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RESEARCH ON THE VALORIZATION OF MELONS AND THEIR BY-PRODUCTS

Cristina TOMA (VAPOR)[1, 2], Gheorghița HOZA[1], Radu-Andrei STERIAN[1, 2], Simona POPESCU[2], Dorel HOZA[1]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd, District 1, Bucharest, Romania
[2]ICDIMPH-HORTING Institute, Bucharest, Romania

Corresponding author email: cristina.vapor11@gmail.com

Abstract

The efficiency of utilizing watermelon rind has made the study presented in this paper spark interest in the potential of valorising watermelons rich in citrulline in various food products, as well as addressing a management and environmental issue. Consumers are becoming increasingly health-conscious and are showing interest in various new food products. The proposed objective was to create two different products based on watermelon rind. The resulting products fall into the categories of "Jam" and "Pickled vegetable preserves (in vinegar)". Fresh watermelon rind (Citrullus lanatus) was washed, the green outer layer was removed, and the rind was cut into uniformly sized pieces. For the jam, blanched rind was used, over which syrup (water, sugar, and lemon juice) was added and left to infuse. For the vegetable mix, the raw rind was used, mixed with vegetables (carrot, celery, green tomatoes, bell pepper, celery leaves) in a vinegar solution.

Key words*: consumers, products, valorisation potential, watermelon, watermelon rind.*

INTRODUCTION

Watermelon (*Citrullus lanatus*) is widely consumed because of its health benefits and low calorie count (Dammak et al., 2019; Masih et al., 2021). Its peel is one of the major wastes. Watermelon rind mainly contains pectin-rich carbohydrates and different methods are available for pectin extraction (Edwards AJ et al., 2003; Hee-Seon Han and Kyung Bin Song, 2021).

The nutritional importance of watermelons has been studied by Dr. Eng. Stefan NANU et al. (2023) and Naz A et al. (2014) for their particularly wide range of organic substances and minerals. Watermelon is an excellent source of vitamins A, B1, B6 and C, when consumed, the citrulline inside is converted into an amino acid called arginine, which is of great benefit to the heart, liver and circulatory system and helps maintain a healthy immune system.

The fruit is generally consumed fresh, but its peel is disposed of as waste. Thus In the study of Setlhoka et al. (2024) presents us the possibility of valorization by different variants of watermelon (cv. Sugar Baby) sweetness with peel and pulp.

Also, Arivuchudar (2023) and Aṣoka s. et al. (2021) in their researches present the importance of watermelon peel, which is a source of water, carbohydrates, proteins, vitamins, minerals and phytochemicals. Based on watermelon rind, he prepared a biscuit-like snack that is popular with consumers.

Research conducted by Mubarak et al. (2022) on the utilization of watermelon by-products as ingredients for a pastille-type product with different percentages of red pulp and peel puree. They used watermelon pulp, lycopene sources and peel by-product as citrulline sources. Another research presents the preparation of melon peel candy based on sugar and honey (Thapa et al., 2022).

Another experiment was carried out at Postharvest Laboratory, Department of Horticulture, Sher-e-Bangla Agricultural University, Dhaka, from February 2018 to December 2018 to determine the quality of melon peel jam with different concentration of sugar and flavor (Monir et al., 2019; Shruti Dubey et al., 2022).

Another research to highlight the potential of watermelon rind as a source of nutrients was carried out by Haque, Ahmed Redwan (2020) by utilizing them in the form of noodles.
The aim of the work was to emphasize the value of watermelon peels to obtain new and quality food products, and 2 products were obtained based on watermelon peel: watermelon peel sweet and Pickle Mix.

MATERIALS AND METHODS

The experiment was carried out at the ICDIMPH-Horting and the raw material was obtained in the institute's own greenhouses. The plant material used to set up the experiment was two watermelon hybrids: Sorento and Baronesa.
The preserves, "Watermelon rind jam" and "Watermelon rind in pickled vegetable mixture" were obtained with the help of the research team in the Research and Valorization Laboratory.
The focus of the work is directed towards the potential valorization of watermelon rinds for consumption in various preparations. Fresh watermelon peel which is a typical and unappetizing waste material, through the experimental process was transformed into new products with appreciated quality attributes.
The watermelons were analyzed quantitatively and qualitatively, sorted and washed until the moment of division. In order to create the product Sweetness according to the scheme in Figure 1, they were peeled of the green peel and red core. The watermelon rinds were washed, divided, blanched, allowed to diffuse in the syrup and then concentrated as shown in Figure 2. An important step in the technical flow is the conditioning of the containers. The resulting product is dosed into the prepared containers, closed and pasteurized at 100°C for 15 minutes. The preserves are labeled and stored under appropriate conditions, see Figure 1.
Pickles are a traditional product for the Romanian market, being a staple product and account for about 90% of the preserves obtained by natural acidification (Adriana Păucean, 2011).
To explore the possibilities of valorization of melon peels were used in a pickle mix. Thus the melon peel, was peeled of the green part and the red core.

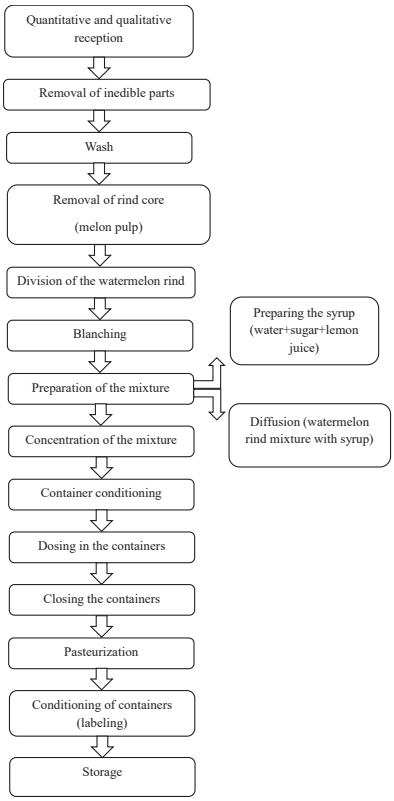

Figure 1. Technology flow of the product (Jam)

Figure 2. Stages in the technological product flow (Jam)

According to the established ratio (solid/liquid) the peel was divided into cubes and added to the vegetable mix. In the presented technological process the following steps are highlighted: conditioning of the containers, dosing of the product and filling with vinegar solution, sealing, pasteurization, labeling and storage according to the scheme shown in Figure 3.

