Application of somatic embryogenesis could be a new promising alternative to produce virus-free grapevines, because of its efficiency in virus elimination of different grapevine cultivars and other vegetatively propagated crop plants (Panattoni et al. 2013). The first results that proved the usefulness of somatic embryogenesis were published by Goussard and his co-workers (Goussard et al. 1991). Up to now, approx.

20 grapevine cultivars have been successfully sanitized, and different viruses and viroids including Grapevine fleck virus (GfKV, Popescu et al. 2003) were successfully eliminated.

During our work, meristems (with sizes of 0.2-0.5 mm) of nine different cultivars ('Anna', 'Furmint', 'Gesztus', 'Jázmin', 'Kadarka', 'Muscat Ottonel', 'Réka', 'Szirén' and 'Trilla') were excised and placed on half-strength MS (Murashige and Skoog 1962) or CP (Chée and Pool 1987) medium including 30 g/l sucrose and 1 mg/l meta-Topolin (mT). The developing sterile plantlets with roots were passed onto a medium with the same composition supplemented with 0.5 mg/l mT. The well-developed plants were micropropagated on the same hormone-free medium with 10 g/l sucrose. For somatic embryogenesis anthers of GfKV infected two 'Muscat Ottonel' clones, and 'Szirén' and 'Trilla' cultivars (grapevine collection of National Agricultural Research and Innovation Centre, Research Institute for Viticulture and Enology, Experimental Station of Kecskemét, Hungary) were used according to the method described by Oláh et al. (2009). Briefly, anthers with filaments attached were excised and placed on solid growth medium. All media contained MS basal nutrients and vitamins, supplemented with 20 g/l sucrose and were solidified with 5 g/l agar. MST medium was prepared by supplementing half-strength basal medium with 0.05 mg/l TDZ and 1.1 mg/l 2,4-D, while MSE medium contained 0.1 mg/l BA and 1.1 mg/l 2,4-D. The anther cultures were incubated at 24 °C in dark. Calluses with embryogenic morphology were passed onto half-strength hormone-free MS medium supplemented with 2 g/l activated charcoal (Oláh 2017) and the same medium was used during embryo development, germination, plant regeneration and rooting (Figure 1.).

For virus tests, total nucleic acids (DNA and RNA) were isolated from leaves collected from *in vitro* grown plants using a simplified CTAB-based protocol (Xu et al., 2004). Briefly, ca. 50 mg of plant material was directly lysed and after repeated extractions with chloroform:isoamyl

