AGRISCIENCE AND TECHNOLOGY
Armenian National Agrarian University
ԱԳՐՈԳԻՏՈՒԹՅՈՒՆ ԵՎ ՏԵԽՆՈԼՈԳԻԱ АГРОНАУКА И ТЕХНОЛОГИЯ
International Scientific Journal
ISSN 2579-2822

Journal homepage: anau.am/scientific-journal
doi: 10.52276/25792822-2021.4-414

UDC 663.2

Developing and Implementing Technology of Rosé Wine Production from the Grape Variety "Charentsi"

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ARTICLE INFO

Keywords:
rosé wine,
teinturier grape,
Charentsi,
alcoholic fermentation,
sensory evaluation

ABSTRACT

The research results indicate that the demand for high quality and unique wines is eventually increasing. The goal of the research was to develop and implement technologies of rosé wine production from little studied teinturier grape variety "Charentsi", for getting high-quality product according to the international standards. During the study, rosé wines were produced from the abovementioned grape varieties by applying different techniques. Besides, physicochemical and organoleptic evaluation for all wine samples were carried out.

Introduction

The production of rosé wines in Armenia is not very much developed, though Armenia has almost all required preconditions for that. The latter is partly due to the lack of demand for quality wines in the former USSR countries, where the wines produced could hardly meet the requirements of the current wine market with nowadays market conditions. Suffice it to say, that currently in developed countries the consumption level and dimensions of rosé wine has significantly increased, which can greatly encourage Armenian wineries to develop such type of wine production technologies. Rosé wine contains essential ingredients for human organism that stimulate carbohydrates, nitrogen and mineral exchange. Table wines are rich in chemical elements such as manganese, fluorine, vanadium, iodine, titanium, cobalt, potassium, phosphorus, rubidium; the latter has a beneficial effect on the nervous system cells. (Boulton, et al., 1999, Gabrielyan, 2021).

In addition to the above noted facts, it is also noteworthy, that rosé and red wines contain various valuable substances, which are neccessary for human body. Wines contain vitamines belonging to groups B, PP, pantothenic acids and biotin. Among the volatile substances constituting the wine bouquet, there are ether oils, compound ethers, algehids and tanning agents neccessary for preserving the elasticity of blood vessels (Moreno and Peinado, 2012).

Materials and methods

The aim of the research was to develop the production techniques of rosé wine from "Charentsi" grape variety

in line with international quality standards. Based on the abovementioned we have become committed to introduce some innovations producing rosé wine from "Charentsi" grape variety which is a local crossbreed of late ripening grape variety made from "Amur x Jemchug Saba" elite seeds and "Karmrahyut" grape variety. The research also aimed to investigate the production process and its details.

In order to produce dry rosé wine from Charentsi grape variety, grape harvesting was implemented in the period of grape technical maturation, when 210 g/l average sugar content and 6-7 g/l total acidity was recorded. Raw material from the vineyards was delivered to the winery in small boxes, weighed and sent to the grape receiving hopper, where, depending on the characteristics of the grapes, potassium metabisulphite (MBSK) was added to it. The grape was destemmed and crushed by gear crushers, then processed through "pipe in pipe" type heat exchanger with the mono-pump, where the already crushed mass of grape was cooled to 12 °C.

Depending on the peculiarities of the 3 wine types, the must was separated from the crushed grape mass parallelly with 3 different methods: 1. free run must, 2. pressed fraction (up to 1.4 Bar), 3. SAIGNEE method.

It is worth mentioning that 3 subsamples were taken from each sample extracted through the mentioned methods to get precise and average statistical data. The grape musts extracted through the abovementioned methods were transferred to separate tanks, where they were kept at 15°C temperature. The further technological procedures for all 3 types of grape musts were implemented similarly; that is, the must was transferred to a tank, where the pectolitic enzymes and bentonite were added. The next day the tank was racked off, then the must was inoculated with the same type of yeast. The fermentation proceeded at the temperature of 17-18 °C. On the 3rd day of fermentation aeration was performed, during which a fermentation activator was added. The fermentation terminated with a rather low sugar indicator. After the complete fermentation, the wine was racked to a storage tank, where potassium metabisulphite was added. Storage temperature was 11-12 °C and it was periodically refilled. Then, periodically battonage (mix of wine and pure lees) was implemented. The latter makes it possible to keep the wine from being oxidized and gives it a specific flavor value.

