RESOLUTION VITI-OENO 1/2005

CODE OF SOUND VITIVINICULTURAL PRACTICES IN ORDER TO MINIMISE LEVELS OF OCHRATOXIN A IN VINE-BASED PRODUCTS

IN VIEW of Resolution CST 1/2002 which sets the maximum contents of Ochratoxin A (OTA) at 2,0 µg/l for wine.

IN VIEW of the said Resolution which provides that the OIV establishes good vitiviniculture practices to prevent OTA contamination risk of vine products.

IN VIEW of Resolution OENO/16/2001, which sets the method for determination of OTA after going through an immunoaffinity column and high performance liquid chromatography with spectofluorimetry detection.

TAKING INTO ACCOUNT the principles provided for in Resolution CST 1/2004 on the development of sustainable vitiviniculture and guidelines associated with the resolution in order to foster reaching the objectives set and in particular health protection and food safety for consumers.

BEARING IN MIND that the origin of the development of fungus species responsible for the presence of OTA is in grapes in the vineyards.

TAKING INTO ACCOUNT the results obtained over the past years following studies and research carried out to decrease contents of OTA through viticulture and oenological practices.

RECOMMENDS that countries set up an analysis system through collective or individual action and survey OTA contamination risk starting from the vineyards to the wine cellar.

DECIDES to adopt the code of good vitivinicultural practices in view of limiting as much as possible the presence of Ochratoxin A in vine-based products. This code determines actions to be set up in vineyards and in wine cellars to contribute to reducing risks linked to the presence of OTA in vine products.

Code of sound vitivinicultural practices in order to minimise levels of Ochratoxin A in vine-based products

PREAMBLE

- Mycotoxins, in particular Ochratoxin A (OTA), are secondary metabolites

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produced by filamentous fungus found in soil and organic matter, which spread and thrive on grapes during the berry ripening phase.

- The formation of OTA in grapes is mainly due to berry contamination by certain mould species, and particular strains thereof, belonging essentially to the Aspergillus species (in particular A. carbonarius species and to a lesser extent A. niger).
- The presence and spread of such fungus in vineyards are influenced by environmental and climatic factors, nocturnal dampening condition of grapes, grape bunch shape, susceptibility of vine varieties, aeration level of grape bunch, health status of grapes and berry injuries which are the main entry points for ochratoxinogenic fungus.

CULTIVATION PRACTICES IN THE VINEYARDS

All recommendations in the OIV document on sustainable vitiviniculture guidelines need to be respected, in particular the aspects concerning vineyards establishment project, soil management, irrigation, and cultivation practices in the vineyards, pest control and the harvest.

The OIV recommends applying the following preventive measures in viticulture regions in which the climatic conditions are favourable to the formation of OTA in vine products in order to reduce epidemic risk which favours the onset of very damaging vine disease:

Regional risk information

- Ensure that regional authorities and grower organisations:
    - analyse and identify the species and strains of toxinogenic fungus present in their region;
    - combine this information with regional risk factors including meteorological data and viticultural techniques and propose adapted management;
    - communicate this information to growers.

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Training of producers

- Ensure training of producers with regards to:
- risk of mould and mycotoxins;
- the identification of ochratoxinogenic fungus and period of infection;
- knowledge of preventive measures to be applied to vineyards and wineries.

Vineyard establishment

- Favour vine establishment in well aerated areas while avoiding very humid areas.
- Draw up plots of land with adequate planting disposition, and vegetation architecture (trellising system) to:
    - facilitate planting operations,
    - correctly position grape bunches above the soil,
    - ensure good pest and disease control,
    - minimise the risk of raisins sun burn,
    - promote the uniform ripening of the grape.

Plant material

- Choose less rootstock vigour and varieties which are less prone to develop mould and grape rot.
- Choose clones or biotypes within a variety which are better adapted to climatic and soil conditions in specific cultivation area and less sensitive to mould and rot development, which are oftentimes characterised by less compact grape bunches.
- Lay out homogeneous plots of land (varieties, clones) to facilitate growing operations and to ensure better crop and disease control and to obtain uniform ripening of the grapes.

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Growing techniques

- Apply management practices which favour leaf/fruit balance for vines and which reduce excess vigour, in particular, avoiding inappropriate nitrogenous fertilizer applications.
- Favour vegetation or organic cover of soils and avoid working the soil between the beginning of the grape ripening and grape harvest period in order to limit the transfer of soil particles and the associated fungi to the grapes.
- Favour placing grape bunches in an orderly manner to avoid overcrowding.
- If water input is necessary, irrigate as regularly as possible in order to avoid berry splitting and the onset of cracks on the skin which are sources of mould penetration and development especially in warm regions.
- Avoid using marc containing toxinogenic fungus as a fertilizer in the vineyards.

Pest and Disease control

• Carry out leaf removal in the grape cluster zone whilst recognising the need to limit the risk of sun burn. This must enable the aeration of clusters. This is particularly necessary under hot and humid weather conditions while the grapes are ripening.

