Deliverable

SIXTH FRAMEWORK PROGRAMME

Area 1.2 - Task 1: Organic viticulture and wine processing

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Foreword

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For further information see the project homepage at: www.orwine.org.

Executive summary

This presentation is based on work done in the ORWINE project, a European Research project focused on organic wine processing. Main objective of this project is to formulate proposals for future common regulation on organic wine at European level.

Organic grapes come from vineyards conducted under organic farming methods, as defined also at European level, by the EC Regulation 2092/91. Because wine is excluded of the scope of this regulation (annex 6, concerning processing organic food), there is till now no legal statute for organic wines at European level, but the only allowed definition is “wines coming from organic grapes”.

It results that the sole overall rules to be applied to wines processed from organic grapes are those contained in the EC Regulations 1493/1999 (annexes 4 and 5) and 1622/2000, which define the oenological practises and treatments allowed for wines in Europe. Due to the current CMO wine reform and the influence of third countries at international level (OIV and WTO), the European legal framework for wine production is moving towards in a sense of opening to more flexibility in oenological practises.

Nevertheless, organic vine-growers have developed specific approaches for processing their wines in a way they consider in compliance with organic farming principles. These private initiatives in the producing countries (Austria, Germany, Switzerland, Italy, Greece, France, Spain) have taken the format of standards or charters belonging to producers groups, organic farming associations connected with certifiers, or national platforms. They are more restrictive than the legal requirements for wine, with limitations concerning the use of additives and technical processes at all steps of wine processing, from grapes picking to wine bottling and storage.

A particular place in the organic agriculture movement has to be recognized to the biodynamic organisations, which have also in some countries wine processing standards.

In the consuming European countries, some limitations have also been introduced by organic certification bodies, particularly concerning the SO_2 rate in wine at consumption (UK, ND).

At international level, organic wine processing is included in the IFOAM Basic Standards (norms for organic production and processing) and by the Codex Alimentarius, which are standards for standards.

As in Europe, there are private standards in most producing third countries (USA, Canada, Argentina, Australia). Moreover, the new American federal regulation for organic farming (NOP) includes wine, as do the Japanese Agricultural Standards (JAS).

Background documents /documents used in the study

The analysis of the legislative and regulatory framework for wine processing has included:

- the General regulation for wine (European Wine regulation, concerning the Common Wine Market organization, and the OIV prescriptions, which have an indicative influence, and concern all countries over the wine world)
- the International regulation and guidelines on organic farming, concerning also grapes (as the European regulation EC 2092/91) and wine (IFOAM Basic Standards, *Codex Alimentarius* Guidelines for organically produced food, National Organic Program USDA, JAS)
- National, regional and private standards on organic wine making: in wine European and non European producing countries, as in European consuming countries

Experts from all European producing countries have also been interviewed, in order to understand the real level of influence of each standard in its territory and the problems eventually met by the producers.

Results and discussion

As a result of the analysis on the text, a comparative matrix has been elaborated, gathering oenological practices coded by the standards. The practises and substances listed as allowed or forbidden in each standard/regulation have been clustered in the following areas:

1. Physical practices allowed by all standards

Processing method (allowed by European wine regulation)	Allowed in organic wine standards; restrictions
Aeration or addition of oxygen	Generally allowed. Not mentioned by Biodyvin, Demeter France and Spanish standards
Temperature management	- Heating and cooling allowed General prescriptions for musts and wines
Centrifugation and filtration, with or without inert agent	a. Filtration methods allowed by all standards. b. All inert agents allowed, except perlite for Demeter and cellulose for CCPB (Italy) c. Sterilizing filtration not clearly considered; practically used in order to reduce SO_2 needs (especially on sweet wines)
Air protection using inert gazes (CO_2, N_2, Ar)	d. Allowed by all standards e. Argon not mentioned by the German and Demeter Austria standards

2. Additives allowed by all standards

Function / additive	Allowed	Restrictions
N nutrition of yeasts	N salts,	Nature of N salts
Sulphitation	SO_2 gas	Doses differed according to different standards and wine types
Enrichment	Sugar, Rectified Concentrated Musts (RCM), Concentrated Must (CM)	Organic enrichment preferred Sugar not allowed in Italy, Spain, Greece, South of France etc. (Zone C)
Acidification /	Tartaric acid	Conditions of use, natural origin Not allowed in Zone A and B (Germany, Austria, Alsace etc.)
Deacidification	Potassium carbonate - bicarbonate, Calcium carbonate, potassium tartrate, homogenous preparation of tataric acid and calcium carbonate	Condition of use Not allowed in Zone C II and III
Fermentation	Dry selected yeasts and selected lactic bacteria	Not allowed by Demeter- Austria. Non GM origin
Clarification	Isinglass, casein, ovalbumin, bentonite, silicon dioxide, enzyms	Pectinolytic enzymes not clearly specified in all cases
	Citric acid, L-ascorbic acid	Non GM origin
Treatment of white wines	Oenological charcoal	

3. Additives and practices generally forbidden

- Genetically modified micro-organisms (yeasts, bacteria) or inputs derived from or by GMO inputs (like enzymes, citric acid, ascorbic acid, if allowed): totally excluded as in the general organic regulation;
- PVPP (E1202): to reduce tannin content in the wine and correct some colour defaults;
- Lysozyme E1105 (to control lactic bacteria activity and reduce SO_2 needs);
- Dimethyl dicarbonate DMDC (recently allowed by the European wine regulation in order to help microbial stabilization);
- Ionization and use of ion exchange materials, as in the general organic food regulation;
- Sorbic acid and potassium sorbate except for few specific Spanish wines.

4. Main practices and additives for which there are differences between the standards

- Sulphitation: use of K metabisulphite and K bisulphite;
- Correction of N deficiency in the musts: principle of correction and type of additives, with different positions on N salts use (Diammonium phosphate, Ammonium sulphate, Ammonium sulphite, Ammonium bisulphite) or other agents stimulating the yeasts growth (Thiamin and yeast cell walls);
- Deacidification: nature of substances to be used for;

- Clarification: use of gelatin, betaglucanases enzymes, tannins and potassium caseinates;
- Reduction of taste defaults[1] : use of Copper sulphate
- Alternative practices to Sulphitation for unstable sweet wines: physical treatments like flash pasteurization and sterilizing filtration, membrane – micro- filtration.

5. Preservation of wines from organic grapes, use of SO_2

As this point is deeply discussed between organic and conventional wine producers, the report makes a great focus on SO_2 limits.

Sulphites are naturally produced by the yeasts during the wine processing. The addition of SO_2 is traditionally considered as an efficient method to protect and preserve the wine at different stages of its elaboration. However sulphites use in food processing is restricted because of their potential negative effects on health, both of processors and of some categories of consumers.

Sulphitation is allowed by all the standards for organic wine processing, but with restrictions compared to the wine regulation.

The European Wine Regulation fixes total SO_2 maximum doses in the end product; they vary according to wine types, and notably in relation to the presence of residual sugars, going from 160mg/l for red wines to 400mg/l for sweet wines from Botrytised grapes, such as Sauternes, Beerenauslese, Ausbruch. Additional quantities, up to 40 mg/l of SO_2, are allowed "*when approved for all wines except those with final rates upper than 300 mg/l of SO_2 end*".

The table below shows that the allowed doses of total SO_2 used during the wine processing are, in the case of all private standards for organic wines, lower than their respective European wine regulation. These reductions vary subsequently between 25% (National Spanish standards) to more than 60% (AIAB standards) for red, white and rosé wines.

The differences are essentially explained by the 2 parameters of the type of wine and the climatic conditions in its production area. This last aspect concerns both:

- the well-known relationships between SO_2 addition needs and wine parameters as,
  - acidity of the white wines (higher in the North, protects the wine, less need of SO_2 but without malolactic fermentation higher need of SO_2);
  - tannins content of the red wines (higher in the South, protects the wine : less need of SO_2);
  - sugar content (create unstable conditions, wine needs to be protected by SO_2);

- and climatic constraints which have an influence on the sanitary quality of the grapes.

