ANTIOXIDANT ACTIVITY OF GRAPE AND WINE PRODUCTS.

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ABSTRACT

Uzbekistan conducts scientific research on the issues. Antioxidants, protection of wines from antioxidants is the oxidative processes of wine, the theoretical basis for the preparation of oxidized wines, such as dry red (cabernet) and the improvement of new technologies, primarily for the production of finished products with high added value based on deep processing of local raw materials.

The intensity of oxidative enzymatic processes depends on technological methods. At the same time, conditions are created for the passage of secondary oxidation-reduction processes. Knowledge of the chemistry of enzyme preparations will allow you to correctly build the technology of making wines depending on their type. [1,2]

Introduction. In the technological chain of wine making, oxidative processes begin immediately after harvesting grapes, which, in accordance with the recommendations, must be protected with sulfur dioxide (SO2).

Key words. Enzymes, antioxidant protection, tyrosinase oxidation, dismutation, sulfitation, oxygen.

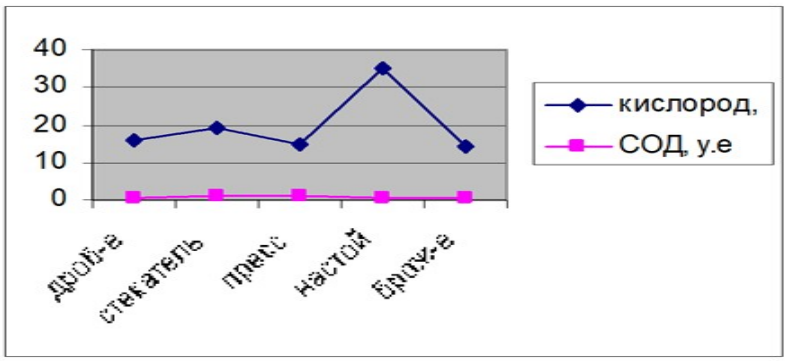
The study of the state of the antioxidant protection system during the processing of grapes and the production of wine materials [3,4] is of particular interest and will allow us to regulate the degree of protection of the must and wine materials from oxidative stress, which is especially important when processing grapes into table, slightly oxidized wines. The redox potential value can be used to

characterize the degree of oxidation of wine and control the production of various types of wine. The redox potential value of wine, which is affected by many factors, is determined by the ratio of the concentrations of oxygen and reducing agents. However, various effects on wine (for example, the introduction of SO2) will cause a simultaneous change in both the concentration of O2 and the concentration of reducing agents, and it is not always possible to establish a relationship between the redox potential value and the quality of wine. Oxygen in wine is weakly active and must be activated to initiate oxidation. In wine, iron ions serve this purpose. Hydrogen peroxide is a relatively weak oxidizer in relation to wine components, but in the presence of iron it is reduced to the hydroxyl radical, a very strong oxidizer. The hydroxyl radical is capable of oxidizing any organic substrates, and its high reactivity explains the possibility of oxidizing even alcohol in the presence of antioxidants such as SO2 or phenolic compounds [5,6]

Research methods. The analysis was carried out on a mixture of both white and red wine grape varieties, sulfated to 150 mg/dm3. Starting from the moment of grape acceptance until the wine material was obtained, the concentration of oxygen and the activity of the enzymes superoxide dismutase (SOD), peroxidase and catalase, which are part of the antioxidant defense system (AOS), were determined before and after each technological operation.

SOD activity was determined by a method based on its ability to inhibit the reduction reaction of nitrotetrazolium blue; activity.

Analysis and discussion of research results.