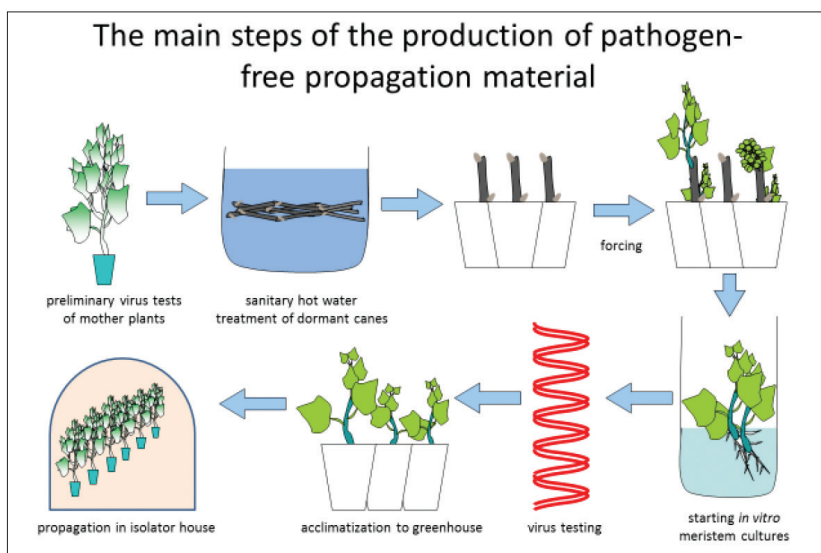


Figure 1. The process of the production of healthy grapevine stocks

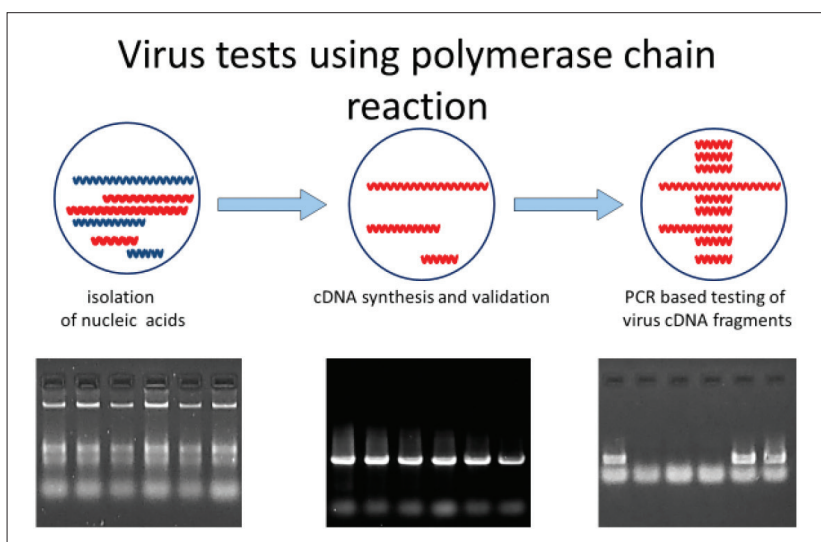


Figure 2: The process of virus tests.

alcohol nucleic acids were precipitated with 0.8 volumes of isopropanol at room temperature for 30 mins. Finally, the precipitated nucleic acid samples were washed in 70% ethanol and redissolved in sterile water, and checked in agarose gel by ethidium bromide (EtBr) staining. Revert Aid First Strand cDNA kit (Thermo Scientific, #K1622) was used for reverse transcription according to the instructions of the supplier. Polymerase chain reactions were carried out with KAPA Taq polymerase (KAPA Biosystems) as proposed by the enclosed protocol. PCR reactions were performed with an initial denaturation at 94°C for 3 min, followed by 35 cycles of denaturation at 94°C for 30 sec, annealing at 58°C for 30 sec, and extension at 72°C for 1 min 30 sec. PCR products were separated by gel electrophoresis in 1.5% (w/v) agarose followed by EtBr staining (Figure 2.). To prevent false negatives in PCR reactions, house-keeping gene-specific PepSfw/PepSrev primers (Oláh et al. 2017)

were used to test the quality of nucleic acid preparations and cDNA synthesis, followed by reactions with virus specific primers.

In our experiments, the plant regeneration from 'Muscat Ottonel' and 'Jázmin' meristems was not successful. In case of another seven cultivars, the half-strength MS medium proved more effective than CP medium. Altogether, 18% of meristems developed to entire propagatable plants on MS-based medium, while 4% on CP-based medium. Based on our experiences, we will continue this work with the tests of additional basal media and medium components.

The induction of somatic embryogenesis and plant regeneration proved to be successful for the four tested genotypes on the 3.2%-13.5% of the excised anthers (Figure 3.). Twelve independent plants were selected and virus-tested from each stock. Based on the results of PCR assays, the regenerated plants were free from Grapevine fleck virus that was present in the mother plants. Our results confirm the earlier observations on the potential role of somatic embryogenesis in the elimination of the most important viruses. The application of thidiazuron-containing medium efficiently induced somatic embryogenesis which is a basic step in virus elimination process.

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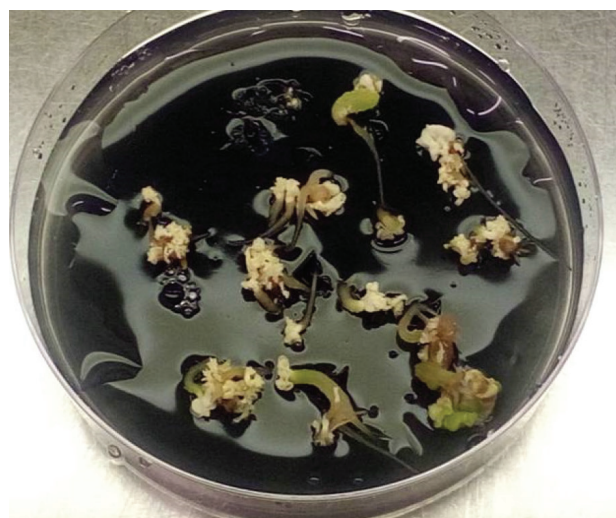


Figure 3: Somatic embryo development on hormone-free medium.

