

Natural wine and organic wine production: management and risks in the frame of climate change

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Natural Wine/ Organic Wine

- • Wine from organic viticulture
- A wine from organic viticulture describes a wine produced from grapes from organic farming, guaranteed until 2012 by private organizations managing brands.
- Since 2012, this name is no longer assigned. Since that date, there have been official European specifications, which define and regulate what henceforth bears the name of organic wine, over the entire process (no longer only organic viticulture but now also winemaking).
- • Organic viticulture is a practice of viticulture according to the principles of organic farming.
- Organic viticulture is forced not to use synthetic organic molecules, promotes the natural struggle between species, soil life, the sustainability of animal and plant species and their natural ecosystems.
- It is governed by European regulation CE 2092/911, and since 2012 regulations specifically regulate the production of organic wine. This regulation follows on from the one governing the production of grapes from organic viticulture.



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Natural Wine French Charter

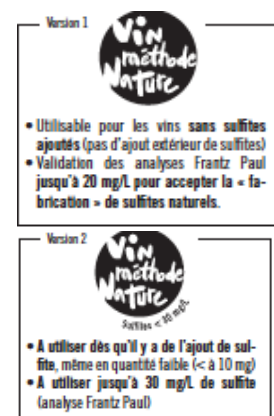
- 7 • No sulphites are added before and during fermentation, or in the starter.
- (Possibility of adjustment - of the order of: $\text{SO}_2 < 30 \text{ mg / l}$ Total H_2SO_4 , whatever the color and type of wine - before placing; obligation to provide information on the addition of sulphites, mentioned on the label via a dedicated logo.)
- 8 • During a "natural method wine fair", both the winegrowers and the organizers undertake to present the charter alongside the bottles; independent wine merchants are encouraged to do the same, as far as possible, within their establishment.



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Natural Wine French Charter

- 9 • Use of one of the identification logos.
- Can be used for wines without added sulphites (no external addition of sulphites)
- With Validation of Frantz Paul analyzes up to 20 mg / L to accept the "manufacture" of natural sulphites.
- **Second logo**
- • To be used as soon as there is addition of sulphite, even in small quantities ($< 10 \text{ mg}$)
- • Use up to 30 mg / L of sulphites (Frantz Paul analysis)
- 10 • The commitment will be made during the "marketing" (obligation of result) by a "declaration of honor", following the opinion of the Syndicate office; it will be requested each year for each vintage (clearly identified batch).



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Natural Wine French Charter

- 11 • Cuvées that are not “Wines method nature” must be clearly identifiable (differentiated labeling) by the signatories.
- 12 • The signatories will undertake in their own name and all information
- **We can see in these rules that they can be considered as organic wines with more restrictions.**
- **It means less protection for some risks**



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Risks

Paper from French Oenologists

POSITION DES CÉNOLOGUES DE FRANCE

CÉNOLOGUES DE FRANCE

LES NOUVEAUX COURANTS D'EXPRESSION DANS LE VIN PAR LES CÉNOLOGUES DE FRANCE

Rédacteurs : Collège des vignerons : Denis Machureau, Gilles Chavet, Christophe Bouchard, Jean-Luc Libault, Daniel Ponsard, Frédéric Bouchard et Serge Dubois

PRÉAMBULE

Depuis sa découverte environ 8000 ans avant notre ère, le vin accompagne l'homme et l'homme accompagne le vin. Du produit original issu de la fermentation des sucres des baies de raisins ou du jus de raisins par des levures, l'homme a su développer des vins d'une grande diversité : vins aromatisés, mûlés ou tout simplement non complètement fermentés, en amphores, distillés, quinqués ou en barriques, la grande affaire étant d'obtenir la fermentation alcoolique et ensuite de garder la couleur en alcool produit, ce sans altération.