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[1] *In order to reduce taste defaults, copper Citrate could b interesting. It is a very new additive, which is actual only allowed in Austria for trials, but it is more effective than copper-sulphate and the amount of copper is very low more than 50% of copper sulphate.*

Tab. Maximum levels of sulphur dioxide for organic wines in Europe in comparison with EU regulation 1493/99 (in mg/l of SO_2)

Wine types	CEE viti-vini (total rates)	FRANCE FNIVAB (total rates)	SPAIN National Standards 23/10/2006 (total rates)	GRECE DIO (total rates)	ITALY A.I.A.B. (total rates)	GERMANY ECOVIN (total rates)	SWITZERLAND BIO SUISSE (total and free)
Dry red wines < 5g/l sugar	**Maximum: 160 mg/l (+40)**	Max :100 mg/l	Max: 120 mg/l (+30)	Max : 60 mg/l	Max : 60 mg/l	R: 100 mg/l Max:160 mg/l	Max:120 mg/l Max free:30 ml/l
Dry white / reddish wines < 5g/l sugar	**Maximum: 210 mg/l (+40)**	Max :120 mg/l	Max: 120 mg/l (+30)	Max : 80 mg/l	Max : 80 mg/l	R. 100 mg/l Max :210 mg/l	Max :120 mg/l Max free:30 ml/l.
Dry sparkling wines	**Maximum: 150 to 235 mg/l (+40)**	Max :100 mg/l	Maxi : 120 mg/l	R. <20 mg/l Max: 60 mg/l	R.<20 mg/l Max: 60 mg/l	Max :150 mg/l	
Semi-dry sparkling wines >15g/l sugar	**Maximum: 185 to 235 mg/l (+40)**	Max :150 mg/l		R. <20 mg/l Max: 60 mg/l	R.<20 mg/l Max: 60 mg/l		
Sweet red wines >5g /l sugar	**Maximum: 210 mg/l (+40)**	Max :150 mg/l	Max: 160 mg/l		R.<20 mg/l Max: 120 mg/l	R. <200 mg/l Maximum 210 mg/l	Max :120 mg/l Max free:40 ml/l
Sweet white/ reddish wines >5g /l sugar	**Maximum: 260 mg/l (+40)**	Max :210 mg/l	Max: 160 mg/l		R.<20 mg/l Max: 120 mg/l	R. <200 mg/l Maxi :260 mg/l	Max:120 mg/l Maximum free: 40 ml/l
Sweet wines	**With Botrytis: 400 mg/l; Without: 300 to 400 mg/l**	With Botrytis: 360 mg/l; Without: 250 mg/l		R.<20 mg/l Max: 120 mg/l	R.<20 mg/l Max: 120 mg/l	With Botrytis: 400 mg/l; Without: 300	Max: 120 mg/l Max free: 40 ml/l
VDN / Vins de Liqueur	**200 mg/l**	100 mg/l	120 mg/l		R. <20 mg/l Max: 120 mg/l		

R. : recommended

In third countries, allowed SO_2 levels take also into account the types of wines and climatic conditions, except in the case of the American NOP :an absolute limitation of 100 mg/l of total SO_2 is given for all types of wines.

The most relevant indicator is the total SO_2 level, because of the reversibility of free forms. Nevertheless, some standards give limits in free SO_2

Conclusions

Considering the main objective of the ORWINE project, which is to establish a basis for a future European regulation concerning organic wines, issues related to the relevance of current standards with regard to organic processing food principles and evolution of the general framework of the wine production at international level have been examined. Several points, concerning all the process of wine production, have been considered. The three main areas are:

- SO_2 limits, both on quantitative and qualitative aspects;
- Regulation of fermentations, with use of N-salts nutrients, in a context of deep climatic changes which affect the wine producing areas;

- Enrichment: because of a coming change in general regulation concerning the exclusion of sugar, what are the possibilities in the future for enrichment of organic wines? Will concentrated rectified musts be acceptable and to which conditions?

Content

1 Introduction : Background and overview about organic wine definitions

The scope of the document is to describe the regulatory framework applied to EU organic wine-making. Legal public and private standards for wine processing are taken in consideration. Standards applied out of Europe are also considered because the countries they are applied on export markets for EU wines and vice-versa Europe is an import market for non-EU wines.

The report summarizes available knowledge on organic wine standards, and considers a general review of bibliography (deliverable 2.1).

1.1 Problem description

Definition of wine: Wine is defined by the European regulation (EC Reg 1493/1999, annex 1) as “the product obtained exclusively from the total or partial alcoholic fermentation of fresh grapes, whether or not crushed, or of grape must”.

EU definition of organic grapes but no legal EU definition of organic wines: Organic grapes come from vineyards conducted under organic farming methods, as defined also at European level, by the EC Regulation 2092/91.

Because wine of grapes (but not of fruits) is excluded of the scope of this regulation (annex 6, concerning processing organic food, does not apply on wine), there is till now no legal definition for organic grape wines at European level, but only for wines coming from organic grapes.

It results that the sole overall rules to be applied to wines processed from organic grapes are those contained in the EC Regulations 1493/1999 (annexes 4 and 5) and 1622/2000, which define the oenological practises and treatments allowed for wines in Europe. Due to the current CMO wine reform and the influence of third countries at international level (OIV and WTO), the European legal framework for wine production is moving towards in a sense of opening to more flexibility in oenological practises.

Nevertheless, organic vine-growers have developed specific approaches for processing their wines in a way they consider in compliance with organic farming principles. These private initiatives in the producing countries have taken the format of standards or charters and appear more restrictive than the legal requirements for wine, with limitations concerning the use of additives and technical processes at all steps of wine processing, from grapes picking to wine bottling and storage. They belong to producers groups (Germany, France, Austria), organic farming associations connected with certifiers (Austria, Germany, Greece, Italy, Switzerland), certifiers (Spain) or representative national platforms for organic wine sector (Spain). In this last case, the implication of officials (regional authorities and national Ministry of Agriculture) gives quite a public status to the standards, but they are not mandatory for all organic wine-makers

In the consuming European countries, some limitations have also been introduced, for example concerning the SO_2 rate in wine at consumption (UK, NL).

At international level, organic wine processing is included but only very generally defined by the IFOAM Basic Standards (norms for organic production and processing) and by the Codex Alimentarius Guidelines, which are standards for standards. As in Europe, there are private standards in most producing countries (USA, Canada, Argentina, and Australia). Moreover, the new American federal regulation for organic farming (NOP) includes wine, as do the Japanese Agricultural Standards (JAS).

1.2 Scope of the report

To look at and compare the different regulations on organic wine-making , to bring out the common points and the differences and to pin-point the hot spots that need to be dealt with while preparing the regulatory proposal

1.3 Structure of report

This document is separated in three parts:

- The first gives an overview of the existing regulations and a brief account of the methodology used.
- The second part is a comparison of the major private standards applied to organic wine production and both the converging points and differences are detailed and analyzed.
- The last part proposes discussion points brought out in the analysis of the second part which should be used to make well balanced propositions for the writing of organic wine production regulations.

2 Methodology

Regulatory requirements and restrictions (on wine, food and organic processing) as well as current organic food / wine standards have been analyzed, on the base of following listed documents as well as the literature survey (Deliverable 2.1) included in the project.

2.1 General regulation for Wine

The following texts have been considered:

- The European Wine regulation, concerning the Common Wine Market organization, defines oenological practices to be applied at European level:
  - EC 1493/1999 Council
  - EC 1622/2000 COM: application, for oenological practices
  - EC 753/2002 COM: application
  - EC 1037/2001 and following texts concerning market exchanges between Europe and third countries
  - EC 2165/2005 Council (new practices)
  - OIV prescriptions, which have an indicative influence, and concern all member countries. They include the Codex Oenologique and the OIV Index, which were given an international recognized base for the normalization and comparison of the other regulatory and standards documents.

2.2 International standards, regulations and Guidelines for Organic Farming and Food

The most relevant standards, regulations and guidelines are:

- European regulation EC 2092/91 (excluding grape wines)
- IFOAM Basic Standards 2005 (overall umbrella standard relevant for private standards)
- *Codex Alimentarius* Guidelines for organically produced food 2004 (Guidance for governments to set their own regulations for organic food and farming)

In addition, the specific European texts concerning the labeling of foodstuffs, with regard to their composition, have been considered because of their application to wines:

- Directive 2000/13/EC of the European Parliament and of the Council on the approximation of the laws of the member states relating to the labeling, presentation and advertising of foodstuffs
- Directive 2003/89/EC of the European Parliament and of the Council amending Directive 2000/13/EC as regards indication of the ingredients present in foodstuffs.

2.3 Standards and rules for wine processing from organic grapes

A differentiation was made between mainly wine producing countries and mainly wine consuming countries

Table 2.1: Overview about standards in European producing countries

Country	Standards	Type of standards
France	FNIVAB (Fédération Nationale des Vins de l'Agriculture Biologique) Nature & Progrès BIODYVIN DEMETER "Return to Terroir" Charter of Quality (guideline)	Wine Producers O Producers O Wine producers BD Producers BD Wine producers BD
Germany	ECOVIN 2005 BIOLAND 2000 NATURLAND 2002	Wine Producers O Producers O Producers O
Austria	BIOAUSTRIA 2005 DEMETER 2006	Umbrella org. O Producers BD
Greece	DIO 2002	Certifier O
Italy	AIAB 2000 CCPB 2002	Umbrella org./ certifier O
Spain	CCPEN Navarra Normas de vitivinciultura ecológica (Regional standards) CCPAE Cataluña Cuaderno de normas de elaboración ecológica (Regional standards)l Sohiscert SA. Normas de bodega ecológica (private certifier) CRAE Normas para elaborar vino de uva ecológica (National) «Propuesta de normas para la elaboracion de vinos procedentes de la agriculture ecologica» version 6 -Feb2006 [NEW]*	Producers / certifiers / government O
Switzerland	BIO SUISSE	Umbrella org./ Certifier O

O: organic
BD: Biodynamic
** as a result of an integrative process done at national Spanish level, includes prior regional standards used by the public certifiers (CCCPAE Cataluña standards and CPAEN Navarra standards 2001).*

Table 2.2: Overview about private standards in countries where EU organic wine is imported or that produce organic wine exported to EU

Country	Reference	Type of standard
UK	Soil Association prescriptions for wines	Umbrella org./ Certifier O
NL	SKAL	Certifier
Japan	JAS Japanese Agricultural Standards, rev 2006	Government
United States of America	National Organic Program (NOP, public) OGWA (California, private)	Government Producers O
Canada	COABC 2002 (private)	Producers O
Argentina	Cuaderno de normas de produccion organica (LETIS S.A, certifier, private)	Certifier O
Australia	NASAA (private)	Producers O

In order to allow a differentiated comparison, the author's choice was to build the matrix of comparison on the same structure adopted by the European wine regulation (Reg. 1493/1999, annexes 4 and 5):

- separation of processes and oenological practices applicable to musts (in fermentation) and to wines

- physical methods considered as well as use of external inputs
- list of ingredients, additives and processing aids referred to the following operations during wine processing

3 Analysis

3.1 Structure of the standards and general considerations

The private standards are focused on wine processing.