APPLICATION OF A SPECIAL GRAPE-GROWING METHOD, THE DMR

The quality of grapes is the most important factor for the development of wine quality. In recent years, the demand for the wine specialities with neutral remainder sugar increased. Wines of this type mainly used to be produced in Hungary in high stock-numbered generally horn-trained vineyards. These plantations with a high demand for labour force considering circumstances today could not be run economically. But on plantations cultivated by modern machines with high intensity, the production of wine of this type

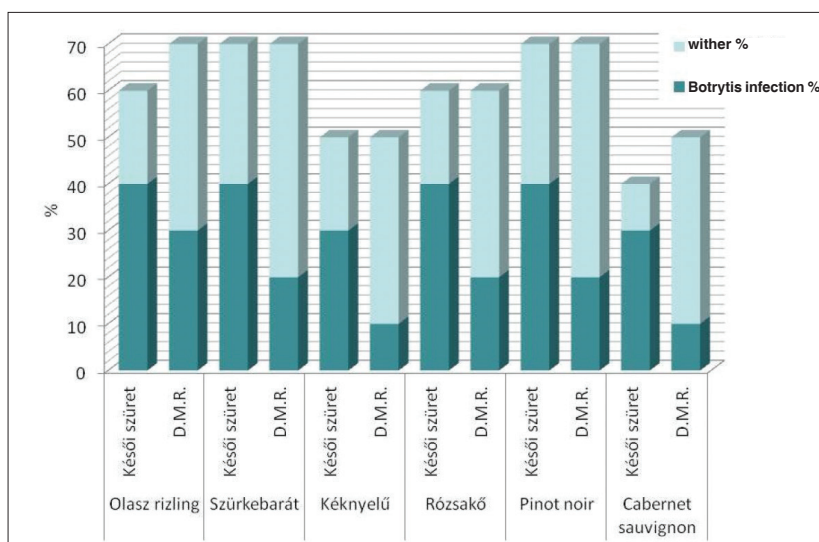


Figure 6. Effect of DMR treatment to the ratio of wither (light green) and Botrytis infection (dark green) in Badacsony, 2014. (late harvest and DMR treatment; cultivars from left to right: Italian Riesling, Pinot gris, Kéknyelű, Rózsakő, Pinot noir and Cabernet sauvignon)

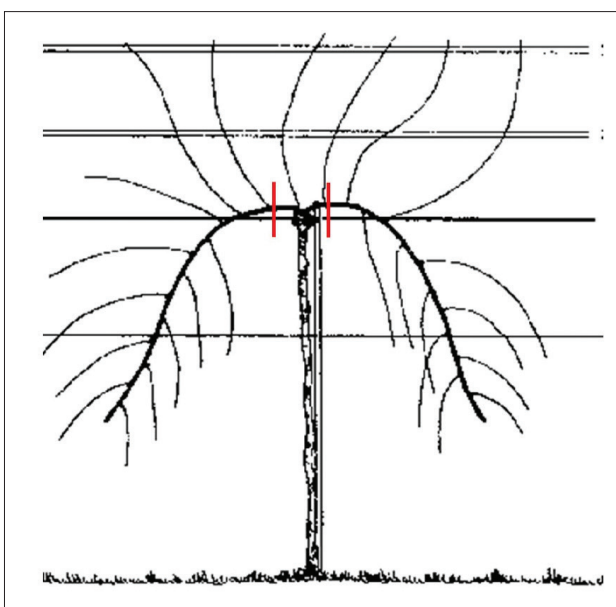


Figure 4. Sketchy presentation of the DMR method



Figure 5. Application of the DMR method in 'Italian riesling' cultivar (Badacsony, 2012.)

involves high production risk because of the loss of acids and Botrytis infection. This risk can be decreased with a special production technology solution, the so-called DMR method.