• Avoid lesions on the berries and skin damage caused by diseases, insects, phytotoxicity and sun burn.

• Apply vine protection plans in order to control dangerous fungal diseases affecting grape quality (oïdium disease, acidic rot).

• Prevent attacks of grape berry moths, grape mealybugs and grape leafhoppers which favour mould development on damaged berries; pest control need to be carried out according to biological and epidemic risk; under high risk conditions preventive treatments must be applied by using specific products and taking into account the warnings of plant protection regional services.

• Apply appropriate and registered protective programmes against grape rot and mould. Specific treatments are recommended in all situations which are favourable to the development of toxin producing species.

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PRACTICES AT HARVEST

A healthy grape harvest can ensure optimal quality and safety of vitivinicultural products. Consequently, only a healthy grape harvest can be used for human consumption without the risk of quality loss and without food safety problems for consumers.

The date of harvest must be decided taking into account grape ripeness, sanitary level, and forecasted climatic changes and epidemic risk. In high risk OTA areas, it is recommended to advance the harvest date.

When grapes are extensively contaminated by mould:

- the grapes can not be used for human consumption, either fresh or in raisins, nor for making concentrated musts, grape juice, wine or vinegar;
- the grapes can only be used for distillation.

Production of raisins and raisined raisins

For production used to obtain raisins and raisined raisins (sweet wine) the OIV recommends that following regulations should be adhered to:

- Ensure the hygiene of containers to be used for the harvest and/or the drying of grapes.
- Use only grapes not damaged by insects and not contaminated by mould.
- Sort grapes by eliminating damaged or contaminated grapes.
- Place grapes to be dried or raisined in just one layer to avoid overstacking.
- Favour progressive and uniform drying of all parts of the grape bunch.
- Take the necessary measures to avoid development of fruit fly infestation.
- For particular conditions of drying in open air, it is recommended to dry in well ventilated conditions and to cover the grapes at night to prevent condensation and humidity.

Production of wine grapes

The OIV recommends the following actions in the case that the harvest is moderately

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contaminated with toxinogenic mould and is to be used in wine production:

- Grapes damaged by insects, mould, or contaminated by dirt particles must be eliminated before the harvest or at harvest time depending on harvesting technique.
- Grapes need to be sorted, in order to separate the grape bunches or the damaged parts of the bunches. It is important to discard grapes with black mould.
- Harvested grapes must be transported as quickly as possible to the winery in order to avoid extended waiting, especially for grapes with a high proportion of juice.
- It is important to clean containers after each load, especially in the case of rotten harvests.

TREATMENT AT THE WINERY

Under conditions with a risk of OTA contamination, it is recommended to measure the contents of OTA in the musts to be used in winemaking.

Operations and pre-fermentation treatments

- Avoid skin maceration in the case of OTA high risk harvests or carry out short maceration.
- In the case of a significant contamination of red grapes, evaluate possibility of carrying out rosé winemaking.
- Adapt pressing rate to the health status of the grape; in case of contamination, carry out small volume, low pressure quick pressings. Avoid continuous press.
- In the case of contaminated grapes, avoid using pectolytic enzymes for racking must or maceration. Quick clarifications with must filtration, centrifugation and flotation are preferable.
- Avoid harvest heating treatments and aggressive and prolonged macerations.
- In the case of contamination, it is preferable to treat the grapes[1] or the musts with the lowest possible and most effective doses of oenological charcoal in order to avoid possible loss of aromatic and polyphenolic compounds when the treatment is carried out on wine.

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Fermentation treatments

- Carry out, as much as it is possible, fermentation and maturing in smooth walled containers to avoid sources of contamination linked to previous fermentations or maturing and in order to facilitate cleaning.
- For alcoholic or malolactic fermentations, use yeasts or bacteria which have adsorbent properties for OTA; ensure that these characteristics are guaranteed by the supplier. Note that the usage of these products only enables a partial reduction of OTA.
- It is recommended to devat as quickly as possible following fermentation.

Maturing and clarification treatments

- Dry active yeasts or inactive yeasts can help reduce the OTA level.
- Maturing on lees can help in reducing the OTA level. The risks of this technique related to the organoleptic quality of wine must be evaluated.
- Current clarification products (organic or inorganic fining agents) have variable levels of efficiency for reducing contents of OTA:
    - Oenological charcoal is the most efficient.
    - Certain cellulose and silica gel associated with fining with gelatine only enables a partial reduction

Before usage:

- Become informed of efficiency of product used and application technology,
- Carry out trials with different dosages to ascertain sensorial repercussions and application rate.

- It is recommended to check that OTA contamination is as low as possible when using wine making derivitives and by-products as food “integrators” in animal and human food.

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CONCLUSION

These recommendations are based on current knowledge and can be updated according to research to be pursued.

Preventive measures are essentially carried out in vineyards and treatments undertaken at the wineries are solely corrective measures.

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[1] The use of oenological charcoal on grapes is currently being reviewed at the OIV

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