Some of them contain also specific detailed recommendations on viniculture (e.g. ECOVIN and NATURLAND in Germany, Bio-dynamists groups). Others refer to another private general document concerning organic farming, or to the legal rules in this area (e.g. FNIVAB, AIAB, BIOSUISSE).

The standards are more or less detailed. The Bio-dynamic ones (DEMETER and BIODYVIN) are more global.

The structure itself of the standards can be described as following two different ways:

- Some standards (e.g. AIAB, Italy) separate “advised” methods (best preferred), “allowed” methods and “forbidden” ones. This interesting approach can be qualified as a mix between standards and code of good practices. A similar progressive structured process is described in the Charters of Quality adopted by the Bio-dynamic wine-growers groups BIODYVIN (standards for certification) and “Return to Terroir” (which are only guidelines);
- Other standards (e.g. FNIVAB, France; ECOVIN, Germany) give only allowed and forbidden methods. They have been written first in order to support an external inspection and certification process and give only minimal limitations.

3.2 Wine processing description basis

According to the OIV Index on oenological practices and treatments (see annex), the following stages have been considered in wine processing and are presenting in the coming paragraphs. This choice leads to decide on a classification even for oenological products which may have different effects.

3.2.1 Allowed methods on grapes

- Physical treatments of the grapes;
- Maceration of the grapes, including under CO_2 or after heating;
- Enrichment, by using several sweeteners from organic origin;
- Sulphitation;
- Using of pectinolytic enzymes and enzymatic preparation of Beta-glucanase.

This last practise, concerning exclusively enzymes from non GMO origin (as fixed also by the IFOAM Basic standards), is allowed by several standards with the exception of Nature & Progrès, Demeter (Austria and France), and other Bio-dynamic groups.

3.2.2 Allowed methods on musts and wines

- Preparation of the musts for either preservation or alcoholic fermentation;
- preservation of the musts;
- alcoholic fermentation;
- adjustment of acidity of wine (including malolactic fermentation when desired);
- clarification of wine;
- physico-chemical stabilization of wine;
- protection and preservation of wine;
- preparation for packaging and packaging of wine.

Following the traditions of each producing area, specific processes for special wines have also to be taken in consideration (e.g. sparkling wines, liqueur wines, Greek retsina wines ….).

3.3 Comparison between organic wines standards and European wines regulation

The European wine regulation (EC Reg. 1493/1999 and other texts referring to the wine CMO) reflects the increasing science of oenology and allows a large number of additives and processes, not only to stimulate the fermentations, but also to manage the wine processing, obtain wines with specific characters, or correct defaults eventually due to a bad quality of grapes.

By comparison, the standards for organic wine processing show a more “close to nature” and cautious approach. This is documented, e.g. by excluding the GMO and the issued of GMO inputs, and limiting the number and quantity of allowed additives.

A basic idea of organic wines is that the quality of wine is directly connected to the quality of grapes. In other words, wine comes first from grapes, which have to be well produced by organic farming methods.

3.4 Comparison of different organic wines standards

3.4.1 Common prescriptions between standards for organic wines processing

The main common prescriptions concern:

- the origin of grapes, which have to be certified organic (or biodynamic for the relevant standards of DEMETER and BIODYVIN), as required from EU regulation 2092/91 for any processed product;

- recommendations concerning the conditions of harvesting (well matured grapes, careful picking), cleaning of the cellar and materiel, the type of materiel to be used in the cellar;
- the total exclusion of genetically modified micro-organisms (yeasts, bacteria) or inputs derived from or by GMO inputs as in the general organic regulation (like enzymes, citric acid, ascorbic acid, if allowed);
- preference, at each stage of wine processing, for physical methods, which respect integrity of the row materiel, and limited use of additives when necessary;
- the use of allowed additives and processing aids, as in positive lists followed by some quantitative limitations for some of them (such as SO_2).

3.4.2 Harvesting of the grapes

Caring of the grapes:

The grapes must be harvested at the right stage of ripening, according to the variety, and handled carefully, using clean recipients and tools. It can be concluded that good manufacturing practises are explicitly required.

Type of harvesting:

Hand harvesting is recommended by some standards (AIAB, CCPB in Italy; DIO in Greece), but mechanical harvesting is allowed by quite all the standards. This question of the type of harvesting is discussed in some producer groups like Demeter-France (hand harvesting is compulsory for wines to be certified under Demeter-France biodynamic wine processing standards). The specification of hand harvesting seems to be more the fact of some organic wine-growers groups, who promote a “hand-crafted” approach of the organic wines (e.g. in France the Association of Natural Wines).

3.4.3 Cellar hygienic standards

As for the quality of harvest, whose dependence on agricultural practices at the vineyard level is underlined, all the standards recommend a preventive approach at the cellar level, by respecting a strict hygiene.

Physical methods e.g. hot water and steam use are recommended.

A more or less short list of allowed cleansing agents and disinfectants is given by quite all the standards. This part has still not been written for the FNIVAB standards. AIAB and CCPB don’t mention cleansing agents in the wine standards but in the general processing facilities one.

Chlorine agents are excluded, as ionization (general prescription for organic production).

Table 3.1: Cleaning agents in organic wine processing standards

Cleaning agents	Standards allowing it	Standards which don't mention it	IFOAM Basic Standards
Peracetic acid	German, Spain, Biodyvin		Yes
Citric acid	German, Spain	Biodyvin	Yes
Tartaric acid	German, Biodyvin		No
H_2O_2	German, Spain, Biodyvin		Yes
Ozone	German, Biodyvin		Yes
Caustic soda	German, Spain, Biodyvin		Yes
Soft soap	German, Spain	Biodyvin	Yes
Sulphurous acid	German*	Biodyvin	No
Alcohol	German, Spain	Biodyvin	Yes
Potassium lye, surfactants	German	Biodyvin	Yes
Metabisulphite	Spain	Biodyvin	No
IV ammonium	Spain	Biodyvin	No

** only for barrel-conservation*

3.4.4 Physical methods in organic wine processing

Physical methods are used in processing of musts and wines. The listed methods are those mentioned by the European wine regulation. The positions of the private standards are more or less detailed for each.

Table 3.2: Processing methods in organic wine standards

Processing method (allowed by European wine regulation)	Allowed or not allowed in organic wine standards
Aeration or the addition of oxygen	• Not mentioned by Biodyvin, Demeter France and the Spanish standards
Heat treatment	• Heating and cooling allowed. • Precise limitation of temperature given by German standards, BioSuisse. • General prescriptions for musts and wines. • Flash-pasteurization not considered clearly by the standards; practically used in order to reduce SO_2 needs.
Centrifugation and filtration, with or without inert agent	• Methods allowed by all standards. • Spanish standards mention only filtration, and Biodyvin recommends avoiding filtration on wines. • All inert agents allowed, except perlite for Demeter and cellulose for CCPB (Italy). • Sterilizing filtration not clearly considered; practically used in order to reduce SO_2 needs (especially on sweet wines)
Air protection using inert gazes (CO_2, N_2, Ar)	• Allowed everywhere, except for the DIO standards. • Argon not mentioned by the German and Demeter Austria standards.

Physical and thermal methods are generally allowed in processing of musts and wines, in private standards, but in many cases there is not an exhaustive list of approved methods

3.4.5 Comparisons of standards : synthesis

The following table gives a synthesis of the status of oenological additives and practices in the different standards. Only those allowed at least, in one standard are mentioned in the table.