The acronym "DMR" is originated from the French term: "Double Maturation Raisonnée", meaning the reasoned double maturation of the grapevine. The essence of this method is that the sugar, acids, taste aroma-materials in the grape berries are concentrating in the cane-pruned stocks by cutting out the cane 1-3 weeks before the planned harvest time (Figure 4.).

Cargnello et al. (1996) investigated the DMR method in Cesanese vineyards in different soil conditions and training systems. According to their establishments, the quantity of the crop decreased due to the effect of removing the one-year old wood, the sugar and acid content of the juice increased, but the degree of the change was different.

According to the trials made by Cargnello and Spera (1996), the resveratrol content of the wine increased due to the effect of DMR treatment, but its degree depended on the pH, acid content and composition as well as sugar content. Another trial was set up by Cargnello and Persuric (1996) with 5 cultivars in Croatia in the years of 1994-95. They studied whether the botrytis infection can be decreased with the DMR method. They discovered that the treated stocks were less infected than the control ones. They also established that the sugar and acid-content of the grapes increased as an effect of the treatment.

To adapt the method, the NARIC Research Institute for Viticulture and Enology – in cooperation with different growers – made experiments which resulted in two different ways of utilization.

The first way of utilization in the Balaton Wine Region



Figure 7. Application of the DMR method in 'Bianca' cultivar (Kecskemét, 2016.)



Figure 8. Withering of 'Bianca' clusters as the result of D.M.R treatments of different length (from left to right: control, 3 weeks, 2 weeks, 1 week-long DMR treatments).

was the production of white wine specialities with neutral remainder sugar from shrivelled berries. The quality of white wines is negatively influenced by the loss of acids especially in years or sites of drought. This problem can also be eliminated with the DMR method because in this case, the sugars the acids concentrated as well (Figure 5.). Based on our former observations, quality increase can be reached in every year in the cultivars of the Pinot conculta members (Pinot gris, Pinot noir, Pinot blanc) but the scale of the quality increase is affected by the year (Májér et al. 2007., Gyórrfyné Jahnke et al. 2011.)

Beside the quality increases, a negative effect must be mentioned as well. If this method is applied in the same stocks in 3 or more successive years, the condition of the

stock can decrease but the application of the method in every 2 years makes no difference in its condition. Because of this, the application of the method in rotation is suggested.

The economy of grapevine-growing is strongly affected by the climatic conditions, of which the amount of rainfall has a determinative importance. In years of extremely high rainfall, the application of the DMR method can lower the rate of *Botrytis* infection (Figure 6.). This can be very important in the case of cultivars susceptible for *Botrytis* infection such as 'Budai' or 'Juhfark' (Májér et al. 2015).

The second way of utilization in the Duna Wine Region was evolved. In this region, winter frosts were very frequent in the past while nowadays, drought and extreme weather conditions cause serious problems. The growing features affect not only the expedience of the site but the cultivars and style of the end-product as well.

From the 76 grapevine cultivars grown in the Duna Wine Region, 16 belongs to the tolerant/resistant group, 15 provides the 75 percent of the total surface of the region. The enological value of these resistant cultivars cannot be expressed because of the lack of knowledge on growing and incorrect determination of harvest time. The Bianca, for example, accumulates the sugars well, it has good productivity but lost the acids easily and if must degree is over 17.5-18.0 °K, the

amount of taste- and aroma compounds decrease in the berries extremely. To meet the requirements of the market, wine quality increase is needed. This can be carried out by the application of the DMR method (Figure 7.).

To determine the optimal time of cane-cutting, three different treatment dates were applied. Harvest time was the same in every treatment. The longest treatment resulted in the highest acid content and the best-quality wine, but the quantity decrease was the highest in this case as well (Figure 8.).

In practice, the mixture of different DMR treatments and untreated wines is suggested. The market value of the wine of Bianca and other tolerant/resistant cultivars can be increased by this method.

