



**WESTERN
BALKANS FORUM**
on Higher Education and Innovation

THE ROLE AND PROSPECTS OF BALKAN AND PANNONIAN AUTOCHTHONOUS AND NEW-GENERATION (PIWI) VARIETIES IN FUTURE EUROPEAN WINE MARKETS

Pécs, 8–9 October 2026



Pécsi Tudományegyetem
University of Pécs



studyportals





Welcome to the Viticulture and Oenology Workshop of the Western Balkans Forum on Higher Education and Innovation (WBHEIF)

It is our great privilege and pleasure to welcome you to the Viticulture and Oenology Section of the Western Balkans Forum on Higher Education and Innovation (WBHEIF), held in the historic city of Pécs. This workshop brings together researchers, academic leaders, and experts representing 10 higher education and research institutions from 6 countries across the Western Balkans and the Pannonian region.

Our shared geographic, cultural, and viticultural heritage forms a natural bridge connecting Hungary and the Western Balkans. Today, as viticulture and winemaking face rapid environmental, climatic, and economic transformations, the demand for cross-border scientific dialogue and strategic partnership has never been greater. The theme of our session—*“The role and prospects of Balkan and Pannonian autochthonous and new-generation (PIWI) varieties in future European wine markets”*—addresses the very core of this challenge: balancing the preservation of indigenous genetic heritage with the development and deployment of innovative, disease-resistant cultivars.

There is immense potential in deepening the cooperation between the universities and research institutes of the Western Balkans and Hungary. By pooling our scientific expertise, genetic repositories, and pedagogical resources, our institutions can establish lasting joint research frameworks, foster student and faculty mobility, and collaborate closely in areas extending from clonal selection and ampelography to sustainable oenology, wine marketing, and wine tourism.

This abstract volume reflects the diversity and depth of that shared potential. From exploring the valorization of local and autochthonous varieties to showcasing cutting-edge advancements in PIWI breeding and modern vinification, the contributions herein demonstrate how regional collaboration can provide sustainable, competitive answers for the European wine markets of tomorrow.

We would like to express our sincere gratitude to all the contributing authors, keynote speakers, and participating institutions for their dedication and collaborative spirit. We trust that this workshop and these proceedings will not only enrich our academic discourse but also lay the groundwork for fruitful, long-term partnerships across Pannonia and the Western Balkans.

Dr. Péter Teszlák

Research Director

University of Pécs, Research Institute for Viticulture and Oenology

Zoltán Györffy

Section Organizer

Editor-in-Chief, Pécsi Borozó wine magazine

*Dean's Representative for Strategic Communication,
Faculty of Engineering and Information Technology*





WORKSHOP

Chair: Péter Teszlák

Research Director, University of Pécs, Research Institute for Viticulture and Oenology

14:00-14:05

András Trócsányi

dean, University of Pécs, Faculty of Sciences

WELCOME SPEECH

14:05-14:25

Anita Martić / Sanja Radonjić

University of Montenegro (Montenegro)

AUTOCHTHONOUS GRAPEVINE VARIETIES OF MONTENEGRO: GENETIC INHERITANCE, SCIENTIFIC VALORIZATION AND MARKET POTENTIAL

14:25-14:45

Péter Balling

Tokaj-Hegyalja University (Hungary)

EVALUATION OF WINEMAKING POTENTIAL OF AUTOCHTHONOUS VARIETIES IN THE TOKAJ WINE REGION

14:45-15:05

Darko Preiner

University of Zagreb (Croatia)

BRIDGING HERITAGE AND INNOVATION: AUTOCHTHONOUS AND PIWI GRAPEVINE VARIETIES IN CROATIAN VITICULTURE

15:05-15:25

Tatjana Jovanović-Cvetković / Miljan Cvetković

University Of Banja Luka (Bosnia and Hercegovina)

FROM INDIGENOUS GRAPEVINES TO NEW-GENERATION WINES: DIVERSIFICATION PATHWAYS FOR VITICULTURE AND WINEMAKING IN BOSNIA AND HERZEGOVINA





15:25-15:45

Zoran Pržić / Andreja Preković

University of Belgrade (Serbia)

