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ARTICLE

Legal Implications of New Genomic Techniques from Vineyard to Glass: GMO Regulation, Plant Variety Rights, Plant Reproductive Material and Geographical Indications

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Abstract

This paper provides a comprehensive analysis of the legal implications of New Genomic Techniques (NGTs) "from vineyard to glass" in the European Union (EU). NGTs promise to address sustainability challenges in the wine sector by enhancing grapevine resilience while preserving varietal identity. Yet their use in the EU remains legally complex. The paper explains their treatment under the current framework for genetically modified organisms and the ongoing reform proposal aimed at establishing a separate regime for NGT-derived plants. It then examines how NGTs challenge the legal notion of "variety" that underpins the regimes for Plant Variety Rights, Plant Reproductive Material and Wine Law. Finally, it discusses legal options to accommodate NGTs while protecting market structures and varietal heritage. It argues for an autonomous definition of variety in wine law that better reflects the expectations of both producers and consumers.

Keywords: new genomic techniques; plant variety law; wine law

I. Introduction

Traditional wine regions are increasingly affected by climate change.[1] Irregular precipitation patterns and earlier *veraison* cause higher levels of abiotic stress and disease pressure. At the same time, growing pesticide resistance and increasingly restrictive regulation,[2] as well as demands from "conscious" consumers,[3] limit conventional adaptation strategies and create a need for new instruments to face these modern challenges.

One potential solution is the development of new, interspecific hybrid varieties (often referred to as "Piwis," from the German "pilzwiderstandsfähige Rebsorten") which are

[1] R Töpfer and O Trapp, "A Cool Climate Perspective on Grapevine Breeding: Climate Change and Sustainability Are Driving Forces for Changing Varieties in a Traditional Market" (2022) 135 Theoretical and Applied Genetics 3947; C Van Leeuwen and others, "Climate Change Impacts and Adaptations of Wine Production" (2024) 5 Nature Reviews Earth & Environment 258.

[2] E Fouillet and others, "Reducing Pesticide Use in Vineyards. Evidence from the Analysis of the French DEPHY Network" (2022) 136 European Journal of Agronomy 126503.

[3] M Borrello and others, "Is Wine Perception Influenced by Sustainability Information? Insights from a Consumer Experiment with Fungus Resistant Grape and Organic Wines" (2024) 190 Food Research International 114580.

more tolerant to fungal disease and require fewer treatments in vineyards.[4] The European Union (EU) has recently paved the way for their use, also for wines sold under Geographical Indications (GIs)[5]. In the product specification for the Protected Designation of Origin (PDO) Champagne, for example, the use of the variety Voltis B has been allowed to a limited extent.[6]

Despite such progress, Piwis are far from being universally embraced. Their potential to produce high-quality wines is still a topic of debate.[7] Depending on various factors, consortia and national authorities are more or less likely to allow for greater flexibility in authorising their use, particularly in wines protected by Geographical Indications (GIs).[8] Many PDO product specifications still require the use of traditional varieties and even if Piwis are allowed, winemakers hesitate to move away from famous varieties because of their high recognition and reputation.[9] They want to produce traditional varieties, just as consumers want to drink them.[10]

Another solution could lie in the use of New Genomic Techniques (NGTs) to improve existing varieties.[11] NGTs are techniques for genetic modification that can precisely alter the genome of an organism by targeting specific genes without necessarily introducing foreign DNA.[12] The most prominent set of NGTs relies on the use of CRISPR-Cas technology. Employing NGTs in combination with traditional clone selection could enhance the resilience of existing vine varieties,[13] by knocking out certain susceptibility genes for fungal disease,[14] or improve disease resistance, regulate plant growth, and modify secondary metabolite production.[15] The practical use of NGT in grape breeding is still limited, mainly because of scientific complexity and doubts over long-term resistance of

[4] O Trapp and others, "More Sustainability in Europe's Vineyards – Using Resistant Grapevine Varieties to Reduce the Input of Pesticides" (2025) Plants People Planet.

[5] E Pomarici and R Sardone, "Is a New EU Wine Policy Coming? The Unexpected Role of Regulatory Measures" (2022) 11 Wine Economics and Policy 75.

[6] European Commission, Publication of a Communication of Approval of a Standard Amendment to a Product Specification for a Name in the Wine Sector, as Referred to in Article 17(2) and (3) of Commission Delegated Regulation (EU) 2019/33' (2023) (2023/C 222/21)' PUB/2024/1008, OJ C, C/2025/221.

[7] G Duley and others, "Oenological Potential of Wines Produced from Disease-Resistant Grape Cultivars" (2023) 22 Comprehensive Reviews in Food Science and Food Safety 2591.

[8] T Reinhardt and Y Ambrogio, "Geographical Indications and Sustainable Viticulture: Empirical and Theoretical Perspectives" (2023) 15 Sustainability 16318.

[9] C Kiefer and G Szolnoki, "Adoption and Impact of Fungus-Resistant Grape Varieties within German Viticulture: A Comprehensive Mixed-Methods Study with Producers" (2024) 16 Sustainability 6068.

[10] G Di Vita and others, "From Roots to Leaves: Understanding Consumer Acceptance in Implementing Climate-Resilient Strategies in Viticulture" (2024) 2024 Australian Journal of Grape and Wine Research 8118128.

[11] M Schmidt and others, "A New Climate for Genomic and Epigenomic Innovation in Grapevine" (2025) 5 Molecular Horticulture 44.

