ABSTRACT

One of the main tasks of winemaking in Romania is obtaining wines which are liked by the consumers and at the same time observe the characteristics of the varieties and the production area. The basis for the production of such wines, with an especially important role, aside from the quality of the raw materials, eco-pedoclimatic conditions of the cultivation area, cultivation techniques, climatic accidents, maturity and sanitary state of the harvest, is represented by the wine making technological procedures for the grapes and wine making materials used to obtain the wines. A lot of technological factors can decisively influence the taste profile for the wines, and some winemaking techniques can properly exploit the potential of the grapes. We observed that the use of certain wine making materials influences some physical-chemical parameters and the organoleptic characteristics of white wines.

Currently, a good part of the wine making materials traded in our country are used based on the recommendations of the producers and the practice of some wine makers, without any thought to the type of varieties or vineyards, without knowing the organoleptic influences provided by various treatments to the sensory qualities of the wines and without considering the physical-chemical and organoleptic changes which can be generated by the respective wine making materials or treatments in the wines.

Starting from the need to adapt to the increasingly stringent requirements of the wine market and in order to preserve the characteristics of the varieties, after conducting a comprehensive bibliographical study, this paper aims mainly to check in micro-production conditions the effect of the use of some wine making materials, during the pre-fermentation and fermentation stages, with influence on the physical-chemical and organoleptic characteristics of some white wines and the economic aspects of their use during wine making.

To this purpose, we used several types of selected enzymes and yeasts on the musts obtained from three different varieties: Pinot gris, Sauvignon blanc, Tămâioasă românească.

Aside from the use of classical physical-chemical analyses the studies focused on the applying of some modern analytical methods (HS-GC-MS) correlated with the results of the sensory analysis. As such, we studied the influence of these wine making materials on the physical-chemical and sensory characteristics of some white wines from the geographical area Oltenia Hills.

The studies were conducted during 2013 – 2015 within the Wine cellar Oprișor of SC Carl Reh Winery SRL and the Wine making laboratory of the University of Agricultural sciences and veterinary medicine „Ion Ionescu de la Brad" of Iasi.

The current study took into consideration the following objectives:

Objective 1 - The study on the use of wine making materials and technologies during the clearing, macerating and fermentation operations, and their influence on the sensory characteristics of the wines, in order to determine if they influence or not the physical-chemical characteristics of the wines from the geographical area Oltenia Hills.

Objective 2 - The study on the use of wine making materials and technologies during the clearing, macerating and fermentation operations, and their influence on the sensory characteristics of the wines, in order to determine if they influence or not the organoleptic characteristics of the wines from the geographical area Dealurile Olteniei.

Objective 3 – The study of the economical influence of the use of wine making products for wine making.

Objective 4 – Drawing up primary wine making protocols which can highlight the quality of wines from the geographical area Dealurile Olteniei.

The raw materials used, the grapes, from the white variants used for the research (Pinot gris – unflavored variety, Sauvignon blanc – semi-flavored variety, Tămâioasă românească – flavored variety) were picked from the selected lots, during the technological maturity, with a good fito-sanitary state, during the years 2013 - 2015.

The basic physical-chemical analyses (alcohol, total acidity, volatile acidity, pH, residual sugars, free and total SO_2) were conducted in the laboratory of the winery, an authorized laboratory, and the sensory analysis was conducted by a group of five authorized tasters, two months after the end of the alcoholic fermentation and the filtration of the sample wines. The analysis of the volatile compounds from the wines, in order to establish the influence of the various technologies on the aromatic profile of the wines was conducted, for the wines from the 2015 season, within the Wine making laboratory of the University of Agricultural sciences and veterinary medicine „Ion Ionescu de la Brad" of Iasi.

The wine making materials used were selected from the offer available on the Romanian market, focusing mainly on selected dry enzyme and yeast compounds. We studied the following enzymes: Lallzyme HC™; Lallzyme Cmax™ (pectinolytic enzymes) and Lallzyme Cuvée Blanc™ (pectinolytic enzymes with β-glucosidase activity), coded for the study as E1-E3. From the yeasts available on the Romanian market we selected for the study the following: Lalvin EC1118™, Lalvin QA23™, Lalvin Cross

Evolution™, Anchor VIN 7™, Anchor Alchemy 1™, Anchor Alchemy 2™, Anchor VIN 13™ – coded for the study as Y1-Y7.

During the research the following were analyzed:

- The influence of enzyme compounds and batches of selected fungi on the physical-chemical and organoleptic characteristics of the wines obtained from a non-flavored variety - Pinot gris.
- The influence of enzyme compounds and batches of selected fungi on the physical-chemical and organoleptic characteristics of the wines obtained from a semi-flavored variety - Sauvignon blanc.
- The influence of enzyme compounds and batches of selected fungi on the physical-chemical and organoleptic characteristics of the wines obtained from a flavored variety - Tămâioasă românească.

The results obtained are summarized in 98 tables and figures (34 tables and 64 de figures).