CLONAL SELECTION OF AUTOCHTHONOUS GRAPE VARIETIES IN SERBIA: CURRENT RESULTS AND PROSPECTS FOR MODERN VITICULTURE

15:45-16:15

COFFEE BREAK

16:15-16:35

Krisztián Gaál

University of Pécs (Hungary)

DIGITALIZATION SUPPORT FOR MAINTENANCE AND DEVELOPEMENTS OF GRAPEVINE GENE BANK IN HUNGARY

16:35-16:55

Jan Reščič / Erika Jež

University of Nova Gorica (Slovenia)

FUTURE OF LOCAL GRAPEVINE VARIETIES UNDER CLIMATE CHANGE: INSIGHTS FROM THE VIPAVA VALLEY

16:55-17:15

Dragoslav Ivanišević

University of Novi Sad (Serbia)

PIWI CULTIVAR MORAVA FROM SREMSKI KARLOVCI (UNIVERSITY OF NOVI SAD) - FROM CROSSING TO WINE BRAND

17:15-17:35

Réka Rác

University of Pécs (Hungary)

AUTOCHTHONOUS AND PIWI VARIETIES: TRENDS AND OENOLOGICAL VALUE IN LA RIOJA





AUTOCHTHONOUS GRAPEVINE VARIETIES OF MONTENEGRO: GENETIC INHERITANCE, SCIENTIFIC VALORIZATION AND MARKET POTENTIAL

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ABSTRACT

Montenegro has a centuries-old viticulture heritage, representing a significant center of genetic diversity of grapevine (*Vitis vinifera* L.) in the Balkans. Modern molecular genetic research (application of SSR and SNP markers) in old Montenegrin vineyards has revealed an exceptionally rich gene pool, with over 100 identified cultivated and wild genotypes. Within the cultivated grapevine population, 51 new genotypes previously unreported in the viticultural literature and relevant databases have been identified. Analysis of parental relationships (pedigree) confirmed that autochthonous varieties, primarily Kratošija, have a key role in the origin of numerous varieties in the country and region, including Vranac, the leading symbol of Montenegrin viticulture and winemaking. These scientific findings provided the basis for the formation of the National Collection of Autochthonous and Domesticated Grapevine Varieties in Montenegro. Beyond their scientific and conservation importance for the preservation of genetic resources, Montenegrin indigenous varieties have exceptional economic and marketing potential. In the context of growing global demand for authentic wines with a strong regional identity, indigenous varieties offer a unique story that combines tradition, wine tourism and sustainable development. Their long-term

adaptation to local pedoclimatic conditions may also represent an important resource for addressing the challenges posed by climate change. Systematic conservation, further scientific research and strategic linking of science, winemakers and the market are key pillars for strengthening the international position of Montenegrin wines in the perspective of 2040.

KEYWORDS

autochthonous grapevine varieties, Montenegro, Vranac, Kratošija, genetic diversity, National collection, wine tourism.





EVALUATION OF WINEMAKING POTENTIAL OF AUTOCHTHONOUS VARIETIES IN THE TOKAJ WINE REGION

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ABSTRACT

Before the Phylloxera epidemic, more than one hundred grape varieties were cultivated in the Tokaj Region, most of which can now only be found in varietal collections. Of these, we started the oenological evaluation of 11 varieties in 2017 using present-day vinification practice. We fermented 5 liters of must per variety from the harvest of a demonstrational bush-trained parcel, of the Patrícus Estate in Bodrogkisfalud. After first racking, wines underwent laboratory analysis, wine sensory evaluation and profile analysis. Based on our findings, all of them may be suitable for producing quality wine. Kövérszőlő (Grasa de Cotnari) tested most closely to the wine character associated with the Tokaj Region. Budai and Török Gohér stood out for their distinctive, spicy varietal character. Gelber Ortlieber was light-bodied with fruity and floral aromas. Balafánt has a flavor profile similar to Furmint, but with a lower alcohol content. The high-yielding, late-ripening Fehér Járdovány was used to produce wines with lower alcohol and higher acidity. The large-berried Polyhos Furmint fermented to a higher, Változó (“Changing”) Furmint to a lower alcohol content, while both have a rich, varietal flavor profile. Although Piros (“Red”) Furmint has a lower sugar accumulation and high acidity, its beautiful, ornamental clusters make it suitable even for decorative purposes. Kék Bakator, although produced without skin contact in our experiment, showed strawberry and raspberry aromas associated with red wine. Wines with notes of fresh red berries and sour cherries were produced from the harvest of the red wine variety Purcsin following three-week skin maceration. Although the generalizability of our results is limited by the scale of microvinification, it will contribute to a greater appreciation of traditional pre-phylloxera varieties and provide momentum for further research.