[12] W Broothaerts and others, "New Genomic Techniques: State-of-the-Art Review" (2021) <https://publications.jrc.ec.europa.eu/repository/handle/JRC121847 > accessed 27 October 2025.

[13] M Schoeler and others, "Breeding New Resistant Grapevine Varieties" (2018) <https://www.semanticscholar.org/paper/Breeding-new-resistant-grapevine-varieties-Schoeler-Rossouw/b77e25513f77b1396c670d63b72bd039571f1776> accessed 27 October 2025.

[14] A Butiuc-Keul and A Coste, "Biotechnologies and Strategies for Grapevine Improvement" (2023) 9 Horticulturae 62; C Ren and others, "CRISPR/Cas in Grapevine Genome Editing: The Best Is Yet to Come" (2024) 10 Horticulturae 965.

[15] C Ren and others, "Knockout of VvCCD8 Gene in Grapevine Affects Shoot Branching" (2020) 20 BMC Plant Biology 47; D-Y Wan and others, "CRISPR/Cas9-Mediated Mutagenesis of VvMLO3 Results in Enhanced Resistance to Powdery Mildew in Grapevine (Vitis Vinifera)" (2020) 7 Horticulture Research 116; X Wang and others, "CRISPR/Cas9-Mediated Efficient Targeted Mutagenesis in Grape in the First Generation" (2018) 16 Plant Biotechnology Journal 844.

gene-edited plants against pests and diseases,[16] but public programmes for NGT breeding in the wine sector are becoming a reality.[17]

This paper examines the legal implications of NGTs "from vineyard to glass": Section II discusses the regulation of GMOs in the EU and the ongoing efforts to reform the legal status of NGT-derived plants. Section III analyses how NGTs challenge the legal notion of "variety" that underpins the frameworks for Plant Variety Rights (III.1), Plant Reproductive Material (III.2) and Wine Law, including GI rules (III.3). Section IV outlines possible ways forward. Ultimately, an autonomous notion of variety in wine law offers the most pragmatic and coherent legal pathway to meet the expectations of both producers and consumers, thereby fostering the sustainable development of the European wine sector.

II. GMO Law

Despite the promises of gene editing, regulatory and political challenges to the use of NGTs in the EU persist.[18] Following the ruling of the Court of Justice of the European Union (CJEU) in case C-528/16 - *Confédération paysanne and Others*, in 2018, plants obtained using NGTs legally qualify as Genetically Modified Organisms (GMOs) in the EU.[19] Hence, they are subject to a strict authorisation regime to ensure that their release does not constitute a risk to human health, safety, and environment, as well as to strict labelling and post-market monitoring requirements.[20]

The decision of the CJEU has been subject to criticism by large parts of the scientific community. NGTs exhibit similarities with traditional mutagenesis techniques commonly used in plant breeding in the last decades.[21] They do not necessarily encompass the inclusion of foreign genes from other organisms (transgenesis). In most cases they simply involve a modification of the plant genome (cisgenesis). Mutagenesis techniques and cell fusion of plant cells of organisms that can exchange genetic material through traditional breeding methods are explicitly exempted from the GMO framework by Article 3 of Directive 2001/18/EC.[22] The CJEU, however, considered this so-called "mutagenesis exemption" applicable only to techniques that have been developed before 2001 and have conventionally been used in a number of applications, with a long safety record.[23] These

[16] S Müllner, "Pflanzenzüchtung von Gehölzen Am Beispiel Der Rebe" (*Progressive Agrarwende*, 18 January 2023) <https://progressive-agrarwende.org/rebenzuechtung/> accessed 27 October 2025.

[17] CSIRO, "Enabling Technologies for Production of Improved Clones of Existing Premium Winegrape Varieties using 'DNA-free' Gene-Editing" (2022) <https://www.wineaustralia.com/research_and_innovation/projects/enabling-technologies-for-production-of-improved-clones-of-existing-premium-winegrape-varieties> accessed 27 October 2025.

[18] F Ren and others, "Efficiency Optimization of CRISPR/Cas9-Mediated Targeted Mutagenesis in Grape" (2019) 10 Frontiers in Plant Science 612; J Villette and others, "New Improvements in Grapevine Genome Editing: High Efficiency Biallelic Homozygous Knock-out from Regenerated Plantlets by Using an Optimized zCas9i' (2024) 20 Plant Methods 45.

[19] *C-528/16 - Confédération paysanne and Others v Premier ministre and Ministre de l'agriculture, de l'agroalimentaire et de la forêt – Judgement of the Court (Grand Chamber) [2018] Court of Justice of the European Union, EU:C:2018:583.*

[20] K Purnhagen and J Wesseler, "EU Regulation of New Plant Breeding Technologies and Their Possible Economic Implications for the EU and Beyond" (2021) 43 Applied Economic Perspectives and Policy 1621.

[21] D Eriksson and others, "A Welcome Proposal to Amend the GMO Legislation of the EU" (2018) 36 Trends in Biotechnology 1100.