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THE EVALUATION OF THE GRAPE AND WINE MARKET

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ABSTRACT

The study describes the grape and wine market from different aspects. The decrease of the area under vines of the world is a result of the shrinking European plantations, although planting wine grape types in other countries has become more prominent. World wine production in 2016 was less than a year before and was one of the weakest years in the last twenty years. European Union Member States were responsible for more than 60 percent of worldwide wine production, especially Italy, Spain and France. Hungary barely had 1-2 percent of EU production. Out of Hungarian wines, demand for white wines was stronger on the international market, their export share was 81 percent in 2016. According to the Market Price Information System of Research Institute of Agricultural Economics, the processing sales price of wines without geographical indication and with protected geographical indication was 4 percent higher in 2016 than a year before.

keywords: grape, wine, production, international trade, price, consumption

THE TENDENCIES OF GRAPE AND WINE PRODUCTION

According to the International Organisation of Vine and Wine (OIV, 2017), the area under vine of the world was 7.5 million hectares in 2016, a thousand hectares more than in 2015. Five countries represented 50 percent of global vine area. Spain had the most (13 percent) followed by China (11 percent), France (10 percent), Italy (9 percent) and Turkey (6 percent). The area covered by vine in the world decreased mainly because of the shrinkage of European plantations that was only partly offset by the plantation of wine grape types in other parts of the world – China, Argentina and Chile.

According to OIV (2017), the wine production of the world (without grape juice and must) was 267 million hectolitres in 2016, decreased by 3 percent compared to 2015 and was one of the weakest of the last twenty years. The wine production of the USA was 23.9 million

hectolitres in 2016, increased by 10 percent compared to 2015. In South America, wine production decreased in 2016 compared to a year before due to the severe weather: the wine production of Argentina decreased by 29 percent to 9.4 million hectolitre and by 21 percent to 10.1 million hectolitre in Chile. Brazil produced 55 percent less wine in 2016 than a year before adding up to 1.6 million hectolitres. The Republic of South Africa produced 10.5 million hectolitres of wine in 2016 which is a 6 percent decrease compared to 2015. The wine production of Australia did not change significantly between 2012 and 2015 while it can be measured up to 13 million hectolitres in 2016 which is 9 percent more than a year before. Similarly to the record harvest of 2014, New Zealand produced 3.1 million hectolitres of wine in 2016, 34 percent more than in 2015. According to the European Commission (EC, 2017), the wine production of the EU (without grape juice and must) was 165 million hectolitres in 2016, 4.8 percent less than in 2015. Out of the biggest wine-making countries of the community, Italy made the most wine in 2016, 50.3 million hectolitres that is 2 percent less than a year before. The wine production of Spain increased by 1 percent to 42.5 million hectolitres while France had a 10 percent decrease to 43.2 million hectolitres in 2016 compared to 2015. Among the Member States, the wine production of Germany was the fourth in 2016 (8.9 million hectolitres) that is 2 percent more than a year before. The wine production of Portugal decreased by 20 percent to 5.6 million hectolitres. The amount of wine in 2016 increased by 28 percent to 4.9 million in Romania and by 2 percent to 2.6 million hectolitres in Greece while it decreased by 13 percent to 1.9 hectolitres in Austria and by 14 percent to 1.2 hectolitres in Bulgaria.

In Hungary, 378 thousand tonnes of wine grapes were harvested from 59 thousand hectares of plantations and made 2.82 million hectolitres of wine from them in 2016 (HNT, 2016). In comparison: in 2015, the amount of wine produced was 2.77 million hectolitres, therefore wine production in 2016 was 1 percent higher than a year before.

The report of OIV (2016) estimated the wine consumption of the world in 2015 to be 239 million hectolitres. The

economic and financial crisis of 2008 resulted in the decrease of wine consumption and since then, global wine consumption has become around 240 million hectolitres. In 2015, the United States was the biggest wine consumer of the world, followed by France, Italy, Germany and China.

