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USE OF WINE WASTE AND PRODUCTION OF BIOCHEMICAL VINEGAR

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ANNOTATION:
When processing grapes in winemaking and non-alcoholic industry A significant amount (from 15 to 20 %) of waste is generated, the rational use of which makes it possible to additionally obtain products that are of significant value for a number of sectors of the national economy. The article presents the amount of waste generated in winemaking, their chemical composition and national economic significance. A technological scheme for the production of secondary products, such as biochemical vinegar from the waste of winemaking, is presented.

Keywords: grapes, wine, waste, secondary products, recycling, technological operation, winemaking, ridges, pomace.

INTRODUCTION:

In the 21st century, people are increasingly beginning to think about the harm they cause to the planet Earth and the atmosphere. Developed countries come up with ways to reduce the negative impact of their activities on nature. Unfortunately, so far their contribution to the preservation of the overall purity of the planet is small. Nevertheless, the need for the purity of the surrounding nature is increasing. Therefore, large and small enterprises follow with interest the news in the field of modern methods of waste disposal. Some of them acquire for their use inventions that make it possible to destroy the garbage produced with minimal consequences for the environment.

Today there are two directions of utilization - regressive and progressive. Regressive - outdated, continuing to harm nature, and subsequently all of humanity. Progressive - based on respect for the planet, moreover, it is also very useful for a person. Choosing a progressive direction of recycling, the company helps to reduce the consumption of non-recoverable and conditionally recoverable resources through the use of a significant percentage of waste in various industrial sectors. Waste disposal facilities are required even by those who operate in the old-fashioned way - taking waste to landfills.

Modern production conditions have led to the fact that the amount of waste is very large, so it is necessary to reduce the volume of waste to be cheaper to deliver it to the dump site ... Enterprises purchase crushers, waste pressing machines and sealed bags so that they can store waste on their territory until it is transported to the landfill. Progressive enterprises want not only to reduce their harm

to the environment, but also to make money, or at least not go into the negative by disposing of their own waste. Therefore, the composition of waste is carefully studied, which may well become a source for the production of products of other enterprises.

Disposal of industrial waste that pollutes the human environment is one of the most important environmental and economic problems of society. Agriculture illustrates this situation most clearly. The main source of food waste in agriculture is crop production. During the processing of products, a large amount of waste remains, suitable for the production of animal feed, natural soil fertilizers.

Let's take a closer look at such a branch of agriculture as viticulture. A lot of waste is generated in wine production. When processing grapes for wine, raw materials and waste are formed up to 20% of the volume of processed grapes, the main of which are the following,%: ridges - 1-7; pomace - 10-14; seeds - 3-4; yeast sediments - 2.5-6. When producing wine materials: tartar - 0.5-2 kg per 100 dal of cognac stillage (about 2/3 of the volume of distilled wine material); thick precipitation - up to 3 decaliters per 100 decaliters of wort or wine material; glue precipitation - up to 0.9 per 1 dal of 20% bentonite suspension used for pasting; Prussian blue sediment - 0.7-1.2% of the volume of processed wine material.

Comprehensive processing of secondary raw materials of winemaking is recognized not only as necessary and useful from the point of view of environmental and recreational activities, as it helps to reduce environmental pollution, but also as a highly effective type of commercial activity. In addition to the well-known product - wine, the vineyard produces a lot of useful waste, which is highly valued in other industries. After the processing of grapes, the constituent parts of the grape bunch, berries, ridges, winnow, vinasses, seeds, yeast, etc. remain for the main product. The seeds and combs are then used to extract tannin from them. The perfumery industry receives enanthic ester from viticulture, or its other name - cognac oil. Most of this product is contained in yeast sediments, but it is also extracted from the pomace, albeit in very small quantities. It is more expedient to use fresh pomace for the extraction of dyes from them.