[22] Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC – Commission Declaration. OJ L 106, 17.4.2001, p. 1–39. Art. 3

[23] *C-528/16* (n 19). Para. 51.

arguments have been criticised for ignoring the technological complexities of such definitions[24] and for being based on technically implausible assumptions, as the use of NGTs cannot reliably be detected.[25]

Treating NGT-derived products as GMOs led to the fear of an evasion of EU biotech companies and researchers[26] and calls for reform of the GMO framework.[27] Consequently, in 2023, the European Commission presented a proposal to exempt certain NGT plants from the GMO framework.[28] According to the proposal, plants obtained through NGTs would be divided into two categories, subject to different regulatory treatments: NGT plants in Category I would be considered equivalent to conventionally bred plants because the changes induced in the genome could occur naturally or be produced through conventional breeding methods. Category II would cover all other NGT-derived plants, i.e., plants which would not be equivalent to conventionally bred plants, because of the number of changes induced in the genome or because of the specific traits that are introduced. This proposal was supported by the European Parliament in 2024 and was endorsed by the Council.[29] In March 2025, a qualified majority in the Council agreed to begin interinstitutional negotiations, the so-called "trialogue." In December 2025, the Council of the European Union and the European Parliament reached a provisional agreement that paves the way for adoption of the proposal in 2026.[30]

While some voices keep arguing for a more restrictive regulation for NGTs, emphasising environmental and health risks, and consequences for intellectual property rights as well as potential conflicts with international law,[31] some EU Member States have already moved ahead. For example, Italy allowed the use of NGT plants in an experimental field trial in Valpolicella.[32] For the first time in Europe, NGT-derived grapevines resistant to

[24] H-G Dederer, "Confédération Paysanne and Others v. Premier Ministre and Ministre De L'Agriculture, De L'Agroalimentaire Et De La Forêt (C.J.E.U.)" (2019) 58 International Legal Materials 1281; P Van Der Meer and others, "The Status under EU Law of Organisms Developed through Novel Genomic Techniques" (2021) European Journal of Risk Regulation 1.

[25] A Hubar-Kołodziejczyk and K P Purnhagen, "Regulatory Requirements for the Identification, Detection and Quantification of Gene-Edited Products in Light of the (R)Evolution of New Genomic Techniques: State of the Art and Prospects for Changes" (2025) European Journal of Risk Regulation 1; European Commission. Joint Research Centre., *Detection of Microorganisms, Obtained by New Genomic Techniques, in Food and Feed Products.* (Publications Office 2025) <https://data.europa.eu/doi/10.2760/1846532> accessed 27 October 2025.

[26] J Wesseler and others, "EU Regulation of Genetically Modified Microorganisms in Light of New Policy Developments: Possible Implications for EU Bioeconomy Investments" (2023) 45 Applied Economic Perspectives and Policy 839.

[27] K Purnhagen and others, "Options for Regulating New Genomic Techniques for Plants in the European Union" (2023) 9 Nature Plants 1958.

[28] European Commission, Proposal for a regulation of the European Parliament and of the Council on plants obtained by certain new genomic techniques and their food and feed, and amending regulation (EU) 2017/625 2023 (COM/2023/411 final).

[29] Council of the European Union, Proposal for a Regulation of the European Parliament and of the Council on plants obtained by certain new genomic techniques and their food and feed and amending Regulation (EU) 2017/625 – Mandate for negotiations with the European Parliament 2025 (2023/0226(COD)).

[30] Council of the European Union, Press Release: "New Genomic Techniques: Council and Parliament strike deal to boost the competitiveness and sustainability of our food systems" (4 December 2025) <https://www.consilium.europa.eu/en/press/press-releases/2025/12/04/new-genomic-techniques-council-and-parliament-strike-deal-to-boost-the-competitiveness-and-sustainability-of-our-food-systems/> accessed 5 December 2025.

[31] S Vöneky and others, "Compatibility of the EU Proposal for a Regulation on Plants Based on Certain New Genomic Techniques with the Cartagena Protocol on Biosafety" (2025) <https://www.bmleh.de/SharedDocs/Downloads/DE/_Landwirtschaft/Gruene-Gentechnik/NGT-Gutachten-EU-Vorschlag.pdf?__blob=publicationFile&v=4> accessed 27 October 2025.

[32] R Defez and others, "The History of GM Crops in Italy" (2024) 26 EMBO Reports 9.

downy mildew were planted in September 2024 by researchers of the University of Verona. Unfortunately, the fields were vandalised after a few weeks reflecting ongoing controversy around biotechnology in parts of the population.[33]

The proposed reform of GMO regulation would facilitate the use of NGTs in grapevine breeding by removing the requirement of pre-market authorisation. However, their relevance for the wine sector will ultimately depend on whether wines produced from NGT plants could be marketed under the names of established varieties such as Pinot Noir or Riesling. This question lies at the intersection of the legal frameworks for Plant Variety Rights, Plant Reproductive Material, and Wine Law.

III. The legal notion of variety

Variety is not a biological concept but a social construct. It designates a subgroup within a species characterised by certain shared, recognisable traits. In this sense, variety is also a legal term, with significant implications for the breeding, commercialisation, and even consumption of plants and their derived products. Three legal domains are especially relevant: plant variety law, plant reproductive material law, and wine law.

1. Plant Variety Law

In the EU, the system of Community Plant Variety Rights (CPVR) established by Regulation 2100/94[34] creates a framework for plant breeders' rights in line with the international conventions set by the Union Internationale pour la Protection des Obtentions Végétales (UPOV). The CPVR system represents a sui generis system of intellectual property that seeks to strike a balance between the rights of breeders and farmers, and the wider interest of promoting innovation.

Article 19 of Regulation 2100/94 grants plant breeders the right to commercially exploit new varieties for a period of 30 years. Despite this market exclusivity, under the so-called "breeders' exemption" other breeders are allowed to use a protected variety when developing new ones. Similarly, the "farmers' exemption" permits farmers to save and reuse seed from protected varieties for planting on their own holdings, subject to conditions and equitable remuneration.[35] For perennial crops such as grapevines the "farmers' exemption" is largely irrelevant as they are reproduced vegetatively.