KEYWORDS

grapevine; genetic resources; microvinification; autochthonous variety; wine flavour profile.





BRIDGING HERITAGE AND INNOVATION: AUTOCHTHONOUS AND PIWI GRAPEVINE VARIETIES IN CROATIAN VITICULTURE

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ABSTRACT

Croatia has a rich diversity of autochthonous grapevine varieties that represent an important genetic, cultural, and economic resource. At the same time, climate change, increasing disease pressure and the need to reduce pesticide use are driving interest in new-generation disease-resistant (PIWI) cultivars. Research at the University of Zagreb Faculty of Agriculture addresses these challenges by integrating the conservation and characterization of local grapevine genetic resources, evaluation of PIWI cultivars and grapevine breeding.

Croatian autochthonous varieties are being characterized through national and international research projects and activities within the Croatian Centre of Excellence for Biodiversity and Molecular Plant Breeding (CroP-BioDiv). Research includes genetic and phenotypic characterization, evaluation of agronomic and oenological traits, and assessment of responses to major biotic and abiotic stresses, including drought, fungal diseases and Flavescence dorée.

In parallel, introduction and field trials of PIWI cultivars under Croatian environmental conditions evaluate their adaptation, disease resistance, agronomic performance, grape composition and wine quality, providing a basis for assessing their potential in more sustainable viticulture.

These activities are complemented by the Faculty's grapevine breeding programme, which combines resistance traits from PIWI germplasm with Croatian autochthonous varieties. The long-term objective is to develop locally adapted, disease-resistant genotypes that reduce dependence on plant protection products while maintaining high wine quality and regional identity.

This integrated approach shows how autochthonous genetic resources, PIWI cultivars, and modern breeding can jointly contribute to more sustainable, climate-resilient, and distinctive viticulture in Croatia and the wider Western Balkan and Pannonian region.

KEYWORDS

grapevine; genetic resources; phenotyping; PIWI; grapevine breeding





FROM INDIGENOUS GRAPEVINES TO NEW-GENERATION WINES: DIVERSIFICATION PATHWAYS FOR VITICULTURE AND WINEMAKING IN BOSNIA AND HERZEGOVINA

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ABSTRACT

Bosnia and Herzegovina possesses valuable grapevine genetic resources and a long tradition of viticulture and winemaking, while current environmental and market challenges require more resilient production systems and greater product diversification.

Our paper addresses these challenges through three complementary directions: valorisation of indigenous grapevine varieties, evaluation of interspecific hybrids, and development of fruit-based wines. Particular attention is devoted to the indigenous cultivars Žilavka and Blatina, traditionally associated with the Herzegovina region in the southern part of Bosnia and Herzegovina, focusing on grape and wine quality and on biological characteristics that determine reliable and economically sustainable production. In parallel, interspecific grapevine hybrids are being evaluated under the environmental conditions of northern Bosnia, with emphasis on genotypes originating from Serbian breeding programmes, complemented by selected cultivars developed in Germany and other European countries. Their adaptability, production potential and suitability for lower-input viticulture are considered. A third research direction explores diversification of wine-type products through fruit wines, primarily blackberry-based wines and their combinations with other locally available fruits.

Integrating traditional genetic resources with new-generation resistant grapevines and innovative fruit-based products offers a promising pathway for strengthening regional identity, improving production resilience and diversifying the wine sector. Such an approach may contribute to positioning Bosnia and Herzegovina within emerging European markets that increasingly value authenticity, sustainability and distinctive regional products.