After the research conducted in the Dealurile Olteniei region, during the 2013 - 2015 seasons, regarding the influence of the use of wine making materials on the physical-chemical and organoleptic characteristics of the wines, the following conclusions and recommendations resulted:

- The clearing technology (with or without enzymes, with the use of pectinolytic enzymes or pectinolytic enzymes with β-glucosidase secondary activity) does not influence decisively the physical-chemical and organoleptic characteristics of the wines, the largest influences being presented by the use or lack of use of selected fungi for the fermentation.
- Certain physical-chemical parameters are not influenced significantly by the enzyme compounds used for the settling-clearing and/or the selected fungi used for the alcoholic fermentation. These are the pH and total acidity.
- The witness technological versions for which the selected fungi were not used for the alcoholic fermentation registered systematically, regardless of the variety, a lower percentage of alcoholic concentration and a higher value of residual sugars, rarely these versions having residual sugars concentrations under 4 g/l.
- Even if in all the cases, with the use of the selected fungi used for the fermentation, the wines obtained were dry, some selected fungi proved their capacity to ferment up to smaller concentrations of residual sugars. Y1, Y2, Y7;
- The volatile acidity of the witness samples had the highest values for all three varieties (Pinot gris, Sauvignon blanc, Tămâioasă românească). The technological version which used selected fungi for the alcoholic fermentation registered significantly lower values than the witness samples.

There was only one exception, the technological version SB3 from Sauvignon blanc for which was used as the selected fungi Y5. The wines from this version, regardless of the production year, registered higher values of the volatile acidity compared to all other technological versions which used selected fungi. This was not surprising, the producer of the selected fungi mentioning in the technical sheet this side effect of the capacity of the fungi to metabolize a larger quantity of flavor substances.

- The witness samples, regardless of the grape variety, presented systematically a ratio free SO_2/total SO_2 lower than in the case of the versions using enzyme compounds for settling-clearing and selected fungi for the fermentation. The selected fungus Y2 was observed, for registering, generally, a very good ratio free SO_2/total SO_2.
- The technological witness versions, for all three white varieties, for which no selected fungi were used for the alcoholic fermentation presented systematically, regardless of the variety, a lower aromatic intensity, lower fragrances of flowers, fruits, exotic, etc.
- In the case of the Pinot gris wines, the settling technology influences the organoleptic characteristics of the wines, being less vegetal and with fresher fragrances of fruits/flower, which are easier to highlight. The type of enzyme used for the settling has no significant importance from the perspective of the organoleptic results.
- In the case of the Pinot gris wines, from the organoleptic perspective, the highest influence is presented by the use or lack of use of selected fungi for the fermentation, and their selection. Even if by using spontaneous fermentation can be obtained wines with a higher complexity from the aromatic perspective, they are not as intense, attractive or commercial as the wines fermented with selected fungi which excel in highlighting the exotic, fruit or flower fragrances (especially Y2 and Y4). In the case of compromised harvests or grapes with a lower quality the selected fungus Y3 seems to be a desirable biotechnological solution due to the aromatic and taste consistency even if it is less spectacular on the olfactory level as the other two fungi mentioned above.
- In the case of Sauvignon blanc, significant aromatic differences were obtained with the selected fungi Y5 and Y6 which registered systematically high grades for exotic, acacia, sambucus fragrances. Good results were also obtained using Y2 especially in the olfactory area of fruits, flowers, exotic fragrances.
- In the case of the technological versions Tamâioasă Românească was observed that the traditional aromas (like honey) are not influenced significantly by the use or the type selected fungi, while other aromas (like

citrus, acacia, exotic fragrances) are determined by the type of fungus, Y4 and Y7 having above average results in the group.

- The analysis techniques HS-GC-MS applied to the analysis of the volatile compounds allow the differentiation of the wines obtained from the same must with various selected batches of fungi. The study showed that it is possible the correlation of these results with the grades obtained at the sensory analysis for all three variations considered. The result is important mainly because the experiments were conducted both on a non-flavored variety and on a semi-flavored and flavored variety.
- During the three harvesting campaigns some selected fungi showed important characteristics from the organoleptic perspective. Y2 and Y4 for Pinot gris, Y2, Y5 or Y6 for Sauvignon blanc, and also Y7 for Tămâioasă românească. These selected fungi can be the proper solutions for obtaining the fresh and fruity wines which are demanded by the consumers.
- The study confirmed that it is possible even in areas with warm climate and not optimal for obtaining high quality white wines to produce wines of a high quality by using a certain package of bio-technological solutions adequate and adapted for each variety (enzymes and selected fungi).
- The study contains practical elements and answers for the questions of the wine makers, highlighting the effects of some wine making materials used for the raw materials from our country and the features present in the production units on the physical-chemical and organoleptic characteristics of the wines.
- The use of wine making materials does not require the change of the wine making technologies and equipments.
- From an economical perspective the use of wine making materials is opportune and has proven to be a practice which must be generalized. Both the enzyme compounds and the selected yeasts, when properly used, have a positive effect on the wines, the benefits obtained exceeding the costs required for their use.
- The study was concluded with technological recommendations and proposals for wine making protocols for the three studied varieties (Pinot gris, Sauvignon blanc, Tămâioasă românească) from a major wine making area, the Oltenia Hills.
- The research can be continued to prepare wine making instructions and protocols to improve the physical-chemical and organoleptic characteristics of the wines from other major wine making areas of the country.