MATERIAL AND METHODS

We established the market tendencies of the Hungarian and international grape and wine production based on the statistics of the International Organisation of Vine and Wine (OIV), the European Commission (EC) and the National Council of the Wine Communities (HNT) for the years 2015 and 2016.

Data used for examining the foreign trade of grapes and wine were related to fresh or cooled grapes (KN 080610) or wine (KN 2204). International information was extracted from the COMTRADE database and Hungarian data from the foreign trade database of the Hungarian Central Statistical Office (HCSO) for 2015 and 2016.

The amount and price of wines sold without geographical indication (GI) and with protected geographical indication (PGI) are from the Market Price Information System of the Research Institute of Agricultural Economics (RIAE MPIS).

FOREIGN TRADE OF GRAPES AND WINE

Four countries were the sources of almost 50 percent of world grape export in 2015 and 2016. The biggest grape exporter of the world in the examined period was Chile, it sold 751 thousand tons valued 1.35 billion dollars. Italy was next in amount, then the USA and the Republic of South Africa, but in value, half of the total was provided by Chile, the US, Italy and China (Table 1).

International wine trade was primarily defined by those EU states that excelled in both grape and wine production.

The biggest wine exporters were France, Italy and Spain (not only in 2016 but also in 2015). Spain exported wines in the biggest amount but regarding value, both France and Italy realised higher export income than Spain in both examined years (Table 1). The reason of the difference is that French and Italian wines are more expensive, their unit price significantly exceeds world average.

The USA (5.8 million dollars), the United Kingdom (4.1 million dollars) and Germany (2.7 million dollars) bought wines in the biggest value but regarding the amount, the wine import of Germany and the UK was decisive with 1.5 million tons each. The wine import of the USA was 1.1 million tons and in the case of France, 780 thousand tons. Regarding unit price, Switzerland (5.7 dollars/kilogram) and Japan (5.2 dollars/kilogram) bought the most expensive wines.

According to the data of HCSO, the wine trade balance of Hungary (without sparkling wine or champagne) was positive in both volume and value. Its volume improved by 6 percent and its value by 10 percent in 2016 compared to the year before. The export of bottled wines and wines transported in bulk increased by 6 percent in volume and 8 percent in value. The bigger part of export consisted bulk wines (58 percent), their share in 2016 increased by 4 percentage point compared to the year before. The transport of bottled wines increased by 4 percent and the transport of bulk wines by 7 percent. Hungary had exported bulk wine mainly to Germany (30 percent), to Czech Republic (23 percent) and to Slovakia (10 percent). The most bottled wines were transported from Hungary to the Czech Republic (20 percent), Slovakia (19 percent) and to the United Kingdom (18 percent). On the international market, Hungarian white wines continued to be sought after the most, their share in export was 81 percent, it increased by 6 percentage point in a year (Table 2).

Table 1: The most significant grape exporters of the world, 2016

Rank	Country	Weight/thousand tonnes	Value/million dollar	Country		
				Weight/thousand tonnes	Value/million dollar	Country
Grapes				Wine		
1	Chile	708	1390	France	1442	9132
2	USA	387	917	Italy	2085	6222
3	Italy	481	743	Spain	2291	2966
4	China	254	664	Chile	911	1853
5	Peru	286	646	Australia	1022	1708
6	Netherlands	241	590	USA	379	1569
7	South Africa	305	436	New Zealand	343	1123
8	China Hong Kong SAR	205	355	Germany	363	1045
9	Spain	157	323	Argentina	259	817
10	Australia	119	273	Portugal	278	805

Source: Comtrade

Table 2: Foreign trade of wine (2015-2016)

Product		Export value			Import value		
Packaging	Wine category	2015	2016	2015=100	2015	2016	2015=100
		Million EUR	Million EUR		Million EUR	Million EUR	
Bottled	White	29.46	33.27	112.95	6.35	8.13	127.99
	Red and rosé	13.55	12.70	93.72	6.10	5.25	86.01
	Total	43.00	45.97	106.89	12.45	13.38	107.42
Bulk	White	21.93	23.82	108.63	1.08	0.15	14.05
	Red and rosé	2.01	2.20	109.06	4.18	5.84	139.85
	Total	23.94	26.02	108.66	5.26	5.99	113.94
Bottled and bulk packaging in total		66.94	71.98	107.53	17.71	19.37	109.36