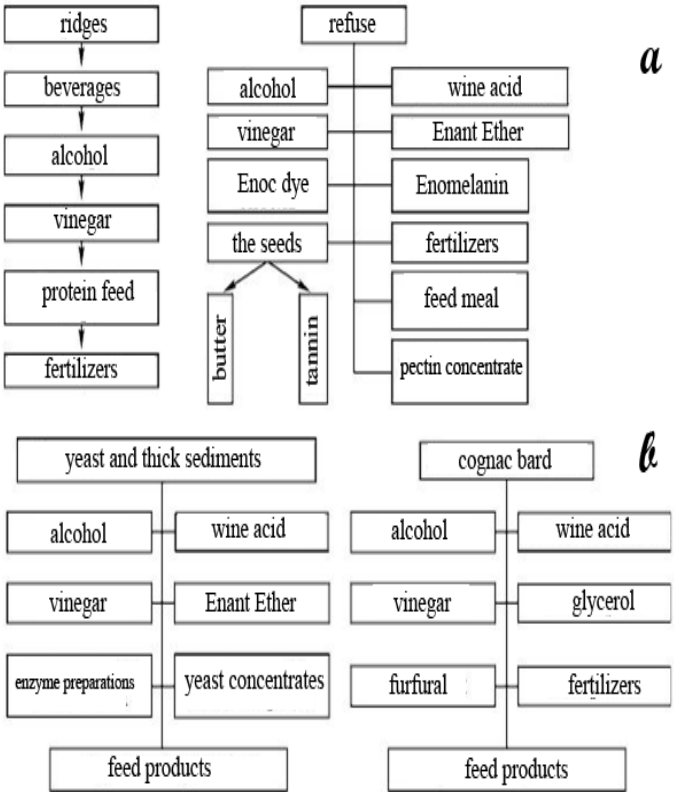
By-products of grape processing are a valuable source of mono- and polyphenolic compounds that exhibit high biological activity. Grape pomace contains procyanidols, which have a number of valuable quality properties, have a positive effect on blood vessels, prevent anherosclerotic processes, and have antioxidant properties. The utilized solid fraction of grape pomace and fruit pulp can become a source of dietary fiber, dyes, vitamins, and minerals. For this reason, the development of effective methods for the complex processing of plant raw materials, including the secondary processing of industrial waste, on the basis of which it is possible to obtain additional products, is currently very relevant. There are the following main types of secondary raw materials for winemaking: pomace obtained after pressing grapes in the production of white and rosé wines, non-alcoholic products or after squeezing out the fermented pulp in the production of red wines; ridges - the hard part of the bunch, remaining after the separation of the berries during the crushing of the grapes; yeast sediments - yeast with various inclusions that settle to the bottom of barrels or tanks after fermentation; thick sediments deposited after sulphitated wort settling, as well as after the fortification of wort and wine materials; glue deposits formed as a result of pasting wine materials with various clarifying materials; tartar, falling out together with yeast during alcoholic fermentation of grape must, during processing and aging of wine and deposited on

the bottom and walls of wine-making tanks; sludge of juice production, falling out during sedimentation and storage of juice, during pasteurization and processing of juice with cold; precipitation formed during the production of vacuum wort and bakemes; stillage cognac, remaining after the distillation of young wine materials into cognac alcohol. From the secondary raw materials of winemaking, with its rational and complex use, additional products are obtained, which are necessary in the bunk bed farm: tartaric acid, ethyl alcohol, grape, grape oil, enotannin, food eno dye, feed meal from pomace and feed yeast. The production of wine vinegar is of particular interest. From yeast sediments, food protein, pure amino acids, enanthic ester, vitamin preparations, etc. are obtained.

Figure 1 shows the waste of processing grapes into wine and by-products from them. The ridges separated during crushing of grapes are moistened with must and contain (%): sugars - 1-1.5; tartaric acid - up to 0.1; tannin - up to 3.27; pentosans - up to 2.8; protopectin - 0.7; mineral substances - up to 2.4. The combs are processed for the following purposes:

- 1) obtaining ridge must - 1 dal from each ton of grapes, which is used to obtain alcohol and vinegar;
- 2) extraction of phenolic dyes used in the production of non-alcoholic and low alcohol drinks;
- 3) production of protein feed - yeast mass from grape ridges and pomace.

Detachable ridges are often used as fertilizer.



Picture 1. Waste from the processing of grapes into wine and by-products from them (a, b).

Pomace from continuous presses is 13% hydraulic, up to 12% screw and are characterized by the following indicators: remnants of ridges - 3, skins - 65, seeds - 32% of the total mass; humidity - 48-55%; density - 1.05-1.2; bulk weight - 350-470 g / l; moisture content - 30-60 ml per 100 g; the sugar content is 25-30% of their concentration in the wort.

In terms of chemical composition, grape pomace is valuable because their main component - the skin - has a rich polysaccharide complex, contains a significant amount of phenolic substances and lignin (Table 1).

