

## THE CONTROLLED TECHNOLOGY FOR OBTAINING AROMATIC QUALITY WINE FROM MUSCAT OTTONEL VARIETY AT THE RESEARCH AND DEVELOPMENT STATION FOR VINE AND WINEMAKING FROM TÂRGU BUJOR

### TEHNOLOGIE CONTROLATĂ DE OBȚINERE A VINULUI AROMAT DE CALITATE DIN SOIUL MUSCAT OTTONEL LA SCDVV BUJORU

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**Abstract.** To implement the control technology it was used the technology developed infrastructure segment, namely: the harvesting of grapes in plastic crates, the transportation of grapes using the laboratory equipment, the electronic quantitative and qualitative evaluation to determining the sugar content and total acidity; the sorting and selection of grapes; the removing of grapes from cluster and the crushing of grapes with a mini smashing instrument made of stainless steel; the maceration before the fermentation made in small capacity pneumatic press for 12 hours; the controlled fermentation with specific enzymes in 500 L tanks with controlled-temperature cooling jackets. The must (unfermented wine) was obtained by stopping the fermentation process when the desired alcohol content was achieved, preserving a certain quantity of sugar specific for this type of wine. For the current research for producing this aromatic wine with this type of flavour, enzymatic extracted flavours from the grapes were used in the before fermentation stage during the cold maceration. The alcoholic fermentation was carried out in the presence of selected yeasts and nutrients with a complex composition.

**Key words:** flavored wine, pre-fermentation maceration, controlled fermentation, flavors

**Rezumat.** Pentru implementarea tehnologiei controlate s-a apelat la infrastructura dezvoltată pe segmentul tehnologic și anume: culesul strugurilor în ladițe din plastic, transportul cu autolaboratorul, evaluarea cantitativă electronică și calitativă prin determinarea zahărului, acidității totale; trierea și selectarea strugurilor procesați pe bandă de selecție; desciorchinarea și zdrobirea strugurilor cu minizdrobitor din inox; macerația prefermentativă în presa pneumatică de mică capacitate timp de 12 ore; fermentația dirijată cu temperatură controlată în cisterne cu manta de răcire de 500 L și fermenți specifici. Vinul brut s-a obținut prin sistarea fermentației la concentrația de alcool dorită și a prezervării unei cantități de zaharuri specifice acestui tip de vin. În cercetările actuale pentru obținerea vinului aromat de tip muscat s-au folosit preparate enzimatice de extracție a precursorilor de arome varietale din epicarpul strugurilor în etapa macerației peliculare prefermentative la rece.

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*Fermentația alcoolică s-a derulat în prezența drojdiilor selecționate și a nutrienților cu o compoziție complexă.*

**Cuvinte cheie:** vin aromat, macerație prefermentativă, fermentație dirijată, arome

## INTRODUCTION

The aromatic spectrum of Romanian wines has been the main interest of a number of Romanian researchers from different geographical areas like Buia, 2001 (vineyard Târnavă) and Heroiu, 1998 (vineyard from Ștefănești-Argeș). Research on the flavour compounds in general and the specific varietal aroma compounds of Muscat Ottonel in particular, have been made at Dealu Bujorului by Ciubucă, Postolache, Miclean (2010). Internationally, the flavours of the grapes and wine are linked by a series of research pertaining primarily to Schneider's Guerin (2001), Rapp and Version (1995).

## MATERIAL AND METHOD

During this research there were used grapes from the Muscat Ottonel variety which were harvested at technological maturity, having a content of sugar of 226 g/L, a tartaric acidity of 6.8 g/L and a pH of 3.36.

The processing of the harvest was made using the modern technology of the research laboratory. The harvesting of the grapes was made manually using crates which were transported with the laboratory equipment. The quantitative evaluation was made using electronic scales, the grapes being sorted before removing from the cluster and smashed. The obtained must using a smashing instrument of low capacity of only 53.7% was fermented in a stainless steel tank using enzymatic extracted flavours and selected yeasts, and then it was cleared, filtered and bottled.

## RESULTS AND DISCUSSIONS

The process of winemaking from the Muscat-Otonel variety involved working with a technological process to extract and preserve the aromatic compounds of the wine. To reach this goal 3g/hL of enzymes of the Zymoclaire Pro Ice type were used together with the sulfitation of the must which happened 4 hours after the enzymes were added, the surface maceration taking place at 17 °C for a period of 24 hours. The must was pressed pneumatically in the press using the Macera programme. The surface maceration is an important stage because this is when the extraction and the diffusion of the aromatic compounds happens.

**The harvest processing.** The evaluation of the harvest includes both the quantity and quality aspects. The first involves the economic aspects like kg/ha, the financial assessment of the harvest, and the second involves the monitoring of the grapes' ripening through a periodical analysis of the sugar content, acidity and pH of the must, which may provide useful information for future necessary corrections.

The processing of the harvest involves sorting removing the grapes from the cluster, the separation of the rachis, the smashing and the cooling of the must. The sorting of the harvest involves the removal of leaves and other debris while the grapes are on the conveyer belt which must be set at a very low speed of 5 m/min.

**Antioxidant protection.** For healthy harvests a treatment with Antioxin W is recommended. This is a mixture of ascorbic acid and potassium metabisulfite of 20 g/hL which will release more than 50 mg/L SO<sub>2</sub> leading to an antioxidant result of the ascorbic acid ten times bigger than the result obtained through separate usage or in association with SO<sub>2</sub>.

