THE CHROMATICALLY AND MICROBIOLOGICAL CHARACTERISTICS OF SOME ROMANIAN RED WINES

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Abstract
In this paper we presented our studies regarding the chromatically and microbiological characteristics upon three different red wines: Fetească Neagră, Pinot Noir and Cabernet Sauvignon, from Orevita (2000). The wine color was determined by spectrophotometrical methods and represented in the CIE 1931 color space chromaticity diagram. Then, the main parameters of wine color: the brightness and the chromaticity were specified by the two derived parameters x and y, two of the three normalized values which are functions of all three tristimulus values X, Y, and Z. The chromatically characteristics of wine are much better precisely by C.I.E. Lab 76 method. It remarks that the brightness color was for Cabernet Sauvignon sample (66.027 %). The transmittance spectrums had the same form for all wine samples, with higher transmittance values for Cabernet Sauvignon. From the chromaticity diagrams we determined the dominated λ of absorbed radiations; the value of dominated wave length established the exactly wine color.
A microbiological analysis completes the characterization of these red wines. We found that the number of viable microorganisms cells was low, due to the age of wines and high stability of these. The acetic bacteria were predominant, with the highest value for Fetească Neagră. The Cabernet Sauvignon presented more yeast strains than other wine samples (23.33%).

Keywords: C.I.E. Lab 76, color space, microorganisms

1. INTRODUCTION

The color of wine is one of the most important parameters in the study of wine quality. For white wines, the color is due to the flavones and the phenol hidroxycaminici acids. The blanc de blanc expression is use for the color of white wine derived from white grapes exclusively. The poliphonens (anthocyan and tannins) join the flavones and the phenol hidroxycaminici acids to form the color of red wines. The value of the coloring intensity is correlated with the anthocyan content (Giurgiuieşcu L., 2008). These anthocyan could be in a free or polymerized form with the tannins. The polymerized forms are formed during the red wine aging and contribute 50% in the color forming, in the first year of wine storage. (Țărdea C., 2007)
The color of wine must be an objective assessment, made by measurements that allow the expression of experimental results in terms of count. Usual, the nuance and the intensity of wine color are calculated by optical methods (Niskanen I. et al, 2009). But the coordinates of color space characterize complete the color of wine. Because the red/green and yellow/blue opponent channels are computed as differences of lightness transformations of (putative) cone responses, CIELAB is a chromatic value color space. CIE L*a*b* (CIELAB) is the most complete color space specified by the International Commission on Lumination. It describes all the colors visible to the human eye and was created to serve as a device independent model to be used as a reference. The three coordinates of CIELAB represent:
- the lightness of the color \( L^* = 0 \) yields black and \( L^* = 100 \) indicates diffuse white; specular white may be higher,
- \( a^* \) - the chromatic component for complementary color red/green; negative values (-100) indicate green while positive values (+100) indicate red,
- \( b^* \) - the chromatic component for complementary color yellow and blue (negative values (-100) indicate blue and positive values (+100) indicate yellow).
The other color parameters are:
- the chromaticity \( C^* \) corresponding to dominated \( \lambda \) (wave length) of absorbed
radiations; its values: 0 (light color) – 141 (intense color) and

- Ho - the nuance of color, definite by azimuthally angle (0° - 51° for red wines and 52° – 80° for purple wines).

In this paper we studied the color of some Romanian red wines by spectrophotometrical methods. Then, the colors were represented in color space chromaticity diagrams. The chromaticity (x,y) and the brightness/luminance of the wine color (Y%) were calculated. These studies were completed by microbiological characterization of the same red wines, because the microorganisms conclusive influence all the wine characteristics.

2. MATERIAL AND METHODS

The studies were performed upon three different sort of red wine: Fetească Neagră, Pinot Noir and Cabernet - Sauvignon, from the same year (2000) and the same place (Orevița). The transmittance spectrums were studied with a Perkin Elmer UV/VIS spectrophotometer Lambda 25, with double fascicule, coupled with a computer IBM-PC.