The legal definition of variety in the CPVR framework is based on the DUS criteria (distinctness, uniformity and stability). Article 7(1) of Regulation 2100/94 clarifies that a variety "*shall be deemed to be distinct if it is clearly distinguishable, by reference to the expression of the characteristics resulting from a particular genotype or combination of genotypes, from any other variety whose existence is a matter of common knowledge in the Community*."

In practice, grapevine varieties are distinguished primarily by phenotypical characteristics, based on a field of study known as *ampelography*. The UPOV Guidelines specify forty-four phenotypical descriptors such as berry size, leaf shape and shoot morphology.[36] To complement these descriptors, the International Organisation of Vine and Wine (OIV)

[33] E Tosi, "Vandals Destroy Experimental 'AET' Vines in Northern Italy – Decanter" (2025) *Decanter* <https://www.decanter.com/wine-news/vandals-destroy-experimental-aet-vines-in-northern-italy-551312/> accessed 27 October 2025.

[34] Council Regulation (EC) No 2100/94 of 27 July 1994 on Community plant variety rights, OJ L 227, 1.9.1994, pp. 1–30.

[35] Ibid, Art. 14.

[36] UPOV, "Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability" (2008) TG/50/9 <https://www.upov.int/edocs/tgdocs/en/tg050.pdf>. accessed 27 October 2025.

proposed eight genetic markers based on short sequence repeats (SSRs) that allow for confirmation of varietal identity and genotypic classification (OIV, 2022).[37]

Traditional varieties such as Pinot Noir are not subject to CPVRs. However, they serve as essential reference points when defining new varieties under the DUS criteria. For this purpose, databases that register phenotypical characteristics and genetic markers – most prominently the Vitis International Variety Catalogue (VIVC) maintained by the Julius Kühn Institute – play a critical role. Traditional varieties are maintained through breeding practices, including clonal propagation and selection, which have been at the heart of viticulture for millennia.[38] Numerous clones of major varieties are recognised and cultivated across different regions, reflecting their intravarietal diversity.[39] In this sense, grape varieties cannot be considered homogeneous or static.[40] In some cases, on the other hand, products of clonal variation are recognised as distinct varieties: Pinot Noir, Pinot Gris and Pinot Blanc for example, are genetically very similar, but differ in stable morphological traits such as berry colour.

Overall, the role of Plant Variety Rights in grapevine differs markedly from that in many other crops. For cereals or vegetables, the CPVR system incentivises the creation of new varieties. In viticulture, the commercial and cultural value of traditional varieties often outweighs the CPVR incentives. This correlates with a prevalence of publicly funded research and collaborative breeding programmes. Many breeding efforts focus on clonal selection and the refinement of existing varieties. As a result, the concept of Essentially Derived Varieties (EDVs) has also not played a big role in viticulture, since small improvements are treated as clones.

Under these premises, the large-scale use of NGTs is likely to affect the intellectual property architecture for plant breeding.[41] In particular, NGTs challenge the "distinctness" criterion for CPVR protection, as they allow for precise mutations on single genes that do not necessarily result in visible phenotypical differences.[42]

In grapevine breeding, a new variety would only be recognised if at least one of the forty-four UPOV descriptors were significantly altered. An alteration of berry colour, for example, could establish distinctness, as could looser bunch architecture to reduce fungal diseases. By contrast, if disease resistance or stress tolerance were introduced through edits that leave morphology unchanged, the resulting plant would not qualify as a new variety and therefore fall outside the scope of protection. Importantly, UPOV descriptors do not cover taste or aroma, even though wine consumers often associate varietal identity primarily with flavour. Recent research has demonstrated that a single point mutation, induced through prime editing, can create a distinct "Muscat-like" flavour, thereby clearly altering the sensory profile of the wine.[43]

[37] OIV, "2nd Edition of the OIV Descriptor List for Grape Varieties and Vitis Species" (2022) <https://www.oiv.int/node/2830> accessed 27 October 2025.

[38] P Callipo and others, "Harnessing Clonal Diversity in Grapevine: From Genomic Insights to Modern Breeding Applications" (2025) 138 TAG. Theoretical and Applied Genetics. Theoretische Und Angewandte Genetik 196.

[39] F Pelsy, "Molecular and Cellular Mechanisms of Diversity within Grapevine Varieties" (2010) 104 Heredity 331; G Carrier and others, "Transposable Elements Are a Major Cause of Somatic Polymorphism in Vitis Vinifera L." (2012) 7 PLOS ONE e32973; G Götz, "Rieslingklone – Eine Neue Vielfalt" (2021) *Das Deutsche Weinmagazin* <https://www.dwm-aktuell.de/rieslingklone-vielfalt> accessed 27 October 2025; J Konradi, R Blaich and A Forneck, "Genetic Variation among Clones and Sports of 'Pinot Noir' (Vitis Vinifera L.)" (2007) 72 European Journal of Horticultural Science 275.

[40] Konradi, Blaich and Forneck (n 39).

[41] J M Lukasiewicz and others, "Intellectual Property Rights and Plants Made by New Genomic Techniques: Access to Technology and Gene-Edited Traits in Plant Breeding" (2024) 53 Outlook on Agriculture 205.

[42] D Kim and others, "New Genomic Techniques and Intellectual Property Law: Challenges and Solutions for the Plant Breeding Sector – Position Statement of the Max Planck Institute for Innovation and Competition: Munich, 8 January 20241" (2024) 73 GRUR International 323.

