

Preliminary quality results regarding S.V.-18402 interspecific hybrid berries processed by multiple techniques to obtain a novel food product

R. Sandor¹, T. M. Gocan¹, F. D. Bora¹, Ad. Hoble¹, A. C. Babeş¹, R. Indrea¹,
C. I. Bunea¹ and Am. Călugăr^{1*}

¹ Faculty of Horticulture, Advanced Horticultural Research Institute of Transylvania, Viticulture and Oenology Department, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

*Corresponding author e-mail: anamaria.calugar@usamvcluj.ro

ABSTRACT

In this study, SV 18402 interspecific hybrid (PIWI group grapevines) was subjected to processing by syruping the berries before boiling. The variants were: V1.1. - grape product from berries without skin – filtered; V1.2. - grape product from berries without skin – unfiltered; V2.1. - grape product from berries with skin–filtered; V2.2. - grape product from berries with skin – unfiltered. Before processing, raw material was assessed for total soluble solids (186 g/l sugar), pH (3.25), and acidity (7.35 g/l tartaric acid). The variants of products measure soluble dry substance over 67% the minimum amount stipulated by the international standard, which guarantees the conservability of the product. Regarding sensory comparison, products from the whole berries (skin, pulp, and seeds) proved to be more acceptable by the general public, as compared to the other variants.

Keywords: grape, interspecific hybrid, jam, dry substance, organoleptic appreciation

INTRODUCTION

A wide range of products can be processed from grapes, juices, and jams, to various traditional products specific to each wine region. Even though Romania has a millennial winemaking tradition, the processing of grapes into different products is not done on an industrial level, only in small family businesses. Grape processing could be made from any grape cultivar once it has attained appropriate maturity. In traditional wine-producing countries, grape processing is made from *Vitis vinifera* grape cultivars. In other countries, the grapes are processed from *Vitis labrusca* grape cultivars or PIWI, which present as the main feature of the preservation of the natural 203flavor after pasteurization (Cosme *et al.*, 2022). The American grape cultivars keep the characteristic aroma of the natural grape after processing (Pop and Pop, 2015). Due to consumers' preferences for aroma, color, and 203flavor, grape juice is mainly made from American cultivars of *Vitis labrusca* species. In many European countries, grape juice and other secondary products are produced from *Vitis vinifera* grape cultivars (Soyer *et al.*, 2003). Most *Vitis vinifera* grape cultivars have an unpleasant taste after the heat treatment. In the United States and South American continent countries, the main cultivars used for processing production are mainly Concord and Muscadine (*Vitis rotundifolia*) cultivars (Cosme *et al.*, 2018). PIWI grape cultivars have a high resistance to fungal diseases and enable a significant reduction in the use of pesticides.

Therefore, these robust and innovative grape cultivars are an obvious addition to conventional, traditional grape cultivars with intensive plant protection (de Melo *et al.*, 2015). PIWI, by the way, is short for PilzWiderstandsfähig, a German term for vine cultivars that have been described previously as hybrids, direct producers, interspecific, disease-resistant, or disease-tolerant. Villard grapes are French wine hybrid grapes, which include the skin Villard noir and the white-wine cultivar Villard blanc. The Seyve-Villard 18402 is an interspecific grape, with typically dark blue or purple, it is a slip-skin cultivar, meaning that the skin is easily separated from the fruit. SV 18402 grapes have large seeds, with a weak aromatic (Bunea *et al.*, 2018). For traditional jam production process uses pectin as the gelation agent, which needs high temperatures for the gel formation (Pop *et al.*, 2015). Various studies have demonstrated that an increase in temperature is the main responsible factor for the loss of color of these pigments (El-Kassas *et al.*, 2014). Some of the PIWI grape cultivars are used for processing, due to their good nutritional and aromatic properties and being well-accepted by the consumers. Some hybrid cultivars are used for color improvement in products deficient in this sensory attribute (Costa *et al.*, 2019). The motivation of this work is to study a way of reevaluating the raw material – SV18402 grapes – which cannot be marketed or vinified for various reasons, but also to bring a new assortment of processed organic horticultural products.

