# STUDY ON THE AUTHENTICITY AND TYPICITY OF RED WINES OBTAINED FROM LOCAL GRAPE VARIETIES

## ABSTRACT

Wine authenticity and typicity is an important and difficult problem, which could be solved by correctly quantifying a large range of aspects, from vine growing conditions to commercialization of the final product.

Authenticity is defined by true, real, not-fake, original, whose reality cannot be questioned. Typicity means something that can separate, characterize an object, the complexity of characteristics that individualizes, particularizes.

Authentic wines are clean, not-fake, original, true wine, in accordance with their description. Typical wines are those that are characteristic to a wine-making technology, specific to the origin area, specific to a certain grape variety.

Establishing authenticity and typicity of the wines represents the whole range of experimental and sensorial methods, that through statistical analysis of the obtained data confirms or infirm the registrations that come with the certain wine

The wine represents a complex mix of organic and anorganic compounds. There are many diverse factors that influence its composition. They can come from the vineyard, extending to the fermentation and post-fermentation process. These factors are deeply connected to the oenological environment, including soil, climate, grape variety and oenological practice that also define the authenticity and typicity of wines.

In the present conditions, the local grape sorts managed to show their virtues, ending in obtaining more qualitative data than the world-wide known grape varieties.

The present study has as main aim obtaining data concerning appreciating authenticity and typicity of red wines obtained from 15 local grape sorts out of which 8 old grape varieties (Fetească neagră, Băbească neagră, Bătută neagră, Busuioacă de Bohotin, Negru de Căușani, Negru moale, Negru vârtos and Vulpe) and 7 new Vinifera creations (Amurg, Arcaș, Balada, Codană, Negru aromat, Negru de Drăgășani and Novac) of different vineyards (Panciu, Odobești, Dealu Bujorului, Huși and Iași), when applying different treatments of maceration-fermentation

Grape harvesting was done manually, in plastic buckets. The grapes were transported and processed in the Oenology Laboratory of the Horticultural FacultyIaşi, after first applying classical maceration, thermo-maceration and ROTO-tanks maceration. After destemming and crushing, the marc was homogenized in order to obtain a similar

compositions characteristics wine sample. The applied technological schemes are the following:

**VARIANT 1 (V1)** - At classical wine-making, to the marc, after being destemmed and crushed, was added selected yeasts of *Saccharomyces cerevisiae* (30g/100kg) and pectolytic and proteolitic enzymes (1,5g/100kg marc). Maceration-fermentation was done in static plastic vessels, for 72 hours with must cap pumping 6 times/day for 15 minutes. After maceration-fermentation, the marc was pressed with a hydraulic pump, while the obtained wine was passed into glass demijohns for its alcoholic and malo-lactic fermentation. A week after the end of malo-lactic fermentation, the wine was racked and fined. Bottling was done after filtering.

**VARIANT 2 (V2) –** In the thermo-maceration method, after obtaining the marc by crushing and destemming, the must was racked, while 2/3 of its volume was heated to 80˚C, then mixed with the rest of the marc until reaching 60˚C. After 15 minutes, the marc was brought to the surrounding temperature with the other third of unheated must. After this process, the marc was processed in the same way as classical wine-making method.

**VARIANT 3 (V3) –** Concerning the ROTO-tanks maceration technology, the marc was kept in stainless steel tanks for 72 hours with homogenizations for 6 times/day for 15 minutes. After this process, the marc was processed in the same way as classical wine-making method.

**VARIANT 4 (V4) –** *Carbonic maceration* was realized with whole grapes of the same harvest with the same physical-chemical characteristics, healthy, without being crushed and destemmed, in a closed recipient with a grill situated at 15 cm under which must in full fermentation was added, in order to assure the $CO_2$ necessary for this maceration. The carbonic maceration was considered finished when the berries skins were partially or totally discolored and the berries are easily crushed. The marc was pressed with the same hydraulic press used for the other processing technologies, while the wine followed the same steps as in the classical maceration.

**VARIANT 5 (V5) –** For obtaining *blanc de noir* wines from Fetească neagră, whole healthy grapes were hydraulically pressed and the obtained must was treated with coal for decolouring (0,5 g/L). A part of this treated must was filtered and then alcoholically fermented in the same conditions as white grapes processing, while the other part was fermented after selected yeast (25 g/hL) being added. Thus, two variants of *blanc de noir* wines were obtained. The unfiltered sample was filtered after the end of the alcoholic fermentation, in order to eliminate the used coal for discoloring. The two obtained *blanc de noir*s did not suffer a malo-lactic fermentation, having to fulfill the sensorial characteristics of white wines. The samples were bottled after being fined.