Product		Export value			Import value		
Packaging	Wine category	2015	2016	2015=100	2015	2016	2015=100
		thousand hl	thousand hl		thousand hl	thousand hl	
Bottled	White	158.64	172.63	110.04	13.07	15.06	115.26
	Red and rosé	85.39	79.16	92.70	26.96	24.52	90.94
	Total	244.03	253.73	103.98	40.03	39.58	98.88
Bulk	White	297.68	317.84	106.77	29.83	2.44	8.16
	Red and rosé	29.03	30.84	106.21	109.51	145.50	132.87
	Total	326.72	348.67	106.72	139.34	147.94	106.17
Bottled and bulk packaging in total		570.74	602.40	105.55	179.37	187.52	104.54

Source: HCSO

CAPACITY USAGE OF WINE-BOTTLING EQUIPMENT AND GRAPE AND FRUIT WINE LINE IN HUNGARY IN 2016

Food industrial capacity survey was done based on data collection in the framework of the National Data Collection Programme (OSAP) with the registration number 2385 in the Research Institute of Agricultural Economics (Bábané Demeter E. et al, 2016). The goal of the analysis was to provide a comprehensive picture of the capacity usage of Hungarian food industry in 2016. Data provision was compulsory for designated organisations producing food, drink and tobacco products. Based on data coming from 136 production lines occurring on the questionnaire, 52 production lines were processed and part of it was the production of alcoholic drinks: the capacity of wine-

bottling equipment and grape and fruit wine processing line is analysed. During processing, a five-grade scale represents capacity usage where the category under 20 percent was very low value, the one between 20 and 40 percent was

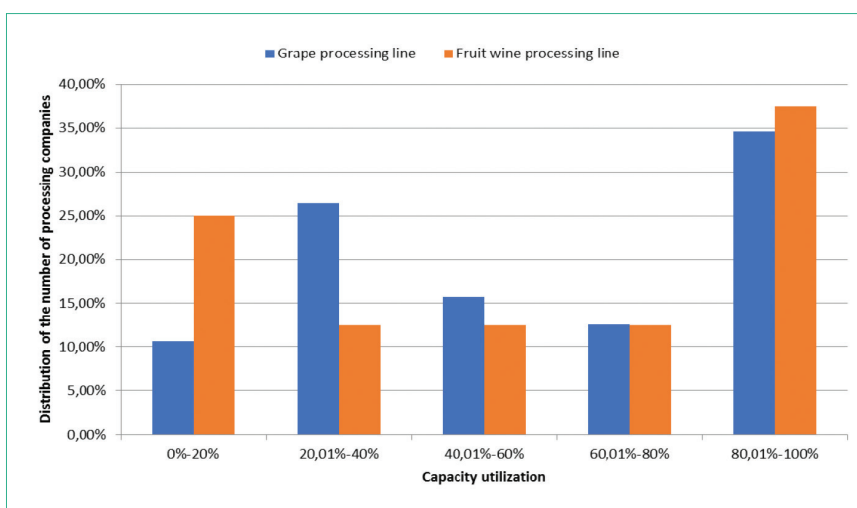


Figure 1: Distribution of capacity usage of grape and fruit wine processing line in Hungary in 2016