MATERIAL AND METHODS

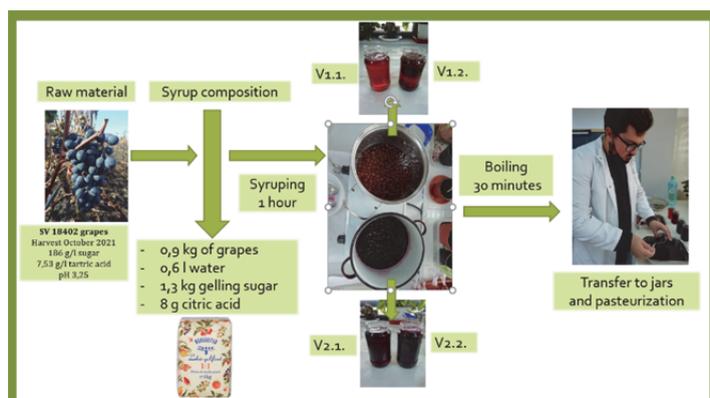


Figure 1. Technological scheme to obtain the variants of product from S.V. 18402 grape

The research was made in 2022, on Seyve-Villard 18402 interspecific hybrid grapes from the Ampelografic Collection of the Faculty of Horticulture and Business in Rural Development – University of Agricultural Science and Veterinary Medicine of Cluj Napoca, Romania. The Ampelografic Collection is in Cluj Napoca City, an area that is not included in a viticultural region. The grape samples were harvested at full maturity, in October 2022. The research methods consisted of evaluating the quality of the raw material before processing (sugar content – refractometric method, titratable acidity – titrimetric method, and pH – ph meter) (Rozsa *et al.*, 2020). Grape products prepared on a laboratory scale by boiling grape juice resulted from the removal of spared from stem, skin and seeds according to the Figure 1. The quality of the finished product's dry matter content was made as described by Rozsa *et al.*, 2020, after 60 days of storage. The prepared products were evaluated by 20 students, assessed by the panelist according to the hedonic scale (Lawless and Heymann, 2010) where 9 represented extremely like and 1 for extremely dislike. Sensory evaluation of jams was conducted to evaluate the quality characteristics including color, taste and aroma, and overall acceptability by following the methodology

described by Wichchukit and O'Mahony (2015). Technological scheme and experimental variants – Figure 1: V1.1. - grape product from berries without skin – filtered; V1.2. - grape product from berries without skin – unfiltered; V2.1. - grape product from berries with skin–filtered; V2.2. - grape product from berries with skin - unfiltered. The obtained data followed ANOVA and Tukey's test (5%) for comparison of means.

RESULTS AND DISCUSSIONS

In the current study, the SV 18402 interspecific grapes cultivar was analyzed for the proximate composition and used for product development. Before processing, the raw material had the following characteristics: 186 g/l sugar, 7.53 g/l tartaric acid, and a pH of 3.25. The prepared products were subjected to further analysis. The results obtained in the research work are discussed below. The dry matter had the highest values in the variants where berries with skin were used (V2). The highest dry matter value was determined for the variant V2.2.-72.7%, followed by V2.1.-69.4% (Table 2.) The refractometric measurement of soluble dry substance passed over the minimum amount of 67% stipulated by international standards, which guarantees the conservability of the product (Pop *et al.*, 2015). The pH values of variant jams were higher than raw material, maybe due to the citric acid added as a conservative (Table 1). Some studies showed that the pH of grapes jam could decrease with storage time (Umar *et al.*, 2022).