KEYWORDS

Indigenous grapevines; interspecific hybrids; sustainable viticulture; fruit wine





CLONAL SELECTION OF AUTOCHTHONOUS GRAPE VARIETIES IN SERBIA: CURRENT RESULTS AND PROSPECTS FOR MODERN VITICULTURE

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ABSTRACT

Wine trends reflect the adaptation of production to changing consumer preferences and climate conditions, with increasing emphasis on autochthonous grape varieties due to their adaptability to modern viticulture. Clonal selection of autochthonous varieties in the Republic of Serbia forms an integral part of the scientific research programmes at the University of Belgrade, Faculty of Agriculture. The range of autochthonous grape varieties in Serbia has narrowed to several that are mainly used for wine production, the most important for intensive wine production being Prokupac and Smederevka, with high technological potential that places them in the category of varieties for premium wines. The investigations included phenological observations, fertility and yield, mechanical composition of bunches and berries, and qualitative parameters such as sugar content, total acidity, phenolic composition, aromatic profile, and others. Following years of field research into the technological and qualitative characteristics relevant to clonal selection, the Genetic Resources Department of the Ministry of Agriculture, Forestry and Water Management issued certificates recognising 12 Prokupac clones (designated PR 2, PR 6, PR 8, PR 9, PR 10, PR 11, PR 12, PR 13, PR 16, PR 17, PR 19, and PR 20) and 4 Smederevka clones (designated Nebojša, Zoran, Ljubica, and Slavica). This clonal genetic material enriches the gene pool and has gained recognition among winemakers, with wines from these clones becoming an important part of the market and receiving awards at prestigious wine fairs. Growing interest in indigenous varieties provides an opportunity to strengthen Serbian viticulture and winemaking by establishing recognised clones as new wine brands.

KEYWORDS

clonal selection, autochthonous grape varieties, Prokupca, Smederevka, Serbia





DIGITALIZATION SUPPORT FOR MAINTENANCE AND DEVELOPEMENTS OF GRAPEVINE GENE BANK IN HUNGARY

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ABSTRACT

Among the items preserved in gene banks, the old standard and autochthonous varieties represent an increasing value, since these varieties may have properties to make their cultivation more effective under changing climatic conditions. The increasingly extreme weather is a huge challenge for the viticulture. Collectional varieties can also play important role in protection against pests and pathogens. A genebank ensures not only the preservation of rare varieties, but also gives the opportunity for more knowledge and research of these varieties.

Our main goal is to further develop national grape database, namely collecting and managing ampelographic and ampelometric descriptive data (OIV descriptors), imaging files, providing information on the origin of the varieties based on the data related to their pedigree, including parents, family trees and offspring.

We examine all 1.570 items in our gene bank with special attention to about 117 grape varieties autochthonous to the Carpathian Basin. From this collection more than 50 varieties can neither be found in national genebanks, nor in larger international collections, such as Bakhtiori Chernyi, Balsare Blanc, Cornucopia, Jabizlak, Piros Gránát, Kárpáti Rizling, Krabljak, Sesh i Zi, Polombina, or Tuingirni kara. Some of them are native to the Carpathian Basin, while others are mostly oriental origin. The genebank contains individuals propagated from the methuselah vine stock of Europe, such as the 450-500-year-old Rosa Menna di Vacca in city of Pécs (validated by SSR markers). Our research is also enriched by the Zametovka variety growing in Maribor (Slovenia), which considered as the oldest vine in Europe.

As a result of our work, the database system will also provide data obtained by molecular methods (SSR, SNP), which identify the genotypes supporting for the discovery of further relationships and for further research about the origin of the domesticated grapevine.

The most important international and autochthonous varieties of the genebank will be analyzed on berry skin and flesh anthocyanin composition as well as aroma profiles.

KEYWORDS

Grapevine, Germplasm, Autochthonous varieties, Clonal selection, Breeding.





FUTURE OF LOCAL GRAPEVINE VARIETIES UNDER CLIMATE CHANGE: INSIGHTS FROM THE VIPAVA VALLEY

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ABSTRACT

Background: ‘Pinela’ and ‘Zelen’ are white grapevine (*Vitis vinifera* L.) varieties associated with the Vipava Valley and represent its viticultural heritage. Understanding their production characteristics and ripening physiology is relevant for assessing their future role under changing climatic conditions.

Objective: This study combines an overview of ‘Pinela’ and ‘Zelen’ production in the Vipava Valley with grape ripening assessment, aiming to identify factors relevant to future cultivation and harvest management.

Methods: Official production data for 2011–2020 were combined with a survey of 25 growers of each variety, covering vineyard characteristics, viticultural practices and winemaking. Grape quality data included berry mass, soluble solids, total acidity and must pH. In a complementary study, sequential berry sampling assessed sugar accumulation as sugar mass per berry (mg/berry) in ‘Pinela’ and ‘Zelen’, distinguishing active sugar loading from concentration caused by berry dehydration.