Table 1. Chemical composition of grape skins of some technical varieties

Components, mg / 100 g of dry preparation	Content in grape varieties	
	White	Red
Polysaccharides (by the sum of monomeric components) including:	42-44	41-45
- cellulose	24-25	24-25
Phenolic and ligno-like substances	36-38	37-39
Nitrogenous substances (nitrogen)	1,4-1,6	1,5-1,8
Ash residue	2,5-2,7	2,6-2,8

The content of pectin substances is about 6.8% in dry matter. According to the method of processing grapes, pomace is divided into three groups: sweet, fermented and alcoholized. The characteristics of the composition of these types of pomace are presented in Table 2.

Table 2. Composition of the main substances of grape pomace (%)

Substance	Refuse		
	sweet	fermented	alcoholic
Sugar	5-10	-	4-6
Alcohol	-	4-5	5-8
Tartaric acid	0,5-2	0,7-2,5	1,2-3
Oil in seeds	10-24	10-24	10-18

The pomace is processed immediately after pressing by extracting sugars and tartaric acid compounds. In the absence of such opportunities, the pomace is placed in cement trenches and silage.

The pomace is used to obtain crude alcohol, tartaric acid (VKI), feed meal, tartaric acid compounds and seeds.

Wine and alcohol are obtained as follows technological scheme:

1. Raw materials - waste - are poured with hot water (for 1 ton of raw materials 2-2.5 m3 of water), infused for 8-12 hours, the liquid is drained, and the pomace is pressed.
2. The resulting wort is free-flowing and pasteurized from pressing for 2-3 minutes. at 85 ° and cooled to 25 °.
3. The wort is drained into vats or large barrels and a pure yeast culture is added. The temperature in the fermentation room is maintained at 18-25 °, in this case, vigorous fermentation takes 7-10 days.
4. The wine is decanted, poured into large-capacity barrels installed in the basement, where the temperature should be 10-12 °, and kept for 2-3 months. During this period, the quality of the wine increases and it self-clarifies. If the strength of the wine after vigorous fermentation is insufficient, then for its better preservation, raw alcohol is added to bring the strength of the wine to 9-10 °.
5. After vigorous fermentation, a certain amount of wine is left, which is distilled to obtain raw alcohol.

At wineries, a slightly modified method of obtaining raw alcohol is used, in which grape pomace is fermented, after which alcohol is distilled off from them.

The resulting wine is used in the manufacture of biochemical vinegar. Pre-prepared oak barrels with a capacity of 150-300 liters each. The barrels are installed horizontally so that the bottoms serve as side walls. Inside each barrel, a wooden lattice frame is attached to 1/3 of the height, below which beech shavings are placed (in the form of rolls). On the bottom of the barrel, a drain cock and a water gauge glass are reinforced and holes are made above the level of the grate for air access. The holes are temporarily closed with wooden plugs.

Then the barrels are filled with hot water, treated with steam, and the gauge glass is calibrated into different containers in the working area.

The technological scheme for preparing vinegar is as follows:

1. The apparatus heated by steam is oxidized with hot 8-9% vinegar, all the holes in it are closed and kept for a day, and then the vinegar is drained. If its strength is below 5%, then the oxidation is repeated.
2. Prepare a mash of wine and vinegar. In this case, the sum of alcohol and vinegar should be 10, that is, if the alcohol in the wine is 6 °, then vinegar should be added at the rate of 4% acetic acid. The mash is pasteurized and loaded into the apparatus to the top of the grate and allowed to cool to 32-35 °, and then a pure culture of acetic acid bacteria is added.
3. The plugs from the air holes are removed, replacing them with gauze swabs so that air can enter the apparatus, but not vinegar flies. The acetic acid fermentation process lasts 8-15 days, the acidity of the vinegar should be 8-9%. After that, part of the vinegar is drained and replenished with mash, etc. The temperature of the fermentation room is maintained within the range of 25-35 °.
4. Ready vinegar is kept in glass bottles for 2-3 months, then filtered or clarified according to the method indicated for the production of juices.
5. Vinegar is bottled and pasteurized at 65-70 °.

In the production process, the loss of sugars is about

10%, and the yield of alcohol 50 l from 100 kg of sugars and 85 kg of acetic acid from 100 l of alcohol.

During the fermentation of grape must, tartaric acid precipitates in vats, and also forms on the surface of their walls in the form of a stone that contains tartaric acid. The precipitate is collected, washed from yeast, dried and sent to special plants to obtain pure tartaric acid. After obtaining the wine must, the grape pomace is processed in a washing vat or on a shaking sieve to separate the skin from the seeds (pits). The grape skins can be used for feeding purposes and the seeds can be dried. They contain up to 15-16% oil, which is extracted by extraction in special factories.

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