The careful smashing of the grape ensures the obtaining of the must. In modern winemaking, the smashing is removed from the process and the grapes removed from the cluster are placed directly in the pneumatic press (fig. 1).



Fig. 1 Pneumatic press

The cooling of the must at 14-15 °C before the enzymatic treatment is compulsory because it ensures the protection of the smelling potential of the grapes.

*The enzymatic treatment in association with cold surface maceration before the fermentation.* Both operations involve the extraction of odorous substances from the skin of the grapes using a natural process of enzymatic maceration before the fermentation. The enzymatic treatment represents the most important procedure and has direct consequences on the sensory profile of the future wine. In the case of healthy harvests with a low maturity stage it is required the enzymatic treatment with enzyme extracts. The surface maceration only happens in the case of healthy crops with an advanced stage of maturity of the grapes. It is recommended to administer in the must an enzymatic compound from the Zymoclaire variety after the pneumatic press is loaded, making sure that the temperature is above 15 °C (preferably 17-18 °C).

The assembly of the must fractions from the first smashing is done using the must (unfermented wine) obtained without pressing the grapes.



Fig. 2 Controlled fermentation tanks



Fig. 3 Storage tanks

The settling of the must; this process is ensured either through the enzymatic treatment with Antioxin W or  $\text{SO}_2$ , or by lowering the temperature to 10-12 °C, followed by a gradual rise in temperature until the recommended temperature of 18 °C before adding the selected yeasts to start the alcoholic fermentation process. The intensity of the settling process is connected with the process of removal of the big burble and the preserving of the medium and fine burble which are natural nutritional resources necessary for the multiplying of the yeasts. NTU (Nephelometric Turbidity Unit) must be between 100-150 and 200-250 NTU.

**Directing and controlling the fermentation process.** The fermentation was controlled by adding yeasts of the Fermactive type of about 10 g/hL. The fermentation process was monitored on a daily basis and after five days the density of the must lowered to the value of 1.030 with a sugar content of 58 g/L (fig. 2). In the following stage the wine was cleared by adding 1 g/L of bentonite and 180 mg/L  $\text{SO}_2$  as antioxidant protection.

During the stage after the fermentation several operations of improving the aromatic profile were done by adding 4 g/hL of Zymovarietal Aroma G enzymes

at a temperature of 18 °C. This type of enzymes have a high level of  $\beta$ -glucosidase which cleaves the aromatic compounds connected with the sugar. The evaluation of the completion of the alcoholic fermentation i.e. the winetesting reveals the result. The raw wine was stored in stainless steel tanks (fig. 3).

The essential stages in winemaking from the Muscat Ottonel variety are the administration of the enzyme treatment during the cold surface maceration before the fermentation until the must is obtained, the adding of nutritional compounds with complex composition and selected yeasts of Fermactive blanc aromatique type for the fermentation. The compulsory second enzyme treatment releases the flavours and ensures a high level of fruity and floral character of the wine. Also very important is the monitoring of the temperature, the density, the alcoholic concentration, the oxygen level and the titre of the yeasts. Temperature variations higher than 1-2 degrees must be avoided.

The stage after the fermentation refers to the improvement of the of the smelling qualities of the wine. The enzyme treatment which releases the smelling compounds is done at the end of the alcoholic fermentation process or immediately after the first decanting.

If the enzyme treatment is done at the end of the alcoholic fermentation process, there is a risk of starting FML, a process which can be balanced by correcting the acidity level to the value of 6.3-6.6 g/L tartaric acid (using 2/3 tartaric acid and 1/3 citric acid).

At higher temperatures than 15 °C, it is recommended an enzyme treatment with 5g/hL of Zymovarietal aroma or 4g/hL of Endozym  $\beta$ -Split. The treatment must be administered at least 2-3 weeks to ensure maximum efficiency; the tanks must be full and antioxidant protection must be achieved by adding CO<sub>2</sub> or inert gas.

The monitoring of the enzyme treatment. It is recommended to test the wine which is being treated at least 2-3 times a week in order to establish the quality and the optimal flavours because of the gradual release of this flavours through a enzyme hydrolysis process. After the alcoholic fermentation is over and after the completion of the second enzyme treatment it is recommended to lower the temperature to 14-15 °C.

The characteristics of the wine when bottled and stored (fig. 4, fig. 5).

From the organoleptic and physico-chemical composition point of view the wine is ballanced. It is a semi-sweet wine with an alcohol content of 11% vol., a volatile acidity of 0.18 g/L CH<sub>3</sub>COOH, 24 mg/L free SO<sub>2</sub> and 163 mg/L total SO<sub>2</sub>. It also has 33 g/L reducing sugars, a non-reducing sugar content of 35 g/L and a pH of 3.25 with an intense muscat flavour, which assured this wine the gold medal at the "Bachus-Focșani" national wine contest this year.



Fig. 4 Bottling line



Fig. 5 Bottled wine

## CONCLUSIONS

1. To obtain a flavoured wine specific to the wine variety it is necessary to follow all the correct technological stages together with a firm monitoring of all the processes of extraction and aromatic preservation under the action of enzymes and those of alcoholic fermentation.

2. The obtained wine through this technology has good quality organoleptic features of composition which recommend this wine.

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