

Evaluation of Differences on the Sensory Characteristics of Wine Produced from Non-Dried and Dried Grapes by Using Discriminative Sensory Test, Two out of Five

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Abstract:

Eight wines produced from Kallmet and Cabernet Sauvignon, from non-dried and dried grapes and in two years 2011 and 2013 were subjected of discriminative sensory test 2out of 5. The aim of the study was to confirm by human perception, the chemical data that shows differences between wines from non-dried and dried grapes. A group of 15 trained panelist after tasted the wines in a blind test were asked to group the wines in two groups according to their similarity. After a small break a visual evaluation took place. The panelists were asked which of the wines were more intense in color. Data showed that for the first test (2 out of 5) the panelist were able to differ with a high significance level between the wines from non-dried and dried grapes, for both varieties and for both year of production. The visual test also shows that for year 2011 the panelist differ between wines of Kallmet 9 of them evaluate wines from dried grapes as more intense and for wines of 2013, 10 panelist evaluate wines of dried Kallmet as more intense than non-dried. For Cabernet wines of this year 10 panelist evaluate the wines from non-dried grapes as more intense in color.

Keywords: analysis, discriminative test, red wine, non-dried and dried grapes.

1. Introduction

Sensory evaluation, which represents the response human on physic-chemical properties of foods and beverages, has become very important in these days. On the basis of these methods the human subjects are used as instruments. A series of new methods, new statistical and mathematic techniques are applied for having the best results which represent much better the perception human.

Based on what we want to determine the methods for sensorial analysis are divided in three groups: 1-the methods which determine the differences between the samples (Discriminative Tests and Descriptive Tests) 2- the methods which gave answer to the reasons why we have these differences, called Mapping of Preferences and the last 3- the methods which show the preferences for a product like consummators Test or Hedonic test [1].

Discriminative tests are becoming a useful

tool for both quality control and product development. The discriminative test aim to detect the presence or the absence of differences between two products. The sensorial characteristics which can give the differences are not know by the panel test [2]

Even that it looks like easy to determine if there is a perceived sensory difference between samples, this process is complex. Botta in his book stated that this complexity is due to two sensory behaviors: 1) two physically different stimuli can evoke two identical sensory response 2) the same stimuli can evoke a variety of sensory responses on different occasions [3]. The most know discriminative tests are the Triangular test, duo-trio test and test p from n (for ex 2 out of 5). The two out of five test is an efficient test from statistic point of view as the chance to guess correctly two out of five sample is 1 in 10 compared with triangle test were the chances are 1 in 3. This method is used when the test objective is to determine

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whether a sensory difference exists between two samples, but the test is strongly affected by sensory fatigue [4][5].

Sensory analysis are seen as useful tool in winemaking to detect problems during the winemaking process, as a tool to characterized a type of wine or as tool that enhances the instrumental analysis [6]–[9].

The aim of this study was to determine if there are sensory differences between wines produced from non-dried and dried grapes. After that physic-chemical analysis shows differences between these wines, the discriminative sensorial analysis were used to see if this differences can be perceived also by human.

2. Material and Methods

2.1. Sample Selection

In the focus of the study were four wines produced from non-dried and dried grapes from two vintages 2011 and 2013.

Table 1. Discription of samples taken in this experiment

Variety	Vintage		Grapes	Site	Abbreviation
Kallmet	2011	2013	Non-Dried	Hajmel	K_ND
	2011	2013	Dried	Shkoder	K_D
Cabernet Sauvignon	2011	2013	Non-Dried	Shijak	CS_ND
	2011	2013	Dried	Durrës	CS_D

The wines were produced from two varieties, Kallmet an autochthonous variety of Albania and Cabernet Sauvignon an international variety. The grapes for these wines were non-dried and the other wines were produced from dried grapes (off-vine). There was no repetition in 2012, as the grape of this year in the sites were we took the grape, was not healthy and in this conditions it was a high risk to be affected from mould during drying process.

2.2. Experimental Conditions

The sessions took place in the sensory evaluation room of the School of Engineering Changins in Nyon (Switzerland) under white light and controlled temperature (20-25°C). It has 22 cabins, each equipped with a computer terminal for direct entry of responses and a data acquisition system: the FIZZ

Software (BIOSYSTEM, Couternon, France). The sessions took place over a period of one day.



Figure 1. The preparation of the samples in black glasses and the coding with three digit numbers.

In the two-out-of-five test, the panelist was given five samples. The panelist was instructed to identify the two samples that are different from the other three. The samples were randomly coded by three-digit numbers were sampled in order of presentation according to a Latin square Williams to avoid presentation order bias. Finally, the wine samples were served in glasses and black with covers in order to avoid a phenomenon waiting for the panelists and concentrate only on the perception in mouth samples. The glasses were filled in the same volum 40ml with the help of pomp Model CALIBREX 521.100, Verrerie de Carouge.

The panelists were asked to divide the samples in two groups according to the similarity of samples.

Name : Date

Sur name :

You have 5 samples. You have to divide the samples in two groups (one group of two and the other group in three identical samples)

The samples have these number :

425 736 257 849 333

Must give a response !