**VARIANT 6 (V6) –** The *improvement of chromatic parameters and color intensity* of the obtained wines were tried at grape varieties that don't accumulate sufficient color because of climatic conditions of the area or because of a longer vegetation time of varieties cultivated

in the north-east of Romania, area with a lower culture potential for obtaining red wines. After obtaining, homogenizing and a short fermentation of the marc, pectolytic enzymes (1,5 g/hL) were added. The Fetească neagră grapes were harvested from Uricani center, Iaşi vineyard. The marc mass was divided in three as follows: the total quantity of must was reduced by 10 %, 20 % and 30 %, the remaining marc extracting more color compounds and thus having a more intense color. The quantities of must that were subtracted at first were then separately processed for obtaining rose wine. The three variants for improvement of chromatic parameters and color intensity were then processed according to a classical wine-making method, as in VARIANT 1 from the above. Three wine samples of Fetească neagră were fined and bottled.

**VARIANT 7 (V7) –** When obtaining rose wines from Fetească neagră the must extracted from VARIANT 6 (color intensity concentration) after selected yeast being added (25 g/hL). The must was processed similar to white wines. The wine was then fined and bottled.

One must mention that the grape variety used for all the seven variants was Fetească neagră harvested from the above mentioned vineyards, and processed by 7 above mentioned technologies. This matrix was used in order to underline the influence of each used technology and of each vineyard, the *terroir* on the authenticity and typicity of wines and their composition characteristics.

All the local black grape sorts were processed according to the classical wine-making technology in static vessels with homogenization of marc during maceration-fermentation (VARIANT 1).

Physical-chemical analyses and the ones regarding chromatic characteristics and the anthocyans profile in the studied wines were effectuated a month after their bottling. The wines' color was simulated on the computer using DIGITAL COLOUR ATLAS 3.0 software, calculating the color differences according to the formulas of the International Commission on Illumination: $\Delta E$ 1976 and $\Delta E$ 2000. Formulating and testing the statistical hypothesis using ANOVA tests was done, in order to establish the degree of influence of vine growing conditions (vineyard), maceration-fermentation technologies on the participation percentage of each anthocyan of the total anthocyans' profile specific to each studied grape sort.

The studied wines can be classified according to physical-chemical composition parameters and color parameters: *controlled origin denomination – late harvest* (DOC-CT), the wine samples that have a minimum of 12,5 % vol. alcoholic concentration and a non-reductive extract of minimum 21 g/L, as in: F.N.-V1-Odobești, F.N.-V2-Panciu, F.N.-V3-Panciu, Băb.N.-V1-Dealu Bujorului, Băb.N.-V1-Odobești și B.B.-V1-Huși; *controlled origin denomination – full maturity* (DOC-CMD), the wine samples that have a minimum of 11,0 % vol. alcoholic concentration and a non-reductive extract of minimum 21 g/L, as in: F.N.-V1-Panciu, F.N.-V1-Dealu Bujorului, F.N.-V1-Adamachi, F.N.-V1-R2-Uricani, F.N.-V1-R2-V6-10%-Uricani, F.N.-V1-R2-V6-30%-Uricani, F.N.-V1-R2-V6-20%-Uricani, F.N.-V2-Dealu

Bujorului, F.N.-V2-Adamachi, F.N.-V2-R2-Uricani, F.N.-V3-Dealu Bujorului, F.N.-V3-Adamachi, F.N.-V3-R2-Uricani, F.N.-V7-R2-Uricani, F.N.-V5-R2-F-Uricani, F.N.-V5-R2-NF-Uricani, Băb.N.-V1-Adamachi, B.B.-V1-Adamachi, Codană-V1-Odobeşti, Balada-V1-Adamachi and Negru aromat-V1-Adamachi, and *geographical indication* wine (IG), with wines that have a minimum of 9,0 % vol. alcoholic concentration and a non-reductive extract of minimum 19,0 g/L, as in: F.N.-V1-R1-Uricani, F.N.-V2-R1-Uricani, F.N.-V3-R1-Uricani, F.N.-V4-Panciu, F.N.-V4-Dealu Bujorului, F.N.-V4-Adamachi, F.N.-V4-R1-Uricani, F.N.-V4-R2-Uricani, Codană-V1-Adamachi, Amurg-V1-Adamachi, Arcaş-V1-Adamachi, Bătută neagră-V1-Adamachi, Negru de Căuşani-V1-Adamachi, Negru de Drăgăşani-V1-Adamachi, Negru moale-V1-Adamachi, Negru Vârtos-V1-Adamachi, Novac-V1-Adamachi and Vulpe-V1-Adamachi.

One could notice the different classes the wines enter according to maturity degree of the grapes at harvest. In the case of wine samples obtained from the processing of the Fetească neagră grape variety, the lowest values were found in the carbonic maceration sample and in the ones obtained from the first harvest of grapes from Uricani, as well as from the majority of grapes from the Ampelographic collection of p U.Ş.A.M.V. Iaşi.