[43] Y Yang and others, "Editing VvDXS1 for the Creation of Muscat Flavour in Vitis Vinifera Cv. Scarlet Royal" (2024) 22 Plant Biotechnology Journal 1610.

If CPVR protection is not available, breeders are likely to rely on patents to safeguard their investments. Directive 98/44/EC explicitly excludes from patentability essentially biological processes like traditional crossing and selection and plant varieties as such.[44] However, Directive 98/44/EC allows for the patenting of natural biological material, including genes and genetic traits, when they are "*isolated from its natural environment or produced by means of a technical process.*"[45] On this basis, patents may cover specific genetic traits, isolated DNA sequences, or gene-editing methods, and they can extend to plants or plant material that express a patented trait if this trait results directly from a technical process.[46] Such patents, however, are highly controversial. They are considered potentially anti-innovative, since they lack a "breeders' exemption," and are also criticised as an unethical commercialisation of nature, because they may concern mutations that could equally occur spontaneously. A well-known example are the Carlsberg patents on barley with reduced dimethyl sulphide off-flavour, which were based on naturally occurring genetic variations.[47]

The increasing overlaps between CPVRs and biotechnology patents have led to contrasting opinions among the breeders themselves on what constitutes their optimal regulation.[48] In the Commission's most recent proposal for regulating the use of NGTs, NGTs-Category I plants are considered equivalent to conventionally bred plants, thereby allowing for the application of a breeders' exemption.[49] Other proposals include the creation of an ad hoc breeder's exemption for NGT developed plants,[50] or the adoption of mandatory licensing schemes for patents, which, for a fair price, would still allow the use of NGT-derived varieties for further breeding.[51]

Arguably, the greatest potential of NGTs in grapevine breeding lies in preserving existing markets rather than creating new ones. Consequently, the crucial question is not only how breeders are compensated through plant variety rights or patents, but also if NGT-derived plants can be lawfully commercialised from breeders to growers. This issue is the subject of Plant Reproductive Material Law.

2. *Plant Reproductive Material Law*

The notion of variety is also central to the rules on Plant Reproductive Material (PRM), which represent one of the earliest and most enduring pillars of EU agricultural law. The core objectives of these rules are to safeguard plant health, ensure varietal identity, and maintain the technical quality of propagation material. Rules are currently spread across eleven sectoral directives with specific requirements for cereals, fodder and oil plants, beet, vegetables, seed potatoes, fruit plants, forest material, ornamentals and vines.[52]

[44] Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions, OJ L 213, 30.7.1998, pp. 13–21. Art. 4.

[45] Ibid, Art. 3(2).

[46] J Kahrmann and G Leggewie, "European Commission's Plans for a Special Regulation of Plants Created by New Genomic Techniques" (2024) 2024 9 European Papers – A Journal on Law and Integration 21.

[47] European Patent Office, T 0420/19 (Barley derived beverages/CARLSBERG) 2021.

[48] Euroseeds, "Euroseeds View on Intellectual Property" (2024) <https://euroseeds.eu/app/uploads/2024/06/24.0386.3-Euroseeds-view-on-IP.pdf> accessed 27 October 2025.

[49] European Commission (n 28).

[50] A Metzger, H Zech and M Koch, "Mitigating Impact of Patents on Plants Obtained from New Genomic Technique (NGT)" (2025) Whitepaper Humboldt-Universität zu Berlin.

[51] D Matthews and H Ostapenko, "The Patent Governance of Agricultural Genome Editing: An Expert Report" (Social Science Research Network, 5 June 2025) <https://papers.ssrn.com/abstract=5436674> accessed 27 October 2025; WePlanet, 'GROWING SMARTER - Navigating Patents, Breeders' Rights and Equity in Agricultural Innovation in Europe' (2025) <https://www.weplanet.org/post/growing-smarter-navigating-patents-breeders-rights-and-equity-in-agricultural-innovation-in-europe> accessed 27 October 2025.

[52] T Winge, "A Guide to EU Legislation on the Marketing of Seed and Plant Propagating Material in the Context of Agricultural Biodiversity" (2012) FNI Report 11/2012.

The marketing of vine propagating material is primarily governed by Council Directive 68/193/EEC.[53] Under this Directive, Member States maintain national catalogues of authorised varieties and clones. Only reproductive materials from varieties and clones entered in such catalogues may be certified and marketed within the EU. Certification ensures varietal identity, purity and plant health through official controls. To be entered in a national catalogue, the material must belong to a recognised variety. In the case of newly selected clones of existing varieties, the competent authority carries out a DUS assessment to verify varietal identity.

European PRM rules have long been subject to criticism for their detrimental effects on agrobiodiversity and a perceived violation of farmers' rights.[54] Restrictions on the marketing of unregistered varieties limit the circulation of traditional landraces and diverse material. They are thus seen to contribute to genetic erosion by favoring a narrow set of commercialised cultivars over conservation varieties.[55] Despite such criticism, the CJEU has upheld PRM regulations, ruling that EU PRM laws pursue legitimate public interest objectives even when they constrain the use of unregistered varieties.[56]

The conflicting interests can also be observed in viticulture, where intra-varietal diversity and polyclonal selection are increasingly recognised as best practices for enhancing disease and drought resistance.[57] Despite so, for example, the practice of *sélection massale*, i.e., the traditional practice of propagating grapevines by selecting cuttings from a diverse population of old vines within a vineyard, is only allowed within a vintner's own holdings. Reproductive material cannot be marketed across holdings.