Pour en arriver là, il a fallu acquiescer une connaissance empirique des phénomènes qui transforment le jus de raisin en vin et, à partir du XIX^e siècle, découvrir et expliquer les processus chimiques, biochimiques

et microbiologiques qui se déroulent naturellement lors de l'élaboration du vin et du vinéage. L'œnologie, la science du vin, rassemble toutes les connaissances acquises et en devenir. Ainsi, les grands types (profils) de vins élaborés depuis plusieurs siècles pour certains, ont été définis et caractérisés par des protocoles œnologiques et donc des pratiques œnologiques. Mais le vin est un produit qui a toujours évolué avec l'implantation des vignobles, le climat, les sols et surtout les aspirations des hommes. Le vin revendique ses qualités gustatives et olfactives (organoleptiques) dans le respect absolu de la réglementation en vigueur qui a su l'adapter, reconnaître et encadrer la grande diversité de produits et de pratiques.

Depuis quelques décennies, les préoccupations environnementales, œnologiques et d'éthique publique ont conduit l'ensemble des opérateurs du vin à trouver des solutions permettant de réduire sensiblement les intrants tant à la vigne (pesticides...) que dans les vins (additifs...).

Dans ce contexte, on assiste à un foisonnement de désignations nouvelles. Ces différents courants expriment-ils une recherche d'authenticité, de volonté de se rapprocher de la nature ou de la laisser faire ?

ET DEVANT LEUR NOMBRE, COMMENT LES DISTINGUER, S'Y RETROUVER ?

Les distinguer revient en premier lieu à utiliser soit leur définition légale, soit celle que leurs producteurs définissent ou revendiquent, soit à consulter leur cahier des charges, s'il existe, ainsi nous rapportons quelques définitions ou du moins une approche de celles-ci.

Boom in the supply of so-called natural wines, close to 2% of current French wine production, responds to a search for authenticity and a health promise, essentially through the reduction of inputs, particularly sulphites.

Various alterations that had disappeared with the contribution of oenological science are encountered again and can be elevated to the rank of qualities!

The faults, whether they are related to the quality of the grapes, to "fermentation letting go, or to a technical failure, are numerous and inexorably lie in wait for the winemaker; thus reappeared:

-The taste of mice generated by strains of yeast of the *Brettanomyces* type and of certain *Lactobacillus*;

-The turn of microbial origin, lactic acid bacteria attacking tartaric acid to give wines without acidity but rich in CO₂;

-Bitterness caused by a bacterial attack on glycerol to give acrolein (toxic);

-Fat disease, lactic acid bacteria of the genus *Pediococcus* producing glucans which make wine oily.

-Ethyl acetate produced by oxidative yeasts and weaklier by those used in wine making;



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Risks

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LES NOUVEAUX COURANTS D'EXPRESSION DANS LE VIN PAR LES CÉNOLOGUES DE FRANCE

Résumé • Collège des œnologues •

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et microbiologiques qui se déroulent naturellement lors de l'élaboration du vin et du vinage. L'œnologie, la science du vin, rassemble toutes les connaissances acquises et en devenir. Ainsi, les grands types (profils) de vins élaborés depuis plusieurs siècles pour certains, ont été définis et caractérisés par des protocoles œnologiques et donc des pratiques œnologiques.

Mais le vin est un produit qui a toujours évolué avec l'implantation des vignobles, le climat, les sols et surtout les aspirations des hommes. La vinification a ses qualités gustatives et olfactives (œnologiques) dans le respect absolu de la réglementation en vigueur qui a su l'adapter, reconnaître et encadrer la grande diversité de produits et de pratiques.

Depuis quelques décennies, les préoccupations œnologiques, écologiques et d'hygiène publique ont conduit l'ensemble des opérateurs du filaire à trouver des solutions permettant de réduire sensiblement les intrants tant à la vigne (pesticides...) que dans les vins (sulfites...).

Cette note, en accord avec le fonctionnement des désignations nouvelles. Ces différents courants expriment une recherche d'authenticité, de volonté de se rapprocher de la nature ou de la laisser faire ?

ET DEVANT LEUR NOMBRE, COMMENT LES DISTINGUER, SE RETROUVER ?

Les distinctions revêtent en premier lieu à utiliser soit leur définition rigide, soit celle que leurs producteurs diffusent ou revendiquent, soit à contacter leur cahier des charges, s'il existe : ainsi nous rappelleront quelques définitions ou du moins une approche de celles-ci.