Source: RIAE, Department of Agricultural Statistics

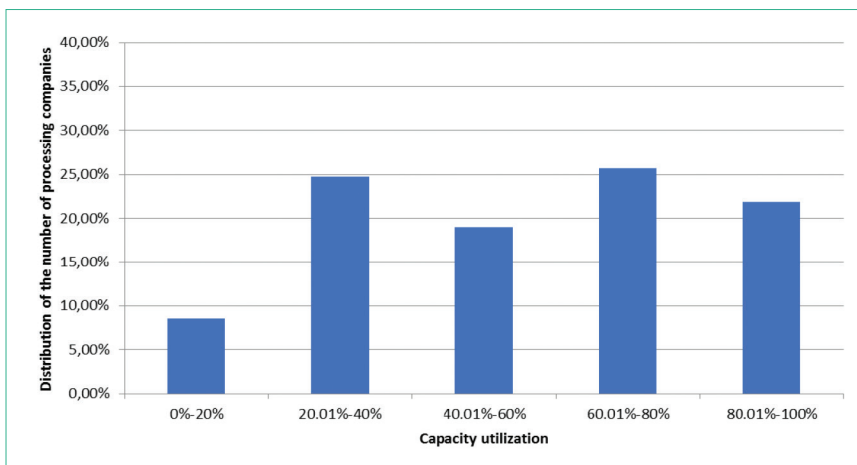


Figure 2: Distribution of the capacity usage of wine-bottling equipment in Hungary in 2016

Source: RIAE, Department of Agricultural Statistics

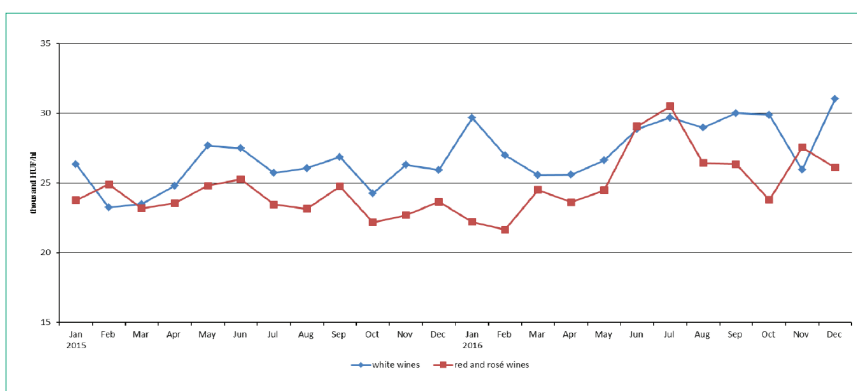


Figure 3: Processing sales price of wines without geographical indication (2015-2016)

Source: RIAE, Market Price Information System

low, medium between 40 and 60 percent, high between 60 and 80 percent, very high above 80 percent.

Based on incoming data, the capacity usage of grape and fruit wine processing moved together above 40 percent per fifths. Below it, the picture is the opposite: 10 percent of grape-processing companies had very low and 26 percent had low capacity usage (Figure 1).

8 percent of organisations with wine-bottling equipment worked with very low capacity usage. A quarter of businesses operated with a low and another quarter with high capacity usage (Figure 2). Incoming figures also revealed that the tank capacity of white wine fermentation was a total of 1 217 850 hectolitres in 2016, less than third of it, 392 445 hectolitres of red wine fermenting tanks were available. The tank capacity of fruit wine fermenting tank capacity was a fraction of it, a total of 20 404 hectolitres.

THE VOLUME OF WINES SOLD AND THE TENDENCY OF MARKET PRICES

According to the representational data of the Market Price Information System of the Research Institute of Agricultural

Economics (RIAE MPIS), the volume of wines without GI and PGI wines sold on the Hungarian market increased by 4 percent in 2016 related to the year before. White wines represented 56 percent of the total domestic sales volume. The selling of white wines decreased by 3 percent, those that are without GI fell while more PGI wines were sold. The sale of red and rosé wines increased by 1 percent in 2016 compared to 2015.

According to HCSO data, the *purchase price* of wine grapes decreased by 8 percent in 2016.

According to the data of RIAE MPIS, the processing *sales price* non-GI and PGI wines was 4 percent higher in 2016 than a year before. The price of white wines rose by 3 percent, and the price of red and rosé wines by almost 5 percent. The price of non-GI white wines rose by 12 percent, and the price of white PGI wines by 4 percent. Out of red and rosé wines, the price of non-GI wines rose by 8 percent while the price of PGI wines did not change significantly compared to 2015 (Figure 3).

According to HCSO data, the *consumer price* of white non-GI wines decreased by 2 percent while the price of red wines rose by 0.5 percent in

2015 compared to the average of 2015 (Stummer et al., 2017).

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