In response to criticisms, the EU legislator has initiated a comprehensive reform process of the PRM legislation. The Commission's Proposal for a new Regulation on Plant Reproductive Material (2023) seeks to replace the patchwork of directives with a unified framework, centralising decision-making at EU level.[58] The draft regulation provides derogations for conservation varieties, to reconcile quality assurance with genetic diversity and introduces new categories such as "heterogeneous material" (i.e., plant groupings within a single botanical taxon, with a high level of genetic and phenotypic diversity between individual reproductive units).[59] The concrete definition of these rules is still subject to an intense political debate, in which NGTs and biopatents emerge once again as particularly thorny issues.[60]

With regard to NGT-altered grapevines, the existing PRM rules could present an insurmountable hurdle. As discussed above, most practically relevant NGT applications

[53] Council Directive 68/193/EEC of 9 April 1968 on the marketing of material for the vegetative propagation of the vine, OJ L 93, 17.4.1968, pp. 15–23.

[54] J de Mévius, "Impact of the European Union's Seed Legislation and Intellectual Property Rights on Crop Diversity" (2022) 31 European Energy and Environmental Law Review

[55] L Batten, M J Plana Casado and J van Zeben, "Decoding Seed Quality: A Comparative Analysis of Seed Marketing Law in the EU and the United States" (2021) 11 Agronomy 2038.

[56] *C-59/11 – Association Kokopelli – Judgement of the Court (Third Chamber) [2012] Court of Justice of the European Union, ECLI:EU:C:2012:447.*

[57] OIV, "RESOLUTION OIV-VITI 564B-2019 -OIV Process for the Recovery and Conservation of the Intravarietal Diversity and the Polyclonal Selection of the Vine in Grape Varieties with Wide Genetic Variability" (2019) <https://www.oiv.int/node/3111> accessed 14 March 2025.

[58] European Commission, Proposal for a Regulation of the European Parliament And Of The Council on the production and marketing of plant reproductive material in the Union, amending Regulations (EU) 2016/2031, 2017/625 and 2018/848 of the European Parliament and of the Council, and repealing Council Directives 66/401/EEC, 66/402/EEC, 68/193/EEC, 2002/53/EC, 2002/54/EC, 2002/55/EC, 2002/56/EC, 2002/57/EC, 2008/72/EC and 2008/90/EC (Regulation on plant reproductive material), COM/2023/414 final.

[59] Ibid, Art. 27.

[60] European Commission (2024). *Plant variety rights: evaluation of EU legislation* (Better Regulation "Have Your Say" initiative). <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14037-Plant-variety-rights-evaluation-of-EU-legislation_en> accessed 27 October 2025.

might not alter the morphological UPOV/OIV descriptors and therefore not lead to new varieties in a legal sense. At the same time, it seems highly doubtful whether NGT-altered grapevines could be classified as clones of existing varieties. Article 2(1)(a) of Directive 68/193/EEC defines a clone as the "*vegetative progeny of a vine which is distinct, uniform and stable and which has been selected for certain characters.*" NGT plants are not selected from an existing vineyard population but grown in cell culture. Even if one Member State registers an NGT-derived clone in its national catalogue, other Member States are not bound to accept it. In fact, this discretion was used in the past to block the marketing and cultivation of authorised GM varieties such as MON810 maize before the introduction of the formal opt-out mechanism under Directive 2015/412.[61]

The proposed PRM Regulation would establish a centralised Union register, thereby abolishing the possibility for Member States to exercise a national veto through catalogue listing. Article 27 of the proposal provides for the marketing of "heterogeneous material" under certain conditions, which could in principle extend to NGT-derived plants. Both the centralisation of registration and the potential application of the "heterogeneous material" category are, however, politically controversial. In addition, wines produced from heterogeneous material could not be marketed under traditional varietal names, unless major changes in the notion of variety are adopted in Wine Law.

3. Wine Law

For most producers and consumers, questions of Intellectual Property and the marketing of propagation material are irrelevant; what matters is how vines behave in vineyard and cellar and how wines can be marketed. That terrain is governed by Wine Law. The legal backbone of European Wine Law is the Common Market Organisation (CMO) Regulation 1308/2013[62], complemented by various secondary acts, as well as Regulation 2024/1143[63] and other acts that regulate the use of GIs.

Regarding varieties, Articles 81 CMO stipulates that Member States classify varieties for planting, replanting or grafting for wine production on their territory with limited derogations for research/experimental plots. This national classification is separate from the catalogues/registers used in the plant reproductive material regime (in Germany, for example, it is issued by a different institution) and serves as the basis for all wine labelling rules.

Varietal labelling is regulated in Article 50 of Commission Delegated Regulation 2019/33.[64] If a single variety is named, at least 85% of the wine must come from that variety; if two or more are named, they must account for 100% (both with limited carve-outs). For EU wines, the variety name(s) must be those in the national classification made under Article

[61] USDA, "Mon 810 Biotech Corn Enters EU Common Catalogue of Seed Varieties" (2024) GAIN Report Number: E34057 <https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Mon+810+Biotech+Corn+Enters+EU+Common+Catalogue+of+Seed+Varieties_Brussels+USEU_European+Union_09-09-2004.pdf&utm_source=chatgpt.com> accessed 27 October 2025.

[62] Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007, OJ L 347, 20.12.2013, pp. 671–854.

[63] Regulation (EU) 2024/1143 of the European Parliament and of the Council of 11 April 2024 on geographical indications for wine, spirit drinks and agricultural products, as well as traditional specialities guaranteed and optional quality terms for agricultural products, amending Regulations (EU) No 1308/2013, (EU) 2019/787 and (EU) 2019/1753 and repealing Regulation (EU) No 1151/2012 PE/72/2023/REV/1, OJ L, 2024/1143.