The chromaticity of wine was then specified by the two derived parameters x and y, two of the three normalized values which are functions of all three tristimulus values X, Y, and Z:

\[
X = 0.42T_{625} + 0.35T_{550} + 0.21T_{445} \\
y = 0.20T_{625} + 0.63T_{550} + 0.17T_{445} \\
Z = 0.24T_{495} + 0.94T_{445}
\]

A number of microorganisms strains with distinct colonial characteristics were isolated for each wine sample; we differentiated yeast and bacterial strains (lactic or acetic bacteria) by microscopy and catalase reaction. The dimensions of yeast cells were determined with micrometer (light microscopy, oc.7x, ob.10x). For each sample were measured 50 cells for five repetitions.

3. RESULTS AND DISCUSSION

From the transmittance spectrums (Figure 1) of the different sort of red wine from the same year (2000) and the same place (Orevița), we noted the transmittance values for different λ (Table 1).

![Figure 1. The transmittance spectrums for Fetească Neagră (FN), Pinot Noir (PN) and Cabernet - Sauvignon (CAB)](image)

<table>
<thead>
<tr>
<th>T (%)</th>
<th>λ = 445nm</th>
<th>λ = 495nm</th>
<th>λ = 550nm</th>
<th>λ = 625nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabernet - Sauvignon</td>
<td>49.06</td>
<td>49.96</td>
<td>63.69</td>
<td>87.81</td>
</tr>
<tr>
<td>Pinot Noir</td>
<td>44.79</td>
<td>46.98</td>
<td>64.12</td>
<td>88.85</td>
</tr>
<tr>
<td>Fetească Neagră</td>
<td>38.48</td>
<td>40.38</td>
<td>56.10</td>
<td>84.68</td>
</tr>
</tbody>
</table>

Using the dates from Table 1, we determined the color coordinates of wine: x, y (Table 2).
Table 2: The color coordinates and the brightness for some red wine, Orevița (2000)

<table>
<thead>
<tr>
<th>The colour coordinates</th>
<th>x</th>
<th>y</th>
<th>Y (brightness) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabernet – Sauvignon</td>
<td>0.3588</td>
<td>0.3410</td>
<td>66.027</td>
</tr>
<tr>
<td>Pinot Noir</td>
<td>0.4248</td>
<td>0.3175</td>
<td>65.785</td>
</tr>
<tr>
<td>Fetească Neagră</td>
<td>0.3767</td>
<td>0.3501</td>
<td>58.821</td>
</tr>
</tbody>
</table>

Then, we realized the chromaticity diagrams, for every sort of red wine (Figure 2).

From the chromaticity diagrams we determined the dominated \( \lambda \) of absorbed radiations (red line for Cabernet – Sauvignon, blue line for Pinot Noir and black line for Fetească Neagră). For the description of the microbiological characteristics the number of viable cells/ml was established: 30 cells/ml – Pinot Noir, 210 cells/ml for Fetească Neagră and 240 cells/ml for Cabernet – Sauvignon (Figure 3).

It remarks that the number of viable microorganisms cells was low, due to the age of wines and high stability of these.

From isolated strains 26,66% were yeasts, 20% were lactic bacteria and 53,33% were acetic bacteria (Figure 4).

From Figure 4 it remarks the yeasts predominate in the Cabernet Sauvignon (CAB) sample and in the Pinot – Noir sample weren’t any yeast cells. The lactic bacteria were more numerous in the Pinot Noir (PN) sample and the acetic bacteria in the Fetească Neagră (FN).

The average of yeast cells dimensions was (7,20-7,74)\( \mu \)m/(7,20-7,74)\( \mu \)m for strain from Fetească Neagră sample and (5,20-6,24)\( \mu \)m/(5,20-6,90)\( \mu \)m for Cabernet Sauvignon sample (Figure 5).
These dimensions are normal for yeast cells.

4. CONCLUSIONS

It was found that the determination of chromatic characteristics of wines by the method CIE-Lab 76 leading to more accurate results than those obtained by other known methods. This method facilitates understanding of the correspondence between the visual impression of wine color and numerical expression of chromatically parameters of wines.

The studied samples from Orevița (2000) had normal microbiological characteristics for ten years old wines. The number of viable cells was low and the dimensions of cells were specified for wine yeast.

5. REFERENCES