Table 1. Analyzed results of grape processed product variants

Variant	Dry substance %	pH
V.1.1	64.6 c	3.29 c
V1.2.	68.7 b	3.33 b
V.2.1.	69.4 b	3.32 b
V.2.2.	72.7 a	3.35 a

Means followed by the same small letter within the lines and the same capital letters within the columns were not statistically different in Tukey's test (5%). NS = Non-significant

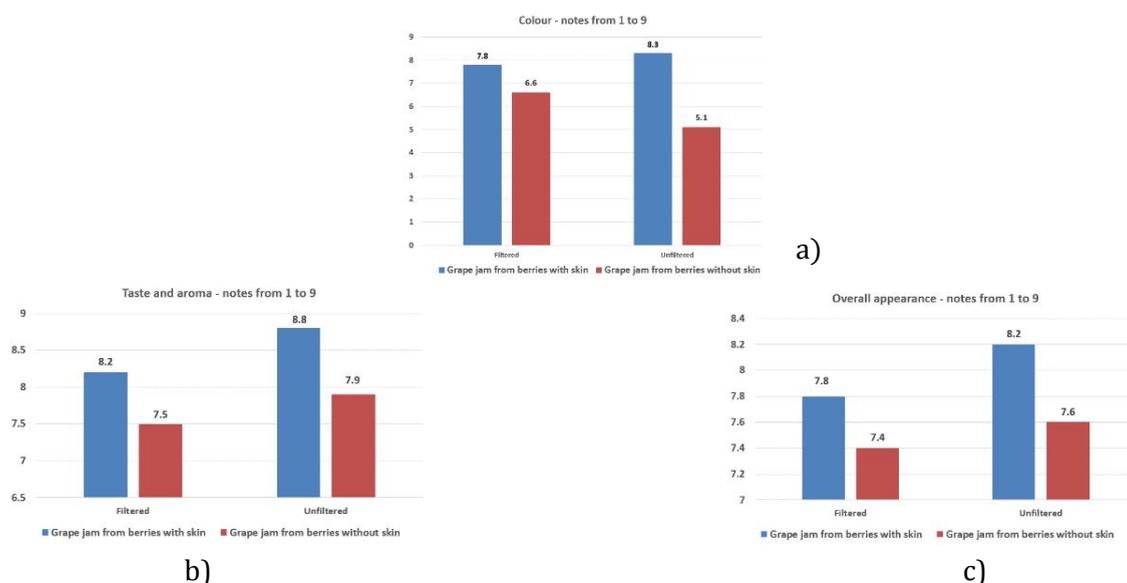


Figure 2. Organoleptic appreciation of products variants a) taste and aroma; b) color; c) the overall appearance

The organoleptic evaluation was done by of students, aged between 21-24 years and an equal proportion between women and men. Scores ranged from 1 (unpleasant) to 9 (pleasant). Color is a major parameter of the product for the cogent assortment by the

consumer side. The color of grape product is influenced by the natural color of cultivars. The highest score in terms of color was for V2.2.-8.8 and V2.1.-8.2, probably due to the initial color of the skinless grape berries (Figure 2a.).

The aroma was better appreciated in the products where were used the whole berries, with the skin: V2.2.-8.3 and V2.1.-8,8 (Figure 2b.). As a result of the organoleptic evaluation, it was found that the products from the skinned berries obtained the highest average for overall appearance, for V.2.2.-8.2 and at V2.1.-7.8 (Figure 2c).

Research finds that the jams obtained from black grape was more appreciated regarding overall appearance than the variant obtained from green grapes. Also, these findings describe that the appearance of grapes jams decreases due to storage time. During grape processing, heat treatments can adversely impact grape flavor, aroma and taste (Umar *et al.*, 2022). Organoleptic evaluations can be used to improve existing products, develop new recipes, or ensure compliance with food regulations and standards. Nevertheless, organic production systems have been an increasing trend lately. It justifies the interest in implementing such systems in regions where the abiotic conditions are more favorable (Comşa *et al.*, 2023).

CONCLUSIONS

Grapes are perishable commodities with substantial nutritional profiles and health benefits. Post-harvest shelf life of grapes is too short so the development of value-added products like jam will be a great approach to commercialize. The present study is the first attempt carried out on SV-18402, and its suitability for processing - in terms of obtaining a new grape processed product, through which the material can be exploited. In the worldwide market, in the last few years, there has been a wide range of food additives and nutritional products originating from grapes. Even with this distribution, consumers search the nutraceutical products' characteristics, but also their palatability.

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