Results: Vineyard area of both varieties increased between 2011 and 2020, with ‘Zelen’ remaining widely represented. The varieties differed in vineyard distribution. Most growers used single Guyot training and SO4 rootstock, while crop thinning and leaf removal were common. The sugar-loading study showed distinct ripening dynamics: ‘Zelen’ and ‘Pinela’ at Planina reached a sugar-loading plateau during sampling, whereas ‘Pinela’ at Manče showed a more prolonged accumulation phase, highlighting the influence of site conditions.

Conclusion: Combining regional production data with physiological ripening indicators provides a broader perspective on the future of local varieties. This approach may support site-specific harvest decisions and contribute to preserving wine styles under climate change.

KEYWORDS

‘Pinela’; ‘Zelen’; local grapevine varieties; sugar loading; climate change





“PIWI CULTIVAR MORAVA FROM SREMSKI KARLOVCI (UNIVERSITY OF NOVI SAD) - FROM CROSSING TO WINE BRAND”

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ABSTRACT

Morava grapevine variety was obtained by crossing Riesling with the valuable local genotype SK 86-2/293 (SK 77/7/4 × Bianca). The genetic background of Morava is predominantly derived from *Vitis vinifera* varieties, including Riesling (50%), Traminer (12.5%), Bouvier (12.5%), and other *V. vinifera* varieties (15.6%). The remaining 9.38% of its genetic background is derived from other species within the genus *Vitis*, including *V. amurensis*, *V. rupestris*, *V. berlandieri*, *V. labrusca*, and *V. lincecumii*. Morava is mid-late ripening white wine variety tolerant to main fungal pathogens such as *Botrytis* sp. and *Plasmopara viticola*, and moderately tolerant to *Oidium tuckeri*. Morava is characterized by stable yields and exhibits excellent tolerance to both drought and excessive precipitation during the ripening period. Its excellent production performance in the vineyard, coupled with more than satisfactory wine quality, has resulted in a substantial increase in the area planted with this variety in recent years. The adaptability of this variety to stressful environmental conditions, particularly drought and excessive precipitation, may provide an advantage under changing climatic conditions. In addition to its proven stability under field conditions, the variety Morava has been well accepted by both grape growers and wine consumers, including its name and identity. Despite being a relatively recently released variety,

KEYWORDS

grape variety; Morava; yield; wine; breeding; marketing;





AUTOCHTHONOUS AND PIWI VARIETIES: TRENDS AND OENOLOGICAL VALUE IN LA RIOJA

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ABSTRACT

Current viticulture in Europe faces strict regulatory reductions regarding chemical fungicides, including copper, necessitating sustainable alternatives to develop resilience and keep good oenological qualities. This study shows the agronomic performance, oenological value, and disease resistance of both new-generation PIWI cultivars and minor autochthonous varieties in the context of La Rioja.

The research integrates findings from two main methodological approaches within the broader Shield4Grape framework. First, the natural powdery mildew resilience of native Spanish varieties was evaluated using in vitro vacuum tower inoculations and a visual scoring scale. Concurrently, field trials were conducted at Finca Valdegón on nine PIWI varieties against traditional controls, utilizing zero-fungicide stress tests and eco-friendly treatments. Microvinifications were analyzed for oenological potential

In vitro testing revealed natural tolerance in native varieties such as Albana and Santa Fe. Field trials demonstrated that PIWIs exhibited significantly shorter reproductive cycles and maintained abundant foliage with reduced treatments. However, extreme disease pressure caused up to a 40% yield drop in specific cultivars like Cabernet Volos. Oenologically, white PIWIs maintained high total acidity, while red PIWIs achieved a higher Total Polyphenolic Index (TPI) than Tempranillo.

While PIWI cultivars successfully reduce the need for chemical treatments and maintain high oenological standards, they can still be vulnerable under extreme disease pressure. Combining the cultivation of resistant PIWIs with the natural resilience found in autochthonous vines provides a balanced, sustainable strategy for the future of La Rioja's viticulture.

KEYWORDS

PIWI varieties; genetic resistance; powdery mildew; sustainable viticulture; microvinification; autochthonous varieties





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