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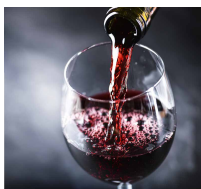


Photo: Oenologie
Illustration: Oenologie

- In addition, ethanal, produced by yeasts (nutritional deficiencies in particular promote their formation) during AF and by oxidation during aging, toxic at high concentration, must be controlled and SO₂ in this case, remains an essential ally with the technical mastery of the moment of its addition.

- The greatest danger for the consumer lies in the misinformation which tends to qualify the worst taste defects born of alterations as characteristics of terroir and authenticity.

- We cannot allow these depreciations and alterations to be confused with the proclaimed authenticity and the return to a product called natural when it may be naturally degraded, or even non-compliant with regulations. That is to say "unfair and no merchant" to use the term.

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RECENT PAPER IN OENO ONE : »SENSORY CHARACTERISATION OF BORDEAUX RED WINES PRODUCED WITHOUT ADDED SULFITES «

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OENO One

Sensory characterisation of Bordeaux red wines produced without added sulfites

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ABSTRACT

Aim: The evolution of consumer expectations has led to the development of new production methods using less inputs. From an oenological point of view, these methods include the production of wines without any SO₂ being added throughout the process. These wines are becoming very popular among consumers, but the absence of SO₂ during winemaking increases the risk of stability problems. Such wines have been poorly explored in the literature and here is the first study for them to be characterised. This study was developed to evaluate whether Bordeaux quality wines produced without added SO₂ have their own typicality, and it provides an insight into current wine production.

Methods and results: From a batch of fifty-two commercial Bordeaux red wines produced without adding SO₂ and twenty red wines made according to the usual winemaking methods, a selection was performed to eliminate wines with at least one defect further to a sensory space evaluation. In a second phase, the napping test was applied to defect-free wines to evaluate the sensory specificities of wines produced without SO₂ addition. The wines without SO₂ addition presented a much higher frequency of defects than those without SO₂ addition (19 % vs. 12 % respectively). Defects described in wines without added SO₂ were: "oxidation" (47 %), "volatile phenols" (31 %), "flavour off-flavour" (10 %), "reduction" (9 %) and "regional" (4 %). Since this study focused on quality wines with no added SO₂ addition, it was difficult for the tasters to discriminate between them according to their overall technical quality.

Conclusion: This approach has revealed that despite the large number of "non-added SO₂" wines with defects, upon blind tasting, expert tasters highlighted some "non-added SO₂" wines without defects. Nevertheless, at equivalent quality levels within the same geographic region, and in non-targeted sensory tests, wines with and without SO₂ addition were considered to be quite similar.

Significance of the study: This study was a first sensory step toward the objective characterisation of "non-added SO₂" wines, enabling further work to highlight markers of quality in wines without SO₂ addition and to describe the production of "non-added SO₂" wines without defects. Nevertheless, at this stage, our results show that the absence of sulfites during the whole winemaking process, including bottling, increases the risk of the development of defects.

KEYWORDS

wines without sulfites, wine defects, sensory analysis, napping, napping test

52 commercial Bordeaux red wines produced without adding SO₂ and 20 red wines made according to the usual winemaking methods,

a selection tasting was performed to eliminate wines with at least one defect further to a sensory space evaluation.

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Pelonier-Magimel E., Mangiorou P., Philippe D., de Revel G., Jourdes M., Marchal A., Marchand S., Pons A., Riquier L., Teissedre P.-L., Thibon C., Lytra G., Tempère S., & Barbe J.-C. (2020). Sensory characterisation of Bordeaux red wines produced without added sulfites. *OENO One*, 54(4), 733-743. <https://doi.org/10.20870/oeno-one.2020.54.4.3794>

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RECENT PAPER IN OENO ONE : SENSORY CHARACTERISATION OF BORDEAUX RED WINES PRODUCED WITHOUT ADDED SULFITES

Frequency of wines with at least one defect according to use of sulfites and vintage.