Table 3.3 : Main allowed oenological practices and additives

Note to the reader: "all standards" in the division "allowed" means "the majority" (that is to say all except those listed in the division "not allowed")

OENOLOGICAL PRATICES AND ADDITIVES	ALLOWED	NOT MENTIONED	NOT ALLOWED
1. ON MUSTS			
Aeration	All standards	DemeterF, Spain, IFOAM	
Heat treatment	All standards	Bio Suisse, IFOAM	
Filtration & centrifugation	All standards		
Inert gazes (CO_2, N_2, Ar)	All standards		
Selected Yeasts (non GM origin)	All standards		Demeter
Yeasts growth (M)			
- diammonium phosphate	Ecovin, AIAB, CCPB*, DIO, IFOAM*	Bioland, N & P, BioSuisse, "nutritive salts" for Naturland and BioAustria	Demeter, FNIVAB
- ammonium sulphate	Spain*, AIAB, CCPB*, FNIVAB*, IFOAM*	Germany, Bio Suisse, BioAustria	Demeter
- ammonium sulphite		All other	DemeterF, FNIVAB
- diammonium sulphite	Bioland	All other	DemeterF, FNIVAB
Thiamin (vitamine B1)	Germany, AIAB, DIO	Spain, BioSuisse, IFOAM, DemeterA, BioAustria	France, CCPB
Yeast cell wall	Germany, Italy	Austria, Spain, DIO, BioSuisse, IFOAM	France
Sulphitation			
- SO_2 gas	All standards*		
- K bisulphite	Germany, DemeterA, DIO	Italy, Bio Suisse, Spain, IFOAM, BioAustria	France
-K metabisulphite	Germany, Italy, Austria IFOAM,	Spain, Dio	France
Clarification			
- edible gelatine	Germany, DIO, Italy, Spain, BioAustria, BioSuisse, IFOAM		Demeter, FNIVAB, N&P
- isinglass	All standards	DIO	Demeter
- casein	All standards	DIO	Demeter
- potassium caseinate	Germany, Italy, DIO	Spain, BioSuisse, N&P, IFOAM, BioAustria	Demeter, FNIVAB
- organic ovalbumin	All standards		
- bentonite	All standards		IFOAM
- silicon dioxide	Germany, Italy, FNIVAB, IFOAM, DIO, BioSuisse, BioAustria	Spain, DemeterA, N&P	DemeterF
- tannin	Germany, DIO, N&P FNIVAB, IFOAM	Italy, Bio Suisse, Austria, Spain	DemeterF
- pectinolytic enzyms	All standards	Bio Suisse, N&P	Demeter
- betaglucanases	Germany, Italy, FNIVAB, DIO, IFOAM	Bio Suisse, Spain, BioAustria	Demeter, N&P
Acidification **:**			
tartaric acid	All standards	Germany, DemeterA	
De-acidification			
- neutral potassium tartrate	Germany, Italy, DIO, Austria, IFOAM	Spain, Bio Suisse, N&P	FNIVAB, DemeterF
- potassium bicarbonate	Germany, Italy, Austria, FNIVAB, N&P	DIO, Spain, Bio Suisse, IFOAM	DemeterF
- calcium carbonate	Germany, Italy, IFOAM, DIO,	DemeterA, Spain, BIO Suisse	FNIVAB, DemeterF
- tartaric acid + calcium carbonate	Germany	Austria, N&P, DIO, Spain, Bio Suisse, IFOAM	FNIVAB, DemeterF
Selected Lactic bacteria	All standards		Demeter
Enrichment :			
- Organic sugar	All standards		Italy
- Organic CM	All standards	Bioland, DemeterA,	DemeterF

- Organic CRM	All Standards	Naturland, Ecovin, IFOAM	Demeter
- reverse osmosis	FNIVAB, N&P, Italy, DIO, BioAustria	Bioland, Naturland, Bio Suisse, Spain, IFOAM	Ecovin, Demeter
2. ON WINES			
On lees breeding	All standards		DemeterA
Aeration	All standards		
Filtration & centrifugation	All standards		DemeterF (perlite)
Sulphitation			
- SO_2 gas	All standards*		
- K bisulphite	Germany, DemeterA, DIO	Italy, BioSuisse, Spain, BioAustria, IFOAM	France
- K metabisulphite	Germany, Italy, BioSuisse, IFOAM Austria,	Spain, Dio	France
Acidification **:**			
Tartaric acid	All standards	DemeterA, Ecovin, Bioland	Naturland
De acidification			
- neutral potassium tartrate	Germany, Italy, DIO, IFOAM, BioAustria	Spain, BioSuisse, N&P DemeterA,	FNIVAB, DemeterF
- potassium bicarbonate	Germany, Italy, Austria, FNIVAB, N&P	DIO, Spain, Bio Suisse, IFOAM	DemeterF
- calcium carbonate	Germany, N&P, Italy, IFOAM, DIO, BioAustria	DemeterA, Spain, BIO Suisse	FNIVAB, DemeterF
- tartaric acid + calcium carbonate	Germany, BioAustria	DemeterA, N&P, DIO, Spain, Bio Suisse, IFOAM	FNIVAB, DemeterF
Selected Lactic bacteria	All standards	N&P,	FNIVAB, Demeter
Clarification			
- edible gelatine	All standards	DemeterA	France
- isinglass	All standards	DemeterA	DemeterF, N&P
- casein	Naturland, Ecovin, FNIVAB, Italy, Bio-Suisse, Spain, BioAustria	DIO, Bioland, DemeterA	Demeter
- potassium caseinates	Germany, Italy, DIO	Spain, BioSuisse, N&P, IFOAM, BioAustria	Demeter, FNIVAB
- organic ovalbumin	All standards		
- bentonite	All standards	DIO, DemeterA	IFOAM
- silicon dioxide	Germany, Italy, FNIVAB, BioAustria, DIO, BioSuisse, IFOAM	Spain, DemeterA, N&P	DemeterF
- betaglucanases	Naturland, Ecovin, Italy, BioAustria, DIO, IFOAM	Bio Suisse, Spain	Demeter, France
Stabilisation :			
L-ascorbic acid	All standards		Demeter
Citric acid	All standards	BioSuisse, N&P	Demeter
Tannin	Germany, FNIVAB, Spain, IFOAM	Italy, BioSuisse, Austria, DIO	DemeterF, N&P
Arabic gum	FNIVAB, Italy, Spain, DIO	Germany, Austria, BioSuisse	DemeterF, N&P, IFOAM
Metatartric acid	AIAB, BioSuisse	All other	Demeter, FNIVAB, DIO
Oenological charcoal	All standard	IFOAM, Spain, DemeterA	N&P
Copper sulphate	Germany, AIAB, DIO, BioAustria,	Spain, N&P, Bio Suisse, DemeterA, IFOAM	FNIVAB, DemeterF CCPB

DemeterA =: Demeter Austria; DemeterF = Demeter France
Germany: all standards of this country
** : allowed with restrictions*
*** new at EU regulation 2165/2005*

3.4.6 Main additives for musts and wine preservation

Beside sulphur (see below) a number of other additives are used for protection and preservation of wine (following OIV classification): but only the use of **natural ascorbic acid** E300 (also used for must preservation) is permitted by all standards except Nature & Progrès and DEMETER.

L ascorbic acid (if non GM origin) allowed

Non-allowed additives,

Some additives, which are allowed by the wine regulation as alternatives to SO_2 for the same purpose of preservation or for protection of wine (same chapter in the OIV classification), are forbidden by the private standards for organic wine processing followed in European producing countries:

- **Polyvinylpolypyrrolidone** (PVPP) E1202 (to reduce tannin content in the wine and correct some colour defaults): forbidden because of its synthetic origin;
- **Lysozyme** E1105 (to control lactic bacteria activity and reduce SO_2 needs): even if there are discussions on its interest and risks (potential allergenic), it is not yet permitted by any standards for organic wines;
- **Dimethyl dicarbonate** DMDC (recently allowed by the European wine regulation in order to help microbial stabilization): forbidden
- **Sorbic acid** E200 and **potassium sorbate** E202 (used to avoid undesirable micro-organisms' development): These are forbidden by all the private European standards: their use was recently allowed in the new Spanish organic wine standards, only for liqueur wines and at limited rates (under 150 mg/l).

PVPP, Lysozyme, DMDC, sorbic acid and potassium sorbate, not allowed in all standards

3.4.7 The case of Sulphitation

The analysis has shown that sulphitation, to be used at different stages of the wine processing (on the grapes, for the preparation of musts to be fermented and for preservation of wines), is allowed by all the standards for organic wine processing.

The European Wine Regulation on wines fixes SO_2 maximum doses in the end product; they vary according to wine types, and notably in relation to the presence of residual sugars, going from 160mg/l for red wines to 400mg/l for sweet wines from botrytised grapes (Sauternes, Beerenauslese, Ausbruch…).

According to the Directive 2003/89/EC of the European Parliament and of the Council of 10 November 2003, amending the Directive 2000/13/EC as regards indication of the ingredients present in foodstuffs, "*it is necessary to provide that additives, processing*

aids and other substances with allergenic effect covered by Article 6(4)(a)[2] of the Directive 2000/13/EC are subject to labelling rules, to give appropriate information to consumers suffering from food allergy". Alcoholic beverages included wines, are concerned by this Directive: "*in the case of alcoholic beverages*, *it should be mandatory to include in the labelling all ingredients with allergenic effect present in the beverage concerned*". "*Sulphur dioxide and sulphites at concentration of more than 10mg/kg or 10mg/l expressed as SO_2",* are concerned by this Directive.