[64] Commission Delegated Regulation (EU) 2019/33 of 17 October 2018 supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards applications for protection of designations of origin, geographical indications and traditional terms in the wine sector, the objection procedure, restrictions of use, amendments to product specifications, cancellation of protection, and labelling and presentation, C/2018/6622, OJ L 9, 11.1.2019, p. 2–45.

81(2); for third-country wines, names must match lists kept by the OIV, UPOV or the International Board for Plant Genetic Resources. In principle, European wine law allows varietal indications for any wines. However, national laws can set stricter rules. German law, for examples, permits the labelling of many varieties only for wines which carry a GI.[65]

GIs add a further layer of complexity. As intellectual property rights, they protect names of wine products whose qualities are essentially linked to their geographical origin. GIs are governed in a bottom-up manner: local producer organisations draft product specifications, which define key features of the wine, including permitted grape varieties and their required proportions. These specifications are arguably the most important regulations for winemakers in traditional production areas, as they directly shape vineyard choices and marketing strategies. Because GI wines command higher added value, farmers and winemakers often prioritise varieties authorised in the relevant specifications. The difficulties in defining variety or clone for NGT-vines, therefore, extend to variety labelling at GI level. Some GI product specifications even contain specifications at the clonal level: the product specification for wines from Burgundy for instance, explicitly excludes certain Pinot Noir clones for red wine production.[66]

IV. Discussion: towards an autonomous notion of variety in wine law

Our analysis has highlighted various legal challenges for the use of NGTs in grapevine breeding. Currently, NGT-derived plants fall within GMO legislation and require pre-market authorisation before being commercialised. The Commission's recent proposal would exempt so-called NGT Category 1 plants that are equivalent to plants obtained through conventional breeding techniques, but the reform has not yet been approved. Moreover, NGTs present challenges in the realm of intellectual property law, especially when used for vine breeding. Most NGT-derived vines would not qualify for Plant Variety Rights under the CPVR system. Biopatents could offer IP protection but are controversial, lack a "breeders' exemption" and face detection and enforcement problems.

The adoption of NGT-derived vines would also be affected by PRM Law, as NGT-grapevines cannot be considered "clones" under Directive 68/193/EEC. This means that reproductive material would not be marketable. The newly proposed PRM Regulation introduces a category of "heterogeneous material" which might provide a pathway for marketing, but its scope remains contested. It also would not allow the use of NGTs to improve existing varieties, if varietal labelling rules in Wine Law are interpreted to follow UPOV descriptors. GI rules could impose additional restrictions by specifying which varieties, and even which exact clones, may be used.

Against this background, different options for reform emerge:

One option would be to adjust the UPOV criteria for distinctness, moving beyond morphological descriptors, which could be considered arbitrary given current knowledge of grapevine genetics. However, such a change would represent a fundamental break with established practice, challenging the entire discipline of ampelography and creating significant legal and institutional disruption.

Another option would be to amend the definition of "clone" in the proposed PRM Regulation to explicitly encompass NGT-derived plants. This would establish a dynamic notion of variety, consistent with the historical development of grapevine cultivation. Even the most "natural wine" remains an artificial creation, a human product, reflecting

[65] § 42 (2) Weinverordnung.

[66] Cahier des Charges de L'appellation D'origine Contrôlée "Bourgogne." Homologué par l'arrêté du 11 décembre 2023 publié au JORF du 22 décembre 2023. VI. - Conduite du vignoble.

centuries of scientific development. However, no such amendment is included in the current Commission proposal, so it seems uncertain whether such a legal change would be politically feasible. Resistance to NGTs often rests on perceptions of "unnaturalness,"[67] and thus revising legal definitions of natural processes could prove particularly controversial.

The most pragmatic option may therefore lie in an autonomous definition of variety in wine law. This might not even require legislative change at all but merely depend on a different interpretation. This interpretation should primarily build on the expectations of wine producers and consumers rather than economic considerations of breeders and propagators. Taste and flavor profile, in particular, are already seen as central markers of varietal typicity in quality evaluations and GI product specifications.[68] They could thus be a much more relevant criterion than the forty-four phenotypical UPOV markers.

Wine law already provides for a separate variety classification under the CMO Regulation, which functions independently of the registers used for plant reproductive material (see above III.3.). Within this framework, even NGT-vines could be recognised as belonging to a traditional variety for labelling purposes on wine labels, independent of their characterisation in the Plant Reproductive Material registry (for examples as "heterogenous material" in the future).

An autonomous interpretation of variety in wine law could be justified through the distinct objectives of the relevant legal frameworks. Whilst plant variety law seeks to incentivise breeders, wine law aims to ensure the functionality of the wine market and protect consumer expectations.

It would also not undermine legal coherence. In fact, it is already exceptional that there are specific legal rules on varietal labelling for wine. Under UPOV guidelines, the unique plant variety denomination (PVD) is primarily intended for the marketing of propagating material to nurseries and producers, not as a consumer-facing name. Divergences between PVDs and commercial designations are common in other sectors. In apples, for example, popular names such as "Elstar" are used for multiple essentially derived varieties (e.g., Elshof, Red Elstar). Breeders increasingly combine variety registration with trademark protection: "Pink Lady," for instance, is a brand under which several varieties are marketed, including "Cripps Pink," "Rosy Glow," and "Lady in Red." This combination strategy is even encouraged by the Community Plant Variety Office,[69] as it allows breeders to reap complementary benefits of registering new varieties under distinct denominations while protecting attractive names as trademarks. Consumers remain protected by the general prohibition of misleading practices.