	2015		2016	
	Wine with SO ₂	Wine without SO ₂	Wine with SO ₂	Wine without SO ₂
Number of wines with defect	03-déc	20/26	0/8	18/26
Percentage of wines with defect	25%	77%	0%	69%

	2015	2016	Total
Oxidation	37.5 %	33.3 %	35.4 %
Volatile phenols	20.8 %	16.6 %	18.7 %
Mousy off-flavor	12.5 %	0%	6.2 %
Reduction	4.1 %	8.3 %	6.2 %
Vegetable/Herbaceous	0%	8.3 %	4.1 %
Total	74.9 %	66.5 %	70.6 %

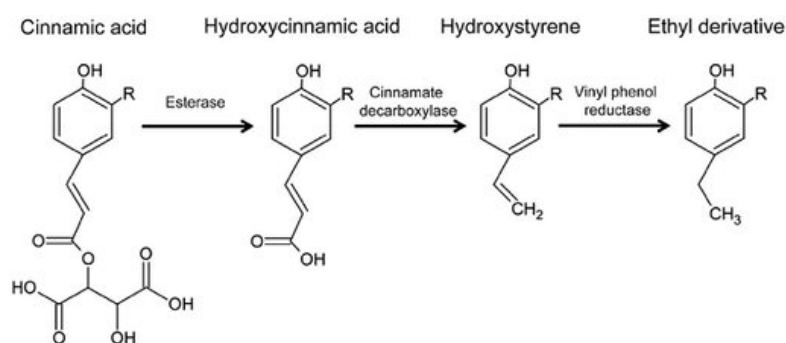
Mousy off-flavor
Oxidation
Reduction
Vegetable
Volatile phenols

Citation frequencies and word cloud of descriptors of defects in wines without added sulfites, with agreement above 60 %

Pelonnier-Magimel E., Mangiorou P., Philippe D., de Revel G., Jourdes M., Marchal A., Marchand S., Pons A., Riquier L., Teissedre P.-L., Thibon C., Lytra G., Tempère S., & Barbe J.-C. (2020). Sensory characterisation of Bordeaux red wines produced without added sulfites. *OENO One*, 54(4), 733-743. <https://doi.org/10.20870/oeno-one.2020.54.4.3794>

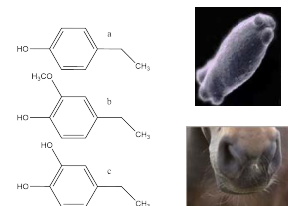
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The formation of volatile phenols from their hydroxycinnamic acids precursors



R = H	<i>p</i> -Coutaric acid	<i>p</i> -Coumaric acid	4-Vinylphenol	4-Ethylphenol
R = OCH ₃	Fertaric acid	Ferulic acid	4-Vinylguaiacol	4-Ethylguaiacol
R = OH	Caftaric acid	Caffeic acid	4-Vinylcatechol	4-Ethylcatechol

The thresholds for the perception of the volatile phenols described are very variable, generally of the order of 450 µg / L.



4-ethyl-phenol (a) stable over time, with a stable odor, at the perception threshold of 400 µg / l in wine. In contaminated wines, there is generally 10 times more 4-ethyl-phenol than 4-ethyl-guaiacol.

4-ethyl-guaiacol (b) stable over time, with a clove odor, at the perception threshold of 100 µg / l in wine.

4-ethyl-catechol (c) smoky, camphoric.

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wine post-bottling development



Incidence of faults in wine during the International Wine Challenge

Description	2006	2008
Total faults, %	7.1	5.9
Cork taint	27.8	31.1
Oxidation related fault	24.3	19.1
Reduction related fault	29.2	28.9

Brettanomyces (11% in 2006, 16% in 2008)

The occurrence of sulfide-like-odours related with screw-caps is increasing:

- in 2006, 2.6% of screw-caps represented 4.9% of reduction faults
- in 2007, 2.6% of screw-caps represented 7.3% of reduction faults

IWC
Observatory tracks faults
through 14,000–15,000
bottles
over the course of the
annual 2 weeks of
wines judging.