3.4.7.1 Comparison of use of sulphites in organic wine standards

Table 3.3: Maximum levels of sulphur dioxide for organic wines in comparison with EU Regulation 1493/99 (in mg/l of SO_2)

Wine types	CEE viti-vini (total rates)	FRANCE FNIVAB (total rates)	SPAIN New National Standards 23/10/06 (total rates)	GRECE DIO (total rates)	ITALY A.I.A.B. (total rates)	GERMANY ECOVIN (total rates)	SWITZERLAND BIO SUISSE (total and free)
Dry red wines < 5g/l sugar	**Maximum: 160 mg/l (+40)**	Max :100 mg/l	Max: 120 mg/l (+30)	Max : 60 mg/l	Max : 60 mg/l	R: 100 mg/l Max:160 mg/l	Max:120 mg/l Max free:30 ml/l
Dry white / reddish wines < 5g/l sugar	**Maximum: 210 mg/l (+40)**	Max :120 mg/l	Max: 120 mg/l (+30)	Max : 80 mg/l	Max : 80 mg/l	R. 100 mg/l Max :210 mg/l	Max :120 mg/l Max free:30 ml/l.
Dry sparkling wines	**Maximum: 150 to 235 mg/l (+40)**	Max :100 mg/l	Maxi : 120 mg/l	R. <20 mg/l Max: 60 mg/l	R.<20 mg/l Max: 60 mg/l	Max :150 mg/l	
Semi-dry sparkling wines >15g/l sugar	**Maximum: 185 to 235 mg/l (+40)**	Max :150 mg/l		R. <20 mg/l Max: 60 mg/l	R.<20 mg/l Max: 60 mg/l		
Sweet red wines >5g /l sugar	**Maximum: 210 mg/l (+40)**	Max :150 mg/l	Max: 160 mg/l		R.<20 mg/l Max: 120 mg/l	R. <200 mg/l Maximum 210 mg/l	Max :120 mg/l Max free:40 ml/l
Sweet white/ reddish wines >5g /l sugar	**Maximum: 260 mg/l (+40)**	Max :210 mg/l	Max: 160 mg/l		R.<20 mg/l Max: 120 mg/l	R. <200 mg/l Maxi :260 mg/l	Max:120 mg/l Maximum free: 40 ml/l
Sweet wines	**With Botrytis: 400 mg/l; Without: 300 to 400 mg/l**	With Botrytis: 360 mg/l; Without: 250 mg/l		R.<20 mg/l Max: 120 mg/l	R.<20 mg/l Max: 120 mg/l	With Botrytis: 400 mg/l; Without: 300	Max: 120 mg/l Max free: 40 ml/l
VDN / Vins de Liqueur	**200 mg/l**	100 mg/l	120 mg/l		R. <20 mg/l Max: 120 mg/l		

R. : recommended

The table shows that the allowed doses of total SO_2 used during the wine processing are, in the case of all private standards for organic wines, lower than their respective European wine regulation. This represents more than two times less in some Southern producing countries. For example in the organic standards, SO_2 rates are included between 60 and 120mg/l for red wines (160mg/l in UE wine regulation) or between 80 and 120mg/l for white and red wines (210 in UE wine regulation). These reductions vary subsequently between 25% (National Spanish standards) to more than 60% (AIAB standards) for red, white and rosé wines.

[2] *"Ingredient shall mean any substance, including additives used in the manufacture or preparation of food stuff and still present in the finished product even if in altered form."*

In Germany, the three standards (Bioland, ECOVIN and Naturland) allow at least the same SO_2 levels as the European wine regulation, but recommend lower rates.

Some standards don't give any recommendations or limitations of sulphites levels, it is the case for Demeter (Austria and France), and also for BioAustria.

3.4.7.2. Nature of SO2 permitted additives

The nature of these additives, when precised, could be different according to the standards:

- limited to **pure SO_2** under gas or liquid formula (E220) in France and Spain;
- SO_2 and **K metabisulphite** (E224) in Italy, Switzerland, BioAustria and by the IFOAM - Basic Standards;
- SO_2 and **K bisulphite** (E228) in Greece by DIO;
- all the three sorts of SO_2 : in Germany, Austria.

We notice that the NOP regulation (USA) allows only pure SO_2 (E220).

Use of pure SO_2, dissolved in water or straight gas has been chosen in France and Greece. In Spain, the gas forms only have been approved.

3.4.7.3. Justifications for the different permitted SO_2 levels

The permitted rates of SO_2 used during wine processing depends essentially on the geographical situation and the type of wine: less important in the Southern than in Northern producing countries, more for white wines, especially for those with high sugar rates.

Standards like AIAB, Bioland, CCPB, DIO, give allowed and recommended rates (as much six time lower than allowed rates in AIAB standards for example). Others like FNIVAB, BioSuisse, Demeter, and of course consuming countries standards (SKAL, Soil association), don't separate these two categories.

The most restrictive are Biodynamics, N & P, AIAB and CCPB (Italy), DIO (Greece) standards, and cold consuming, or with only a marginal local production, countries (UK and NL, through the certifiers Soil Association and SKAL). The most permissive are Spain standards. FNIVAB, Bioland (only for recommended rates) and Bio Suisse are in the middle.

The amounts of SO_2 are generally lower in more tannic red wines and in more acidic dry white wines. They are higher in wines with residual sugar as the inhibitory action of SO_2 on yeast activity can be crucial to prevent refermentation. But even in sweet wines low acidity and the presence of botrytis can increase the quantities of SO_2 needed to ensure microbiological stability. Years with warm wet weather giving low acidity and botrytised grapes (sour rot, volatile acid) need greater SO_2 protection as do the voluntarily botrytised sweet wines.

Some standards accompany the lower SO_2 dose recommendations with recommendations on harvested grape quality.

3.4.7.4. Discussion

SO_2 and human health

Added SO_2 will behave quite differently in different wine types.

Once added to must or wine, SO_2 will take several chemical forms divided into 2 basic categories: **free** SO_2 and **combined SO_2**. The free SO_2 is relatively active as it has an anti-oxidant and antiseptic activity; the combined SO_2 is much less reactive and has little or no impact on yeast. The main negative impact of SO_2 use is his toxicity for the users during wine processing, especially when using SO_2 gas if the protection prescriptions are not enough respected:

- preparation of SO_2 solution in a ventilated area,
- use of protections (masks and gloves).

The wine consumers can be disturbed if too high SO_2 levels on the wines, and depending on their own sensitivity, because of irritant properties of SO_2, which lead to asthmatic reactions. In most cases the combined SO_2 does not produce such reactions.

The ratio of free SO_2 to combined SO_2 is very variable from one wine type to another; in wines made with botrytised grapes it can be around 1 : 10; in many dry white wines it is 1 : 3.

The efficiency of molecular SO_2, which is the active part of the free SO_2, depends on the must/wine pH value. At low pH levels (high acidity), the free SO_2 is much more reactive. So, in Northern wines or in wines made from acidic grape varieties, the quantities of added sulphur used are generally much less than in warmer climates. Nevertheless, the harvesting period and conditions have also a great influence on the wine acidity level, with consequences on the quantity of required sulphur additions.

Forms of allowed SO_2 additives used for preparation of musts and preservation of wines

This restrictive choice of using only the pure forms which liberate rapidly into the atmosphere SO_2 poses several problems particularly in bigger wineries when used on grapes before pressing:

- The liquid form which nominally is at 6% liberates its SO_2 so easily that usually the real rate is lower: 5,3% by the time it leaves the producer and 4,3% or less by the time it gets to the user. This fact makes the correct dosage difficult and can encourage putting higher doses to overcompensate the losses. So under- dosing in bad climatic years is very risky and can provoke a total loss of quality with undrinkable wines.
- The most serious problem of these gas forms (not filled in specific SO_2 gas canister) are health and comfort conditions for people working in wineries. It can produce skin, eye and respiratory tract irritations, coughing spluttering, headaches bleeding.

- These uncontrollable losses of SO_2 into the air pose environmental problems. Already measures are being applied in industry and transport to reduce SO_2 emissions it is a bit odd to make no effort in this domain in organic wine production.

Potassium metabisulphite and bisulphite, as alkaline salts, are much less volatile and do not give out the strong unpleasant odour of the encountered in the « pure » form. Their concentrations are much more stable and they cause less sanitary problems to the users. Nevertheless, they are excluded by some standards (e.g. FNIVAB till now) because of the enrichment of potassium they produce in the musts.

- **Sulphitation allowed by all the standards for organic wine processing.**
- **Allowed doses of total SO_2 used during the wine processing are lower than their respective European wine regulation, as much as two times less.**
- **The form of SO_2, is different according to the standards**

3.4.8 Fermentation

3.4.8.1. Use of micro-organisms

The use of micro-organisms: **yeasts** (commercial, on-cellar selected, natural), and **lactic bacteria** addition is commonly allowed -if certified as non genetic modified origin- by all standards, except the Demeter's ones, for musts. The FNIVAB standards exclude clearly the selected lactic bacteria on wine.

All physical processes promoting growth of micro-organisms or allowing their good management, such as aeration or heat treatments (heating and cooling) are permitted by the standards for organic wine.

Discussion

Natural spontaneous fermentations, due to domestic micro-organisms, may be preferred according to all standards for organic wines. Nevertheless, the addition of selected yeasts, as allowed by the European wine regulation, is also permitted "when necessary" and if certified of non GM origin, by all standards for organic wines, except the DEMETER- Austria and France ones.

