INSTRUMENTAL METHOD FOR DETERMINATION OF GRAPE WINE TURBIDITY RESISTANCE

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Turbidity resistance is one of the main indicators that determines the safety of wine within the expiration date, so it is important to be able to properly assess it and own various methods for determining it. Evaluation of turbidity resistance is carried out using tests that provoke and stimulate the occurrence of turbidity and / or sediment. For example, to assess biochemical opacities, oxidase cass propensity tests are performed. If the nature of turbidity is physicochemical, then the tendency to colloidal, metallic and crystalline opacities is determined [1].

One of the main tests is to determine the tendency to irreversible colloidal opacities, which are typical for white table and champagne wine materials, as well as wines. Irreversible colloidal opacities are due to the presence in the wine material of a complex of biopolymers consisting of proteins, phenolic substances, polysaccharides and iron ions. The method for determining irreversible colloidal opacities is based on external influences of a chemical and physical nature, accelerating the processes of coagulation and sedimentation of protein substances and their complexes. Determination of the turbidity resistance is carried out at the stage of blending wine materials, and the end result is the choice of a scheme for processing wine material [2].

Thus, the purpose of this work was to determine the opacity resistance of grape wines and wine materials by a quantitative method.

Materials and research methods. The object of the study were three samples of the blend, consisting of different wine materials (table 1). Tests to assess the turbidity resistance were carried out in the physical and chemical laboratory of JSC «Minsk Sparkling Wines Plant». Before conducting laboratory tests to determine the tendency to colloidal opacities, a trial processing of wine materials was carried out in the production workshop of the plant, which included the addition of gluing agents in a certain ratio, namely: bentonite and fish glue. After processing, laboratory tests were carried out to establish the optimal ratio of bentonite and fish glue, ensuring the absence of turbidity throughout the entire shelf life.

Table 1 - Characteristics of the objects of study

Sample No.	Composition of wine material
1	Raw Pinot, Raw Riesling, Natural White Processed Sauvignon, Natural White Processed Chardonnay, Raw Bianca
2	Raw Pinot, Natural White Processed Chardonnay, Raw Chardonnay, Raw Bianca
3	Raw Pinot, Raw Chardonnay, Raw Bianca

The ratios of bentonite and fish glue used in the experiment to select their optimal ratio based on the results of determining the turbidity resistance are presented in Table 2.

Table 2 – Concentrations of using agents

Substance	Concentration, g/dm^3							
Bentonite	0,2	0,2	0,4	0,4	0,6	0,6	0,8	0,8
Fish glue	0,1	0,2	0,1	0,2	0,1	0,2	0,1	0,2

Preparation for testing of wine material treated in different proportions with bentonite and fish glue (table 2) consisted of the following: filtration; adding a saturated (25%) alcohol solution of tannin; heating in a boiling bath and cooling. At the same time, the control sample was only filtered.

The test consisted of comparing the transparency of experimental and control samples by visual and quantitative methods.

To determine the turbidity resistance by a visual method, the transparency of all experimental and control tubes was evaluated, choosing the most transparent sample of wine material. The ratio of gluing agents, which is contained in the selected test tube, was considered optimal to ensure the turbidity resistance of the blend. The test was carried out by specialists from the production laboratory of the plant, who have the status of selected testers according to ISO 8586:2012 [3].

To quantify the turbidity resistance, a turbidity meter was used, which makes it possible to obtain numerical values of the turbidity index. The principle of operation of the device is based on the determination of the opacities value using the primary signal of the nephelometric detector (90°) and the signal of the transmitted scattered light detector. Turbidity measurement was carried out in all test samples. The control sample was an experimental tube, selected according to the results of visual evaluation as the most transparent. The obtained numerical values of the turbidity of the test samples were compared with the values of the opacity of the control sample, i.e. turbidity resistant wine material.

Results and discussion. The results of testing the objects of study by the visual method are shown in Table 3 and indicate that in order to ensure the turbidity resistance of the blend samples we studied, 2 or 4 parts of bentonite must be used for 1 part of fish glue.

Table 3 – The results of choosing the optimal ratio of gluing agents to ensure the turbidity resistance of the objects study

Sample No.	1	2	3
Selected concentrations of gluing agents (bentonite: fish glue), g/dm^3	0,4:0,1	0,2:0,1	0,4:0,1

The results of measuring the turbidity indicators of the experimental and control samples indicated the following. The turbidity values of the three control (turbidity resistant) wine materials were equal to: 1.2 FTU (sample No. 1); 1.6 FTU (sample No. 2); 1.8 FTU (sample No. 3). Based on these data, in comparison with the turbidity values of other experimental tubes, we concluded that the maximum value of the turbidity index cannot be more than 1.8 FTU for turbidity resistant wine materials.

Thus, the results obtained allow us to conclude that to determine the turbidity resistance of wine materials, it is possible to use an instrumental method for determining turbidity using a turbidity meter, provided that there is a sample of wine (wine material) with the proven turbidity resistance as a standard.

References:

1. Handbook of winemaking / V.V. Andreev [et al.]; Ed. V.M. Maltabar and E.M. Shpritsman // Moscow: Food industry, 1973. – 408 P. (in Russian).

2. TI 190239501.9-2.041-2011 Requirements for the stages of testing grape wine materials for turbidity and processing in order to stabilize the produced grape wines. Entered: 10.06.11. – Minsk (in Russia).

3. ISO 8586:2012 Sensory analysis – General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors. Publication date: 2012-12; Edition: 1, Number of pages: 28.