Ionic forms and mainly SO--3 bind oxygen most easily. Sulfuric acid suppresses the action of oxidative enzymes and prevents the oxidation of polyphenols and other substances. SO2 reacts directly with oxygen and protects polyphenols and other components from oxidation, and the main function of SO2 is to remove hydrogen peroxide formed during the oxidation of polyphenols. In samples where oxygen saturation is noted, the reaction of the active form of sulfurous acid with oxygen can be represented by reaction 2, where 2 moles of bisulfite react directly with one molecular oxygen, forming two moles of sulfate:

$$2HSO_3^- + O_2 \rightarrow 2H^+ + 2\,SO_4^{2-} \quad (1)$$

Study of red grape processing technology. presence of antioxidant protection. The main directions of development of the national economy of Uzbekistan envisage expansion of the range and improvement of the quality of food products, including wine. [7,8]

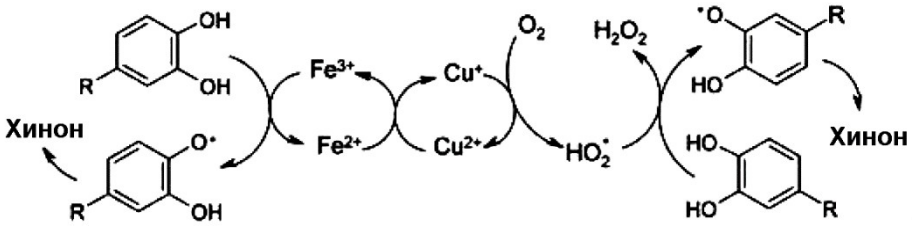
In the future development of the industry, it is planned to increase the production of aged vintage dry and high-quality fortified wines that meet modern requirements for environmental friendliness. These circumstances require both the improvement of existing technologies and individual stages and phases. If we consider that SOD activity is the first sign of the presence of active forms of oxygen, then the most dangerous or vulnerable in the processing of white wines should be recognized as such technological methods as pressing and settling. In general, when processing white grapes, the following technological methods can act as sources of "oxygen stress":

SO2 performs its antioxidant function mainly in a reaction with hydrogen peroxide. The main antioxidant action of sulfur dioxide in wine is due to the bisulfite ion, which reacts with H2O2 to form sulfuric acid, thus limiting further oxidation of phenolic molecules or ethanol. Undissociated sulfurous acid H2 SO3 ionic (HSO13 and SO23) and related forms have little such properties. In an

aqueous system, SO2 forms sulfurous acid, which dissociates so that the bisulfite form (HSO3-) predominates in wine, as shown in the reaction: [8,9]

$$H_2O + SO_2 \quad HSO_3^- + H^+ \leftarrow\rightarrow SO_3^{2-} + 2H^+ \quad (4)$$

The antiseptic effect of SO2 in red must is much less frequent than in white, since most of the SO2 is spent on binding with coloring agents. Increasing the dose of SO2 reduces the stability of coloring to 50%. To protect coloring agents from oxidation, it is necessary to introduce free SO2 at a level of 20-30 mg / l. According to the results of the analysis, it follows that red wines are not sufficiently protected from oxidative stress, which can be explained by the binding of SO3, reducing its antimicrobial effect. Part of the oxygen dissolved in wine is spent on its oxidation into sulfuric acid and is catalyzed. He, which are always present in wine in the form of iron ions. Sulfurous acid inhibits the action of oxidases. It is customary to introduce SO2 in red wine in smaller quantities (how much) since tannins and catechins contained in sufficient quantities have natural antimicrobial properties and secondly, SO2 reacts with anthocyanids of wine and discolors them. It seems that for this reason, in wine, especially in red wine, the interaction of SO2 with oxygen is effectively blocked by polyphenols. At the same time, wine aldehydes (acetic and others), reacting with anthocyanins, prevent excessive oxidation. Oxidation of catechins by Fe(III) catalysis with the production of hydroperoxide (hydroperoxyl) radicals and quinone is shown in Scheme 5



(5)

However, the oxidation product of the sulfite radical (SO3•-), the peroxymonosulfate radical (SO5•-), is a very strong oxidizer. In the presence of oxygen, SO2 also promotes oxidation, which is prevented by the action of polyphenols, which remove the radicals.

Consequently, the processing of red grapes apparently promotes an increase in the bound forms of SO2, thereby reducing its antioxidant effects. [10,11]

-SO2 removes hydrogen peroxide, and polyphenols block its interaction with oxygen, and only then is the antioxidant effect realized.

- Sulfitation of red must in the amount provided by the technological instructions is clearly insufficient to ensure antioxidant protection.

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