The general prohibition of genetically modified organisms by the organic standards does also apply to all oenological products eventually produced by using genetically modified micro-organisms processing, such as enzymes, citric acid or ascorbic acid.

Use of selected micro-organisms allowed by all standards if certified non GM.

3.4.8.2. Improvement of the fermentations conditions

Nitrogen deficiency in the musts can be corrected, as allowed by the wine regulation, with a supplementation by Ammonium- salts.

Except DEMETER (Austria and France) and Nature & Progrès, all private standards for organic wine consider this problem and allow at least one N-additive in the musts, mostly in more restrictive conditions than those permitted by the wine regulation (maximum added quantity under 1 g/l of di-ammonium phosphate E342 or ammonium sulphate E517, no given details for other N-forms).

In the organic standards, the nature of nutritive salts can be detailed and their quantity limited (FNIVAB, CCPB, Spanish project, in coherence with the IFOAM basic standards) or not (AIAB, ECOVIN). The forms of these products are diverse:

- **ammonium sulphate** : allowed by , AIAB, CCPB (with restrictions), DIO and IFOAM standards;
- **di-ammonium phosphate** : allowed by ECOVIN, FNIVAB (with restrictions), AIAB, CCPB (with restrictions), DIO, Spain (with restrictions) and IFOAM Basic Standards;
- **ammonium sulphite**: not allowed specifically by any standard for organic wine;
- **ammonium bisulphite** (ammonium hydrogenosulphite) : allowed by Bioland.

These two last additives are allowed and recommended only on musts by the wine regulation.

Some standards (BioAustria, Bioland and Ecovin) don't precise the nature of ammonium salts and just allow addition of "nutritive salts".

Other fermentation activators allowed by the Wine Regulation are also considered in some private standards:

- **thiamine (vitamin B1)**: allowed only in Germany (Bioland, Ecovin and Naturland), in Italy (AIAB) and Greece (DIO);
- **preparation of yeast cell wall** (yeast ghosts). Allowed in Germany (all standards), in Italy (all standards), in Spain and by NOP standards.

Discussion

Nitrogen deficiency in the musts, which is deeply linked to agricultural options (such as irrigation, grass-cover, low nitrogen fertilization, foliar sprays), should become a growing problem, mainly in the Southern hotter wine regions, but also in the Northern wine regions depending on climate changing. It is a problem also for secondary variety flavors (ex. Sauvignon) and off-flavors (ex. Riesling, Grüner Veltliner) as a lack of N does not allow proper aromatic cycles.

The threshold for adding N salts is defined only in the French FNIVAB and in the Spanish standards, and fixed at the limit value of 100 mg/l of N content in musts.

An interesting point has to be underlined concerning ammonium sulphate which brings to the musts both ammonium and SO_4 which can increase a higher sulphate level in

the wine. The use of ammonium –sulphite and bisulphite can increase the building of off-flavors like H_2S.

- **All private standards (except 2) allow N-additive in the musts.**
- **Nature of nutritive salts can be detailed and their quantity limited or not.**
- **Different forms allowed: di-ammonium phosphate (E342), ammonium sulphate (E517), ammonium bisulphite and ammonium-sulphite**
- **Other fermentation activators like thiamine and yeast cell walls are allowed by some standards.**

3.4.9 Sugar enrichment

- Following the prescriptions of the general wine regulation, enrichment is allowed in all cases by using of ingredients from organic origin: sugar (beet or cane), Concentrated Musts and/or Concentrated Rectified Musts. The choice of each form depends on the national/regional traditions.
- In e.g. Italy, Spain, Greece national law does not allowed to use sugar in wine; it should be mentioned because as a consequence no organic sugar can be used. It is also the case in the Southern French wine producing area, in order to support the market of wine derivate products. Consequently, the organic wine producers of these regions can't use sugar for enrichment when necessary.
- The use of Concentrated Rectified Musts issued of organic grapes sets the problem of its process, which uses ion exchange resins, not allowed till now by the European regulation for organic farming.
- The partial concentration (including reverse osmosis) is allowed in France (FNIVAB, Nature & Progrès), Italy (AIAB, CCPB) and Greece (DIO), forbidden by ECOVIN and DEMETER (Austria and France), but not considered by the others (Naturland, Bioland, Spanish standards, Bio Suisse)
- Self enrichment: allowed by AIAB standards, is not mentioned in other standards.

- **Enrichment is allowed in all standards, by adding of organic sugar or concentrated musts, rectified or not.**
- **Some standards do not allow the enrichment by physical methods such as inverse osmosis.**
- **The technique of ions exchange resins use to make rectified concentrated musts is not allowed by the regulation for organic food; discussions on the subject don't conclude till now on the necessity of changing the previous position.**

3.4.10 Adjustment of the must and wine acidity

Acidification and de-acidification processes are strictly regulated at European level, depending on the production conditions and detailing allowed additives and level of using them. By comparison, the standards for organic wine processing generally allow carefully this kind of operations, if highly necessary. The basic allowed additive is natural **tartaric acid** E334, coming from wine. Some other salts can be authorized (**neutral potassium tartrate, potassium bicarbonate, calcium carbonate**) following the standards and with quantitative limitations.

3.4.11 Clarification of must and wine

The main restrictions concerning the processing aids for clarification of musts and wines in the standards for organic wines compared to the wine regulation list are:

- organic origin for **ovalbumin;**
- non GM origin for the **enzymes;**
- purity for the **bentonite**;
- exclusion of **lactalbumin**, except for the Spanish standards and under form of fresh milk for BioSuisse;
- **gelatin** E430 is not allowed by Demeter, Nature & Progrès and the French FNIVAB standards, essentially because of its animal origin. Alternative forms of gelatine from plant origin, recently allowed by the European wine regulation, with restrictions concerning their origin and prescriptions on labelling, under the form of **vegetal proteins**, are not considered;
- yeast **mannoproteins** (for white wines treatments) are also not specifically considered by the standards for organic wines;
- **isinglass**: allowed;
- **casein preparations**: allowed;
- **silicon dioxide**: allowed;
- addition of **tannins**, both for preparation of musts and clarification of wines, is not permitted by Demeter France and not mentioned by Italian and Swiss standards. The Spanish standards, most recently discussed and written, precise their origin must be from grapes. This position underlines the necessity of clarification, when more and more sophisticated oenological products are sold as tannins, with diversified effects on wines.
- alternative forms of gelatin from plant origin, recently allowed by the European wine regulation, with restrictions concerning their origin and prescriptions on labeling, under the form of **vegetal proteins**, are not considered.

Ovalbumin, bentonite, Isinglass, casein, silicon dioxide, pectinolytic enzymes (if non GM) allowed in all standards.

3.4.12 Physico-chemical stabilization of wine

The following treatments are **allowed**, some with restrictions:

- **gum Arabic** (natural origin), in the Southern Countries, by the French FNIVAB, Italian, Greek and Spanish standards;
- **bentonites** (restrictions on purity);
- **charcoal for oenological use**, for treatment of white wines: allowed in all standards except N&P, not mentioned in Spanish and Demeter Austria standards.
- **citric acid**, allowed in all standards except by Demeter, (Nature & Progrès and BioSuisse don't mentioned it); from natural and non-GMO origin. Restricted to less than 1 g/l for the CCPB standards.
- **metataric acid** for tartrate stabilization is allowed by AIAB, Bio Suisse and not mentioned by all other standards.
- **potassium ferrocyanide** and **calcium phytate** are **NOT** allowed at all.

3.4.13 Preparation for bottling packaging and packaging of wine

The use of **copper sulphate** (off-flavor clarification agent) is allowed by the German standards, BioAustria, AIAB and DIO.

The question of using **wood chips**, newly integrated in the European wine regulation (Reg EC 1507/2006) is not yet considered by the private standards for organic wines. It has to be discussed later, on a basis considering first the general debate on wine in each producing country. Two topics can be concerned in this subject:

- Aromatization of wine (It is a short cut to give a taste of wood without storing the wine in barrels);
- Environmental interest for a process which uses less wood than the barrels…

The subject of **bottling** is not treated at the same level by all the private standards. Most of them leave a free choice, even if traditional cork bottling is preferred.

3.4.14 Special wines are considered by the standards for organic wine

- **Sparkling wines**: allowed using of charcoal for red musts discoloration, N nutrients for yeasts and the addition of selected dry yeasts are recommend by all standards (to support the secondary fermentation), and "liqueur d'expédition". Potassium alginate is considered only by the FNIVAB and ECOVIN standards, in coherence with the IFOAM Basic Standards.
- **Liqueur wines**: allowed using of caramel and alcohol, from organic origin
- **Retsina wines**: allowed use of Alep pine resins in greek standards (DIO).

4 Discussion

4.1 Main convergence and divergence between the standards for organic wine processing

The analysis of the different standards shows that they have a large common trunk of practices and additives, even if important points like yeasts nutrition, sulphitation and enrichment can be consider as divergent points.