Goode J, Harrop S (2008) Wine faults and their prevalence: data from the world's largest blind tasting, in 16èmes Entretiens Scientifiques Lallemand, Horsens



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JAMIE GOODE COMMENTS IWC (MAY 28, 2019)



'With the natural wine movement's growth, we have seen the corresponding growth of a rare wine fault'

But along with the natural wine movement's growth, we have seen the corresponding growth of a rare wine fault that previously students of wine learned about from textbooks, but rarely encountered: mousiness.



Default
perceived by
retro-olfaction
(after mix with
saliva)

Mousiness seems to occur almost randomly in wines that haven't had any SO₂ added. It is still quite a mysterious fault, and it's unusual among wine faults that you can't smell it until the wine is in your mouth. On your first encounter with a mousy wine, it tastes fine, as you take a sniff. Then you put it in your mouth and, after a few seconds, the characteristic flavour appears: mouse cage, water biscuits, and a sort of savoury warmth that's quite hard to describe.

It's kind of sickly sweet, and while it's not as repellent as the mustiness of cork taint, it's the sort of thing that stops you enjoying the wine. Some of the other descriptors associated with mouse include popcorn, rice, crackers, bread crust, sausage skin and vomit.

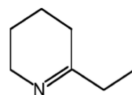
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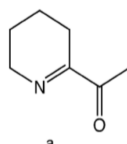
Mousy off-flavor ➤ 3 N-heterocyclic bases (other compounds?)

ETHP



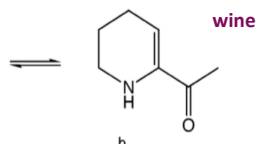
2-éthyl-3,4,5,6-tétrahydropyridine

ATHP



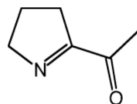
saliva

2-acetyl-3,4,5,6-tétrahydropyridine

 \rightleftharpoons 2-acetyl-1,4,5,6-tétrahydropyridine


wine

APY



2-acétyl-1-pyrroline


Mousy off-flavor is produced by different microorganisms

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Conclusions

- Natural wine could be assimilate to a particular case of EU organic wine (OIV Working Group reflexion) 
- 7% of Faults current on panel classical/traditional wines samples that can be 70% for wines produced without SO₂ protection.
- Risks to have a trivialization of organoleptic defects elevated to quality rank
- The question for winemakers in a near future is :
 - How to protect wine from oxidation process ?
 - How to protect wine from microbiological development ?



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IMPORTANCE OF SO₂ AND ACIDITY OF WINE – NEEDS FOR ALTERNATIVES



2020

OIV COLLECTIVE EXPERTISE

SO₂ AND WINE: A REVIEW

Coordinator
International Organisation of Vine and Wine (OIV)

Authors
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Dr. Angelika Paschke-Kratzin (Germany)
Pr. Pierre-Louis Teissedre (France)
Pr. Patrizia Restani (Italy)
Dr. Nuria Garcia Tejedor (Spain)
Ing. Claudia Quini (Argentina)

The production of wines with reduction of SO₂ concentrations need to be explored and should be managed with recommendations at all steps of the winemaking process – from the grapes to the bottle – without compromising wine quality in terms of organoleptic characteristics and microbiological stability.

This approach should be considered in function of the various wines types specificities and taking into account the OIV Code of good practices that recommends different practices to limit the use of SO₂ in wine making process.

Based on data received from several Member States the mean concentration of total SO₂ observed according to the different types of wine are :

Red < 4g/L sugars:	60-96 mg/L
White/Rosé < 4g/L sugars:	100-132 mg/L
Red/White/Rosé > 4g/L sugars:	80-130 mg/L
Sweet/Special wines:	110-180 mg/L

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Conclusions

→ **Future alternatives :**

Physical or biological and chemical treatments to explore with 2 functionalities:

→ **Inhibit / Kill yeasts and bacteria**

→ **Prevent oxidation of wine** (preservation of aromas and color during storage) to avoid negative sensory consequences.



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Thank you for your attention