Concerning the comparative presentation of absorption spectrums of the Fetească neagră obtained wines from each vineyard and processed through different maceration technologies (classical maceration, thermo-maceration, ROTO-tanks maceration, carbonic maceration) the following can be noted: the highest values are found in the thermo-maceration wine samples from all the studied vineyards, the classical maceration follows, exception being the wine from Panciu vineyard, where on second place is the ROTO-tanks maceration, while the next two variants are ROTO-tanks maceration obtained wine, with one exception (Panciu vineyard) and last, the wines obtained by carbonic maceration. When comparing the wines obtained from the same grape variety but harvested from different vineyards the highest qualitative values are found in the vineyards that fulfill the best the required eco-climatic conditions for black grapes, respectively the maturity degree at harvest.

The situation of the absorption spectrums of local wines obtained by classical maceration from Vasile Adamachi didactic farm is as can be seen: the highest values present themselves in wines from Vulpe, Balada, Novac, Negru de Drăgăşani, Fetească neagră, Arcaş, Negru aromat, Negru de Căuşani, Negru vârtos, Bătută neagră, Băbească neagră, Negru moale, Amurg, Codană and last Busuioacă de Bohotin.

Classification of the studied wines according to their color is similar to the already established order of absorption curves of the same wines.

Color intensity values have a decreasing trend proportional to the results of the color simulation of the wines and to their classification according to their absorption spectrums, while the hue values have an increasing trend, inverse proportional to the results of the wines' color. The used technology must also be taken into consideration when calculating the final values.

When calculating the color differences using the ΔE 2000 formula, which proved to be the most rigorous, the majority of wines can be sensorial differentiated, except: F.N.-V1-Dealu Bujorului with F.N.-V3-Dealu Bujorului and F.N.-V1-Adamachi, F.N.-V1-R2-V6-20%-Uricani with F.N.-V2-R2-Uricani, F.N.-V2-Dealu Bujorului with F.N.-V2-Adamachi and Novac-V1-Adamachi with Negru de Drăgăşani-V1-Adamachi.

It can be observed that by using a certain technology of maceration-fermentation when harvesting grapes earlier, like classical maceration, similar results can be obtained by applying less extractive maceration-fermentation technologies, like ROTO-tanks maceration, applied to more mature grapes, technologically speaking, harvested from the same vineyard.

These similarities only occur in wines obtained from the same grape variety or in wines obtained from grapes that have something in common, as: Novac and Negru de Drăgăşani, varieties obtained at SCDVV Drăgăşani, the first one homologated in 1987 and the second in 1993, breeder Mircea Mărculescu, grape varieties obtained by sexual hybridizing of Negru Vârtos and Saperavi.

The values of total phenolic compounds and anthocyans in Fetească neagră wines are very close in the case of the wines that do not have an obvious color difference, fact that is normal as long as these total phenolic compounds and anthocyans take part in color development.

Noticeable is the fact that the established order in the values of the total phenolic compounds is the same with the hierarchy of the anthocyans content, developed according to each wine's absorption spectrums and to computerized color simulation.

The area values of each main anthocyan are the only ones that can make a difference between the studied wines, with a few exceptions: F.N.-V1-Dealu Bujorului, F.N.-V1-Adamachi and F.N.-V3-Dealu Bujorului, which have the same value of the ratio between participation percentage of acetylated anthocyans and the participation percentage sum of cumari anthocyans. The value is 0,45 ± standard deviation for each wine sample. The three chromatograms are also similar, because of the grape sort Fetească neagră, from which the above mentioned wines were obtained. The analyzed samples did not have a sensorial color difference, which was calculated with the formula ΔE 2000.

All the other variants that weren't identified as different according to sensorial perception have different values of the ratios between the participation percentage of acetylated anthocyans and the participation percentage sum of cumaril anthocyans. Also, the ratios of area percentage sum of mono-glycosidic anthocyans and the area percentage sum of acetylated and cumaril anthocyans are different, even if the chromatograms have similar allures.

Considering the use of maceration fermentation techniques adequate to composition characteristics and to sanitary parameters of the crop, wines that "simulate" very well the authenticity prints of wines obtained from other vineyards or other maceration-fermentation technologies could be obtained.

The ANOVA statistical tests were applied in order to underline the possible authenticity and typicity characteristics that are influenced by vineyard or maceration technology. The results showed that the origin vineyard and the maceration-fermentation technology as well have a significant influence on the participation percentages of the main anthocyans. The data also demonstrated that there is no influence on the calculated ratios.

Even when comparing two wines obtained from the same grape variety and of the same vineyard, a significant influence of the vineyard on petunidin-3-monoglycozide, which is considered as the main mark of wine differentiation in cases when the wine samples seem identical.

When analyzing the wine authenticity and typicity, combined techniques may be used as isotopes analysis and mineral analysis. The obtained profile in unique for each wine and can definitely be used as authenticity proof. Of course, other methods (instrumental determinations and sensorial evaluations) are useful and could result in classifications with a high degree of accuracy, but, used alone, they cannot represent certain methods for wine authenticity.

Wine's authenticity and typicity is deeply connected to all the factors that can influence in a positive or in a negative way the physical-chemical state of the analyzed wines.