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QUALITY ASSESSMENT OF SELECTED POLISH GRAPE WINES

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Summary

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Wine has been in human life for thousands of years. The taste and aroma, the health benefits of making this drink one of the most popular low-alcoholic beverages consumed by people.

Wine traditions in Poland date back to the 12th century. Today, thanks to increasingly favorable climatic conditions, Polish wine-making is experiencing rebirth. Polish producers wishing to popularize their products should produce good quality wines if they want to enter the domestic market as well as in the world markets.

Wine quality is a relative concept. It is believed that it shapes the taste and aroma created by the ingredients contained in it. The composition of the wine is determined by geological and climatic conditions, the vinification process and the length of ripening of the wine produced.

Quality tests are performed using sensory methods, which allow you to evaluate the flavors. Composition of wine is determined using generally expensive instrumental methods (eg spectrophotometry, chromatography). The disadvantage of these methods is the lack of possibility to investigate the flavors. It is therefore necessary and reasonable to develop and test inexpensive equipment that would permit a quicker assessment of the quality of wines. Such devices may be potentiometric flavor sensors.

The main purpose of thesis

The main purpose of the study was to develop and apply a six-channel potentiometric taste sensor with All Solid State Electrode (ASSE) to evaluate the quality of red dry wines of the Pinot Noir grape strain, in terms of selected characteristics such as: vintage, crop region, composition and changes taking place under the influence of air access.

The subject of thesis

The subject of research are Polish red, dry grape wines of the Pinot Noir grape strain originating from the vineyards of Srebrna Gora, Adoria, Jaworek and Milosz. French wine of the same grape strain (B & G) was used as the standard. The wine samples were from: 2012, 2013, and 2014.

The summary of Ph.D. thesis

The dissertation consists of two parts: theoretical (chapters 1, 2 and 3) and the experimental part (chapters 4, 5, 6, 7 and 8).

The theoretical part of this dissertation describes the grape varieties for the production of red grape grown in Poland. The definition of wine quality has been defined, the grading and quality markings of wines in Poland and France are presented. The following section discusses factors influencing the quality of the wine. The health aspects of red wine consumption have been presented. Wine tourism and the collector's aspect of wine are discussed. An analysis of the cost of selling wine on the example of selected Polish vineyards was conducted. The consumption of wines in Poland with wine consumption in France and in the world was also compared. Presented are methods of testing the quality of red grape wines. Sensory methods of wine quality assessment have been discussed, with a presentation of the mechanism of action of the sense of taste. The stages of wine tasting and the consumer CSI methodology have been characterized. Described instrumental methods were used to examine total polyphenol content in red wines (absorption spectrophotometry method) and saccharide content (refractometric method). The types of taste sensors and their uses for evaluating the quality of red wines are presented. The mechanism of operation of the potentiometric taste sensor was discussed, which was used to examine the quality of red wines.

The experimental part presents the physicochemical, organoleptic and potentiometric methods of testing red wine grapes. Physicochemical studies related to wine composition and included determination of: total acidity, polyphenol content, saccharide content and % vol. ethyl alcohol. Based on the results obtained, it was found that the overall acidity and saccharide contents of Polish wines from different regions differ significantly and do not exceed the reference value given in the Regulation of the Ministry of Agriculture and Rural Development of 21 May 2013. The polyphenol content showed the highest concentration of polyphenols in Jaworek wine 2012 while the smallest in Miłosz wine was in 2013. In the case of saccharide content, the highest concentration was found in Jaworek wine, and the lowest in wine was Adoria 2013. The T test showed significant ($p < 0.05$) differences between the samples tested saccharide content. The determined ethyl alcohol content of the wine samples tested was less than the value declared by the manufacturers on the labels.

The next part of the study concerned potentiometric measurements using the developed six-channel potentiometric taste sensor with ASSE electrodes, which was used

to compare the quality of red grape wines originating Polish vineyards and French vineyards of the same grape strain (Pinot Noir grape strain). The results obtained with this taste sensor correlated with physicochemical and organoleptic results. The results show the performance characteristics of a six-channel potentiometric taste sensor, its sensitivity to taste, reproducibility and stability over time.

With the use of a six-channel potentiometric taste sensor can distinguish wines from Polish vineyards because of their region of production. Wine from vineyards: Jaworek, Adoria and Milosz located in the west of the country form one group, while the wines from the vineyard Srebrna Góra, which lies in the south of the country, constitute the second group. Comparison of wines from Polish winery with wine from the French vineyard, Jaworek 2012, Miłosz 2014 and WSG 2012 are one of the B&G wines used as a standard. Samples of other wines exhibiting different flavors are the second group. In addition, it was found that with the potentiometric taste sensor with the ASSE type electrodes it is possible to differentiate between red dry wines due to the year of manufacture and also distinguish between freshly opened wines and daily wines opened for 21 days. Wines in which air access is characterized by changes in polyphenol content. With the use of taste sensor can be grouped wines with saccharide content corresponding to dry wines, semi-dry, semi-sweet and sweet.

Two pairs of red wines from the Polish and French wineries were conducted for the CSI consumer satisfaction survey. On the basis of the evaluation of six characteristics (taste, smell, color, cork, information on the label and price) consumers rated the French wines rather than the wine from the Polish vineyard.

It has been shown in the dissertation that a potentiometric taste sensor with six ASSE electrodes can be used to discriminate red dry wines with relatively small composition changes. This is an innovative approach as these sensors were mainly used for products where the differences in the tested features were greater. The conclusions of the studies discussed in this paper suggest the possibility of using this taste sensor to control the quality of grape wine at the final stage of its production process.