Table 4.1 : Recapitulative table

Convergence Points
Aeration (M & W)
Heat treatments (M & W)
Centrifuging and filtration with or without an inert filtrating agent : perlite, diatomiceus earth, cellulose (M & W)
Air protection with inert gas :Ar, CO_2, N_2 (M & W)
Selected yeasts from non GM origin (M & W)
Selected Lactic bacteria from non GM origin (M)
Use of SO_2 as preservative (M & W)
Enrichment if sugar content too low
Clarification (M & W) : isinglass, casein, ovalbumin, bentonite, silicon dioxide, pectinolytic enzyms (M)
Acidification by natural tartaric acid (M & W)
Di-acidification: Potassium carbonate - bicarbonate, Calcium carbonate, potassium tartrate, homogenous preparation of tataric acid and calcium carbonate
Addition of L-ascorbic acid (W)
Addition of citric acid (W)
Interdiction of : sorbic acid, potassium sorbate, calcium tartrate, lactalbumin, potassium ferrocyanide, calcium phytate, lyzozyme, PVPP
Divergence points
Yeasts nitrogen feeding and nature of ammonium salts (M & W under conditions)
Use of thiamine and yeast cell wall (M & W)
Nature and especially level of SO_2 (M & W)
Nature of enrichment : divergences due to national regulation on wines (M)
Clarification : gelatine, betaglucanases (M & W)
Nature of substances to be used for de-acidification (M & W)
Use of tannins (M & W)

M: Musts *W: wines*

Notable points:

Even if, some standards don't allowed selected lactic bacteria on wines, the use of yeast and lactic bacteria is given as a convergence point, because all standards recognize the necessity to manage correctly the fermentations. Practices promoting good fermentations conditions are recommended (such as heating of the must or making of a "pied de cuve"). Nevertheless, the Biodynamic standards recommend avoiding addition of external yeasts except for sparkling wines.

The tannins do exist under several different forms, coming from grapes or from wood, and they have complex effects on the wine structure, improving the production of more “round” tasty , sweet and easy to drink young wines. Because of that, their necessity should be discussed, as the forms eventually acceptable.

4.2 Consistency of the organic wine processing with general prescription and principles for organic food processing

Following the principles of organic food processing, the methods generally allowed are those which respect the integrity of organic raw materials and are considered as “essential”. According to the IFOAM Basic Standards, a substance is considered essential if a processed food product requires that substance in order to meet established standards of identity, governmental regulations, or widely accepted consumer expectations. Consequently, the allowed substances, which are ingredients from non agricultural origin required to produce and preserve organic food (in the case of additives) or produce it (in the case of processing aids), considered as essential, are listed on positive lists.

At international level, the IFOAM basic standards and the *Codex Alimentarius* guidelines for organic food and farming include both the wine in their scope. They have to be compared with the specific standards for organic wines studied higher.

At European level, even if wines are excluded of EC 2092/91 regulation, a majority of additives and processing aids used for organic wine processing are already allowed for organic food processing and listed in annex 6 of EC 2092/91. Only a few of those which are important for wine don’t belong to this positive list.

The following table shows the different statutes of main inputs of private standards used for organic wine processing, comparing to Annex 6 of European regulation for organic food and the 2 international guidelines including wines which are the IFOAM Basis Standards and the *Codex Alimentarius*.

Tab 4.1: Coherence between organic wine processing standards and organic food processing rules

Step of wine processing / fonction	Additive / processing aid INS : international code	Organic wine standards allowing it	IFOAM BS	Codex Aliment. Guideline	EC 2092/91, annex 6
Preservation (M & W)	**SO_2**, INS 220 **K metabisulphite** INS 224 L-ascorbic acid INS 300	All Not all All	Yes [a] Yes [a] Yes [a]	Yes [a] No Yes [a]	**Yes [a] *** **No** Yes [a]
N nutrition of yeasts / M	**Ammonium salts**	**All**	**Yes** [a] (E517, E342)	**No**	**No**
Fermentations	micro-organisms (Non GM) Thiamin	All Not All	Yes No	Yes No	Yes **No**
Filtration (M & W)	Diatomiceous earth Perlite, **Cellulose**	All All **All**	Yes [pa] Yes [pa] **No**	Yes [pa] Yes [pa] **No**	Yes [pa] Yes [pa] **No**
Enrichment (M)	Sugar **RCM** CM	Not all **All** All	Yes **Yes** No	Yes **No** Yes	Yes **No** Yes
Acidification / de-acidification (M & W)	Tartaric acid INS 334 Citric acid INS 330 Ca carbonate INS 170 K bicarbonate E501	All Not all Not all All	Yes [a], [pa] Yes [a], [pa] Yes [a], [pa] Yes [a], [pa]	Yes [pa] Yes [a] Yes [a],[pa] Yes [a]	Yes [a] Yes [a] Yes [pa] Yes [a]
Clarification (M & W)	Gelatine Isinglass Casein Ovalbumin Silicon dioxide Bentonite K Caseinates **betaglucanase**s Tannin INS 181	Not all All All All All All Not all **Not all** Not all	Yes [pa] Yes [pa] Yes [pa] Yes [pa] Yes [pa] No [pa] No Yes [enzyme] Yes [pa]	Yes [pa] Yes [pa] Yes [pa] Yes [pa] Yes [pa] Yes [pa] No Yes [enzyme] No	Yes Yes Yes Yes Yes Yes Yes **No** Yes
Tartar precipitation (W)	K tartrate INS 336	Not All	Yes [a], [pa]	Yes [pa]	Yes [pa]
Inert Gas (M & W) Oxygenation (M)	Argon INS 938 CO2 INS 290 Nitrogen INS 941 Oxygen INS 948	All All All All	Yes [a] Yes [a] Yes [a] Yes [a]	Yes [a] Yes [a] Yes [a] Yes [a]	Yes [a] Yes [a] Yes [a] Yes [a]
Special wines (W)	K alginates INS 402	Not all	Yes [a]	Yes [a]	Yes [a]
Stabilization (W)	Arabic Gum INS 414	Not All	Yes [a], not for wine	Yes [a], not for wine	Yes [a]
	Copper sulphate INS 519	**Not all**	**No**	**No**	**No**

M: on musts *W: on wines*
[a]: listed as additive *[pa]: listed as processing aid*
** Only for fruit wines; rate < 50 mg/l or for cider: SO2 total < 100 mg/l*

The international guidelines for organic food consider the main steps of wine processing. Some additives are missing but quite all the functions are assumed. That is not completely the case with the European regulation for organic farming (EC Reg 2092/91, annex 6), which doesn't till now cover the wines. In the perspective of establishing a positive list in a future annex devoted to wine, the main additives and processing aids to be discussed for addition can be shared in two categories:

4.2.1 Additives allowed by all the standards for organic wines but not by the European regulation for organic food

- SO_2, with higher final rates than the 50 mg/l allowed for the fruit wines;
- Ammonium- salts, to supply Nitrogen deficiency of musts
- Concentrated Rectified Musts, whose process uses ion-exchange resins, currently non-allowed. Ion exchange resins, which are processing aids, shall be evaluated on the environmental and integrity of processed food aspects, if using for diverse process in organic food (dairy products, baby food…).
- Cellulose used as an inert filtering agent, which is not mentioned in any guidelines or regulation for organic food

4.2.2 Additives allowed by some organic wines standards but not by the European regulation for organic food

- Fermentation activator like thiamine, allowed by German, Italian and Greek standards;
- Enzymatic preparation of betaglucanases used for clarification, allowed only by Ecovin, AIAB and DIO standards
- Corrective agents, such Copper sulphate[3] allowed by German (Bioland, Naturland, Ecovin), BioAustria, Italian (AIAB, CCPB) and Greek (DIO) standards

The case of Arabic gum has also to be detailed. This natural colloidal product, traditionally used for clarification and stabilization of wine, which exists on organic form in the market, is allowed by the French FNIVAB, Italian AIAB and CCPB, Greek DIO standards and the American NOP. The international guidelines of IFOAM and *Codex Alimentarius* allow it for other products (dairy, fat, and confectionary products). The European organic food regulation allows it without restriction for processed organic food from vegetal and animal origin. It should be considered as an essential additive for improving the physical and organoleptic quality of wine as maintaining its integrity (preservation of the native wine tannins).

4.3 Representativeness of current standards for organic wine processing

The legal framework of oenological practices being given by the European regulation and the national public rules, such as the AOC ones, the private standards for organic wines can be considered as reflecting the main oenological practices on the territory where they are used. Though, they have been elaborated by the producers themselves

[3] *In order to reduce taste defaults, copper citrate could be interesting, it is a very new additive, which is –in the EU- actual only allowed in Austria for trials, but it is more effective than copper-sulphate and the amount of copper is very low more than 50% of copper sulphate. It is actually allowed by South African, Australian and new Zeeland Food regulation*

through a consultative process and are respected by personal choice, organic private standards have never a regional base; in this sense AOC regulation may appear more "locally adapted". The standards analysis shows how they give, or not, another concept of wine production than the general regulation does. Nevertheless, the impact of these private standards should be measured through the number of organic wine producers who claim following them and are certified under. In that way, ones can observe that the number of certifications depends both on the nature of the standards (is it easy or not to respect each year?) and the conditions of access to the certification logo (cost of the certification? Communication supports? Which market need for an organic wine logo or not?)