Figure 2. Example of a questionnaire for the test 2 out of 5 [2]

The chi-square and binomial statistics are suitable for analyzing most discriminative tests including the two-out-of-five test [1].

The chi-square statistic takes the form:

Equation 1

$$X^2 = \sum_{i=1}^n \frac{(O - E)^2}{E}$$

E= Expected ($E = \frac{n \cdot 1}{10}$) n= nr of panelist

O= Observed

The binomial statistic takes the form:

Equation 2

$$P = \sum \frac{N!}{C!(N-C)!} = p^n (1-p)^{n-c}$$

n= number of panelists; c= correct response and p= probability of each panelist choosing the two correct samples by chance (1/10)[10].

After the first session the panelist took a break. A visual evaluation of wine took place after. The wine were served in transparent glasses, coded with letters A, B, C... and the panelist were asked which wine were more intense in color, by comparing the wine from non-dried and dried grape.

2.3. The panelists

The panelists were 15 people (8 men, 7 women), all internal panelists of Ecole de Changins. Some panelists work in the world of wine but had no notion of sensory analysis before taking advantage of this panel.

2.4. Statistical analysis

Statistical analyzes were performed using the FIZZ Treatments software to analyze sensory data, software R equipped FactoMineR packages, SensoMineR and for analyzes of variance and multivariate statistics. Seven panelists tested only Kallmet wines for both years and the other seven panelists tested the Cabernet wines for both years in two session for each year.

3. Results and Discussion

The results were taken direct in the end of the session by the software of FIZZ. The results in Tab.2 for year 2011, showed that the panelist could differ with a very high significance the wine from non-dried and dried grapes. The response was the same for both varieties, where for Kallmet wines from 7 panelists only 4 of them arrived to differentiate the wines and for Cabernet Sauvignon wines from 7 panelists, 6 of them arrived to differentiate the wine

from each other. So the data fulfill in this way the physical-chemical results for these wines that shows that drying process affect the chemical content of wine and this can also percept by sensorial analysis [11].

Table 2. Results of test 2 out of 5 for year production 2011

	No Answer	Answer Expected	Answer Correct	Signif.
K_D/KND	0	7	4	0.0027**
CS_D/CSND	0	7	6	<0.0001***

*Significant with the level of 99.9%. treatment uses the binomial rule (or distribution) with 1/10, according equation 2.

For the year of production 2013 (Tab. 3) the results shows that for Kallmet wines the panelist arrived to differ with a high significance the wines from non dried and dried grapes. From 7 panelists 4 of them arrived to find the correct answer.

Table 3. Results of test 2 out of 5 for year production 2013

	No Answer	Answer Expected	Answer Correct	Signif.
K_D/KND	0	7	4	0.0027**
CS_D/CSND	0	7	2	0.1497

*Significant with the level of 99.9%. treatment uses the binomial rule (or distribution) with 1/10, according equation 2.

For the Cabernet Sauvignon of this year (2013) the panelist weren't very significate in their answer. They thought that there were no differences between non-dried and dried wines. From 7 panelists just 2 of them gave the correct answer.

The visual test shows also that the panelists can differentiate the wines from each other by their intensity in color. For wines of 2011 (Tab.4) the results shows that from 15 panelist 9 of them evaluate the Kallmet non-dried as more intense, 5 of them evaluate Kallmet dried as more intense in color and 1 of them evaluate them like equal.

Table 4. Results of visual test for wine of 2011

	More intense	Equal
K_D (A)	5	1
K_ND (B)	9	

This visual evaluation fulfill again the physical chemical analysis of these wines that shows that color parameter are different between wines from non-dried and dried grapes. But colorimetric measurement shows that wines from dried grape are characterized by a lower L* component, that means that these wines were darker. Also the absorbance in 500-550nm that

is related with the absorbance of anthocyanins (pigments of the color) were higher in wines from dried grapes [11].

For the wines of 2013 the panelist evaluate that there were differences between wines produced from non-dried and dried grapes (Tab.5). For Kallmet wines from 15 panelist 10 of them evaluate the Kallmet dried as more intense in color, 5 of them evaluate Kallmet non-dried as more intense, no one of them evaluate them as equal. For Cabernet wines it were the opposite as 10 of them evaluate Cabernet non-dried as more intense in color, 4 of them evaluate Cabernet dried as more intense and one of them evaluates them like equal.

Table 5. Results of visual test for wine of 2013

	More intense	Equal
K_D (E)	10	0
K_ND (F)	5	
CS_D (G)	4	1
CS_ND (H)	10	

4. Conclusions

Sensorial analyses are becoming very useful tool in now days for evaluation of quality of food. After a long work in chemical evaluation of these wines evaluation by human response it will give a complete overview for these samples. Data shows that drying gives wines that differ from wines from non-dried grapes. These differences are measureable not only by laboratory equipment but also by human senses. The panelist in this research arrived to differentiate the wines from non-dried and dried grapes for both years of production 2011 and 2013. Also the response by panelists was the same for both varieties. In visual test were the panelists were asked which the more intense wines were, also they arrived to differentiate the wine from each other. In this case the data weren't completely in accordance with the chemical analysis. But the fact that the panelist arrived to differ the color it is a good response. But other sensory tests needs to be compiled in the future in way to understand in much more details the changes between samples.

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