Nor would an autonomous notion of variety compromise the quest for authenticity, as one of the core objectives of wine law. European law generally assumes a reasonably well-informed, observant, and circumspect consumer.[70] Wine consumers justifiably expect a particularly high degree of authenticity, even for credence aspects such as grape origin or vintage. Yet, even wine law does not demand authenticity at a molecular level: as seen above, varietal labelling is already permitted by EU law where at least 85% of the product derives from the named variety.

[67] A Uddin and others, "Consumer Acceptance of New Plant-Breeding Technologies: An Application to the Use of Gene Editing in Fresh Table Grapes" (2022) 17 PLOS ONE e0270792; A Monaco, "The Role of Heuristics and Biases in the Choice of Risk Triggers for Novel Foods and GMOs in the European Union" (2025) 16 European Journal of Risk Regulation 217.

[68] L S Gonzaga and others, "Defining Wine Typicity: Sensory Characterisation and Consumer Perspectives" (2021) 27 Australian Journal of Grape and Wine Research 246.

[69] À M López, "Trademark And/Or Plant Variety Rights – Maximising benefits by combining protection measures" (2021) Prophyta Annual 18.

[70] H Schebesta and K Purnhagen, *EU Food Law* (Oxford University Press 2024).

In fact, an autonomous notion of variety in wine law could even help preserve Europe's viticultural heritage and thus support a central objective of wine law.[71] Grapevine varieties are more than agricultural products: They embody centuries and sometimes even millennia, of selection, adaptation, and collective know-how that shape regional identities and consumer expectations. Several European winescapes are recognised as *World Heritage* under UNESCO conventions.

Continuing current plant-protection practices is not feasible in the face of climate change and the biodiversity crisis. At the same time, replacing traditional varieties with interspecific hybrids could erode the heritage particularly in regions where a variety and its terroir have co-evolved as one cultural entity, for example Pinot Noir in Burgundy. The wines we enjoy today are the product of human ingenuity; enabling innovative breeding techniques that sustain traditional lineages and maintain their symbolic and sensory continuity can help to safeguard this cultural heritage.

Finally, this interpretation would be consistent with broader policy developments. In December 2024, the EU's High-Level Group on Wine Policy explicitly recommended that forthcoming revisions of the EU wine framework "*explore all options to adapt the rules, including inter alia on definitions [. . .], to facilitate the marketing of grapevine products [. . .], while preserving the integrity of the sector and preventing damages to the long-standing good reputation of EU wines.*"[72]

Even under an autonomous variety definition in wine law, GIs could set restrictions, for example by excluding individual clones, as already occurs in the Bourgogne specification. This could create restrictions for innovation and revive the debate around "naturalness" at the local level. At the same time, it could also provide a structured arena for societal debate about how much innovation is acceptable in traditional products amongst those who are most concerned and informed. GIs could thus be considered as "regulatory sandboxes,"[73] which identify workable solutions to address critical issues raised by biotechnology, including intellectual property rights and transparency towards consumers.

V. Conclusion

NGTs are an example of how technological progress causes "legal disruption"[74]: new technologies challenge existing regulatory frameworks and require a certain level of adaptation. The case of NGT-grapevines shows that disruption goes beyond the area of GMO regulation. The established notion of "variety" in several frameworks may become untenable in light of new molecular insights and possibilities for gene-editing.

To pave the way for NGT-derived varieties, the EU must take action: Either by changing the definition of clones in the new Plant Reproductive Material Regulation, or by clarifying that varieties are defined autonomously in wine law (i.e., that variety labelling does not strictly follow plant variety law). Given the advanced state of the PRM proposal and the controversies around it, the latter alternative is probably more realistic.

An autonomous notion of variety in wine law could embrace both the diversity and the dynamic evolution of plant varieties. Why should varieties be frozen at an arbitrary point

[71] *Agreement establishing the International Organisation of Vine and Wine* (opened for signature 3 April 2001, entered into force 1 January 2004) 2196 UNTS 275, Art 2(2)(vii).

[72] High-Level Group on Wine Policy, "Policy Recommendations for the Future of the EU Wine Sector" (Directorate-General for Agriculture and Rural Development 2024), p. 7.

[73] A Molitorisová and K Purnhagen, "Regulatory Sandboxes for Novel Foods" (2025) 16 European Journal of Risk Regulation 1063.

[74] K Purnhagen, "You Want It Extra CRISPERY? Legal Disruption through New Plant Breeding Technologies in the EU" (2021) Yearbook of European Law.

in time, when their development has in fact been continuous over centuries? At the same time, it could address critical issues around biotechnology, for example around intellectual property rights and transparency, and promote solutions that serve the best interests of breeders, producers, consumers and the environment.

The unique, multi-level and bottom-up structure of EU wine law has already demonstrated its capacity to integrate innovation, be it the promotion of disease-resistant hybrid varieties or the accommodation of consumer demands for dealcoholised wines.[75] Extending this adaptability to enable the sustainable use of biotechnology would represent a logical next step. By doing so, wine law could preserve authenticity while opening space for innovation, ensuring that grapevine breeding continues to serve producers, consumers, and the cultural heritage of wine alike.

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[75] T Reinhardt and others, "Wine Law, Sustainable Innovation and the Emergence of a Wine Constitution" (2024) 13 Wine Economics and Policy 15.

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