Tab 4.2. Number of organic vine producers certified under standards for processing wine

Country	Certified organic wine producers / cellars	Standard for organic wines	Type of control	Number of certified / affiliates
FRANCE	1534 (2005)	FNIVAB	external	54 (=4,2% of total area) + 50 ready to involve
		Nature & Progrès	external	44
		DEMETER Fr.	internal	100 certified for viticulture*; none for wine
		BIODYVIN	external progressive	41
		Return to Terroirs	Charter, 3 levels, internal	120 / 12 countries
GERMANY	350 (2006)	ECOVIN	External control	60% (210)
		BIOLAND		20% (70)
		NATURLAND		5% (17)
		Demeter		5 % (17)
AUSTRIA	496 (2005) 1800 ha	BIO-AUSTRIA		85 %
		DEMETER Au.		5 %
SWITZERLAND	110	BIOSUISSE		
ITALY	400 cellars	AIAB		80
		CCPB		50
GREECE	180 3000 ha	DIO		10
SPAIN (2005)	1000 (estimated) 180 cellars	CRAE National Standards CPAEN Navarra CCPAE Cataluña Sohiscert Standards New National Standards (approved 23t/10/07		unknown

** wine from Demeter grapes*

Remark on the data:

In France, the "number of producers" means the farmers, including those who don't process their wines in their own cellars because they are members of cooperatives.

The majority of wines is sold under the labeling “wine from organic grapes” and is allowed to use the AB logo since 2004.

In Italy, the number given is the total of producers who claim for organic on their bottles of wine, what is a minority compared to the number of certified organic grape producers.

One has also to note that deciding on common public rules for all European organic wine producers is not the same debate than designing private standards free to be followed or not.

4.4 How are differences in natural conditions of wine production areas taken in consideration?

Three main criteria depend greatly on the climate conditions: sugar content of the grapes, sanitary aspect of the grapes, nitrogen content of the must. Agronomic practices, as observed in organic farming, have generally a corrective influence on these criteria. Nevertheless, the standards for organic wine processing have proposals, if necessary, for enrichment, preservation and yeast nutrition.

Concerning the use of SO_2, the differences between allowed rates seem to cover both climatic constraints which have an influence on the sanitary quality of the grapes and the well-known relationships between SO_2 addition needs and wine parameters as,

- acidity of the white wines (higher in the North, protects the wine, less need of SO_2);
- tannins (polyphenols) content of the red wines (higher in the South, protects the wine);
- sugar content (create unstable conditions, wine to be protected by SO_2).

As observed by the producers, organic agronomic practices show a great positive influence both on the sanitary aspects and the balance acidity/sugar on the musts. In northern countries, due to varieties choices that not always respect local climate and climatic conditions which are often responsible of botrytis problems, the northern standards have higher SO_2 level accepted.

Concerning the N nutrition of yeasts, the standards reflect clearly the different situations met by the producers: till now, it was essentially a Southern problem, but it has to be taken in consideration also in Northern wine production areas because of the climate heating. In another way, this technical aspect has shown the less adaptation of some non-traditional varieties in certain conditions (for example in France, Cabernet-Sauvignon or Merlot, issued from the Bordeaux area and cultivated in the Languedoc one for market reasons, give more frequently nitrogen deficient musts than the local Carignan).

The enrichment practice is of course more a Northern problem, clearly depending on the climate conditions and variety choice. Organic agronomic practices have an influence, giving generally musts which are more sugar balanced. This leads some produc-

ers to refuse enrichment, such in the Demeter France standards, with the risk of not being able to follow the standards each year.

Not all types of organic wines have the same problem concerning the need of a future harmonization. The main quantities consist of dry white and red wines, for which the global differences between organic ways of production and conventional ones are clearly visible. A few parts of "specialty wines" can not easily be processed completely under "organic ways". Special wines represent a small part of the global production of organic wines but they often can be very important and/or emblematic of a region (for example Sauternes or Porto) or correspond to local consuming habits (for example retsina wines in Greece). That why their status require a special space in the regulation which must take into account their specific needs.

4.5 Influence of the third Countries, hot points on the organic wine market

There are not a lot of differences in the positive lists of allowed additives and oenological practices between European and non-European standards for organic wines processing, except for sulphitation.

The forms to be used on musts and wines are limited to pure SO_2, except for the Australian NASAA standards, who allow also K metabisulphite.

If the Argentinean standards consider, as in Europe, different levels of total SO_2 content depending on the type of wine, the American, Canadian and Australian standards give the same maximal rates of total sulphites (90 or 100 mg/l) and free SO_2 (20 or 30 mg/l) for all the wines. These values are coherent with the usual European practices for dry red and white wines. Nevertheless, this position leads to ask the question of alternative methods to be used for preservation of the wines, when producing other types, like wines with residual sugar.

At federal level in the USA, the National Organic Program which concerns also the wines, is making a separation between wines processed without or with SO_2 addition: the first only can be labelled as organic wines, the second being only "wines from organic grapes". The unbalanced position regarding this question of labelling between Europe and the United States has to be pointed, when trying to define at European level what should be an Organic Wine.

In this context, the debate between the different ways of producing wine in the world ("traditional hand-crafted product" or "industrial product") seems to be open also in the organic wine sector.

Some consuming countries have also specifications for wines from organic farming to be sold on their territory. The Japanese Agricultural Standards are focused on the process management and traceability control, but don't stand specific conditions for organic wine processing. At contrary, two major European certifiers, Soil Association in the UK and SKAL in the Netherlands apply their specific standards on imported wines to be sold under their label, with a limitation of SO_2 final content.

4.6 Organic wines processing rules and trends in wine regulation at international level :

4.6.1 Limitation of enrichment practices

Till now, the enrichment practice, which is strictly regulated, is considered as necessary in certain conditions and allows the use of two types of sweeteners: coming from grapes (rectified and concentrated rectified musts) and from external origin (sugar from cane and beet). A future trend at international level should be the forbidden of sugar use. If confirmed, this reinforces the technical problem of enrichment with RCM.

4.6.2 Limitation of alcoholic content of the wines

An emerging trend on the market is the need for less alcoholic wines, when the alcohol content is getting higher all over the world, under the influence of climatic heating vineyard management techniques and oenological innovation. In this way, less alcoholic organic wines should be managed from the vineyard, by adopting adapted practices, and not at the cellar with new subtracting technologies. Also vocational variety and place of cultivation should be taken into consideration

4.6.3 Use of wooden chips as a substitute of barrels

The use of wooden chips is allowed by the European regulation on wine since 2005 (EC 2165/2005). None of the current organic standards allows it, and there is a great opposition in the AOC wine production areas. This point, which has to see with the identity of the wine, seems to be discussed in time, and supported by a clear communication.

4.7 Organic wines processing rules and labeling and general food regulation prescriptions

The European regulation of food makes now compulsory for all food products the labeling of sulphites and other allergenic components, such as those coming from cereals, eggs, fish or milk.

Wine is concerned through some processing aids used for clarification (substitutes of animal gelatin, egg white, casein, ovalbumine and isinglass).

In the case of sulphites, which are “moving” additives, as explained in the devoted chapter, the problem is that it is necessary to indicate a eventual presence of SO_2, even if not added (naturally produced by the yeasts during fermentation).

5 Conclusions and recommendations

The main objective of the ORWINE project is to establish a basis for a future European regulation, concerning organic wines, if relevant. Consequently, issues related to the relevance of current standards with regard to organic processing food principles and evolution of the general framework of the wine production at international level have to be considered, by a review of all steps of the wine production process. The three main concerned technical areas are:

- SO_2 limits, both on quantitative and qualitative aspects;
- Regulation of fermentations, with use of N-salts nutrients, in a context of deep climatic changes which affect the wine producing areas;
- Enrichment: because of a coming change in general regulation concerning the excluding of sugar, what are the possibilities in the future for enrichment of organic wines? Shall concentrated rectified musts be acceptable and to which conditions?

Wider than technical points, it is important to consider the relevant ways of regulation, in a sense of full respect of the wide diversity of organic wines made in Europe and adapted at the market's needs.

The main "hot spot" of this analysis and main point of divergence between the different organic standards is sulphitation: which products and which doses? Having established, SO_2 is necessary additives for organic wines, the questions on this subject for future European organic wine regulation are:

- should the EU regulation fix SO_2 levels for each type of wine?
- or should the general organic European regulation need only to authorize the use of SO_2 and leave to regional or local regulations the option of fixing SO_2 levels (depending of type of wines and/or climatic conditions) ?
- or should not the regulation fix any limitations of SO_2 and leave the consumer the choice of which wines satisfies his desires by indicating SO_2 level uses, on labeling ?

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http://www.letis.com.ar (Argentina)

7 Annexes

1) general matrix of comparison regulation / private standards
2) table of SO_2 total rates allowed by Regulation / standards
3) summary of the OIV international Code of Oenological practices
4) Comparative list of oenological practices OIV, CH, UE, USA