The resulted wine samples were investigated by applying not only different physicochemical but also organoleptic (Triangle Test, Paired Comparison Test) methodologies. All applied methods are approved and guaranteed by International Organization of Vine and Wine (OIV) (OIV 2016, ISO 5495:2005, ISO 4120:2021).

Table 1. The chemical parameters of the grape samples*

Weekly measurements	Brix	PH	Total acidity, g/l	APA	Malic acid, g/l	NH_4^+
1	15.1	3.1	9.2	210	1.8	105.8
2	17.4	3.32	7.5	273	1.5	122.3
3	21.1	3.5	6.3	324	1.1	150.7

*Composed by the authors.

Results and discussions

In the grape and wine composition there are substances belonging to various chemical groups: carbohydrates, organic acids, phenolic and nitrogen substances, mineral elements, micro and macro elements, etc. In the course of grape processing these elements are transformed into the mash and further - to wine, as well as undergo compound transformations, thus becoming a source for creation of multiple new compounds. These transformations and the type of new compounds are related to the wine making technologies. Thus, wines produced with different technologies from the same grape variety differ in their chemical composition (Gabrielyan, 2021, Ribereau-Gayon and Dubourdieu, 2006).

The physicochemical indicators of the wine musts extracted through 3 different techniques were investigated, the results of which are introduced in Table 2. From general physicochemical viewpoint the grape musts are not drastically different from each other. Depending on certain technical peculiarities some differences were observed which cannot impact wine must quality and styling significantly.

Table 2. The chemical parameters of wine samples*

Samples	Alc., vol%	Residual sugar, g/l	pH	Volatile acidity, g/l	Total acidity, g/l
Wine 1	12.5	1.5	3.35	0.37	5.2
Wine 2	12.3	1.3	3.5	0.35	5.5
Wine 3	12.4	1.0	3.4	0.42	5.3

*Composed by the authors.

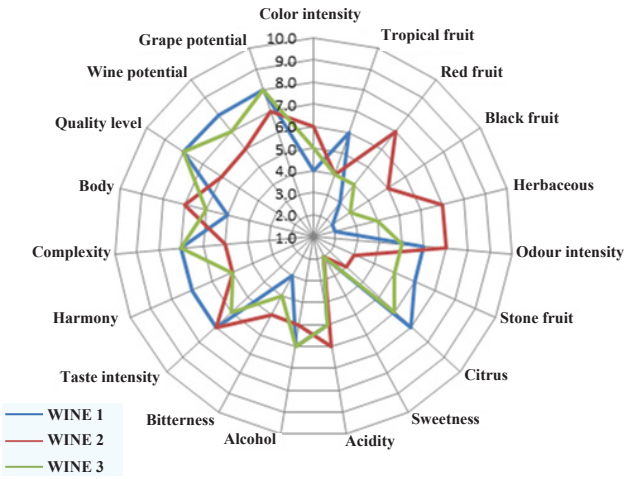

Figure. The aroma wheel of the investigated wine samples (*composed by the authors*).

Table 3. The content of total phenols in the samples*

Samples	Total phenols, mg/l
Must 1	537
Must 2	721
Must 3	584
Wine 1	392
Wine 2	516
Wine 3	458

*Composed by the authors.

Total phenol concentration in the wine must was also investigated the results of which are summed up in Table 3. It is obvious that the phenol concentration decreased after production procedures. However, relatively higher concentrations were recorded especially in rose wine.

In the wine sample 1 (wine made of free run must) the lowest concentration of total phenols was observed which can be viewed as a positive outcome for rosé wine made of such a grape variety.

After analyzing the results of Paired Comparison Test it was identified that the organoleptic indicators of the samples were different, moreover, after tasting, the majority of testers preferred the sample made of free run must.

According to Triangle Test results it can be surely stated, that the sample made of free run must was not drastically different from the one made with Saignée method, however, it is significantly different from the sample made of pressed must. Taking into consideration the demand for rosé wine flavors in the internal and external markets, the majority of testers reacted positively choosing the wine sample 1 and wine sample 3 as the best samples.

Based on the research results, the aroma wheel of the investigated wine samples was designed (Figure).

Conclusion

Hence, the results of the research show that it is possible to produce rosé wine from "Charentsi" grape variety in line with international quality and standards. The research findings prove that the wine sample made of free run must is significantly different from the other samples; it has relatively lighter coloring and body, which is the main factor accounting for its selection as the most preferable one.

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Accepted on 29.11.2021
Reviewed on 05.12.2021