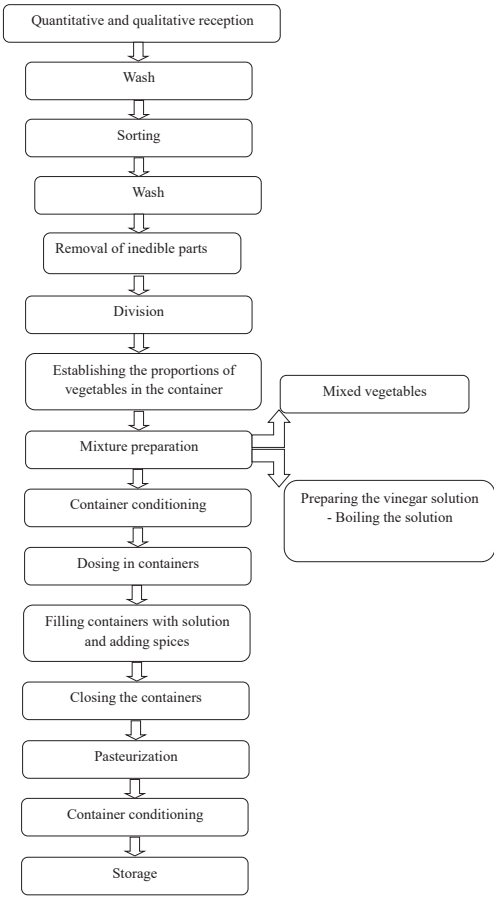

Figure 3. Technological flow of the product - Pickles

Figure 4 shows the split watermelon rind, the vegetables used in the pickling mix and the labeled finished product.

Figure 4. Stages in the technological product flow -Pickles

The obtained products were presented for tasting to the staff of the other departments of ICDIMPH Horting (Figure 5), based on a tasting sheet with scores from 1-5 for the analyzed characteristics (1 - inadequate, 2 – mediocre, 3 - acceptable, 4 - good, 5 - very good).

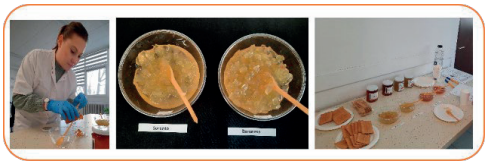

Figure 5- Tasting products

Sensory analysis allows better identification of the organoleptic characteristics of the products and consumer preference.

RESULTS AND DISCUSSIONS

Between the two hybrids analyzed there were differences in the yield of utilization of melon peel and core, the hybrid Baronesa stands out from the hybrid Sorento (Figure 6).

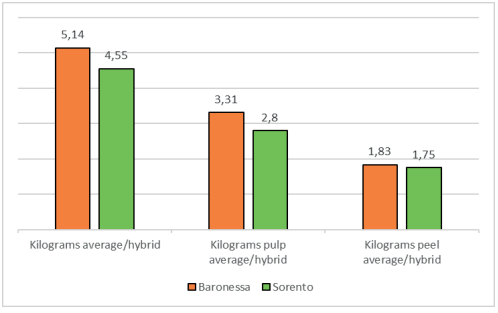

Figure 6- Yield of watermelons

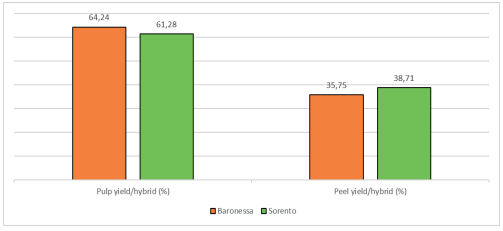

Figure 7. Shell and pulp yield

The amount of fresh by-product ranged from 35.75% in hybrid Baronesa to 38.71% in hybrid Sorento of the original weight (kg) (Figure 7).

Quality control contributes to product development according to consumer preferences. The products “Sweetness” and “Pickle mix” were tasted and appreciated by

the consumers and the result is shown in Figures 8 and 9.

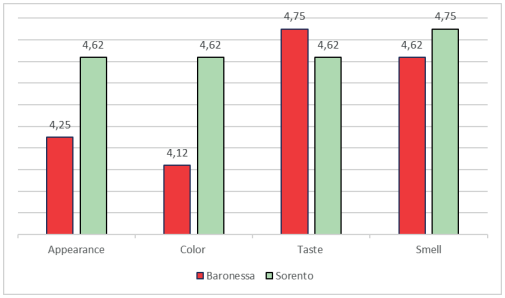

Figure 8. Results obtained during the tasting of the product - Jams

Figure 8 shows the appreciation of the sweetness of the hybrids obtained from the Baronesa and Sorento hybrids in terms of organoleptic characteristics. The sweetness from the rind of hybrid Sorento watermelon was more appreciated in terms of appearance, color and smell compared to the sweetness obtained from hybrid Baronesa. In terms of taste, the sweetness obtained from the Baronesa hybrid was more highly rated, with a score of 4.75 compared to 4.62 for the sweetness obtained from the Sorento hybrid.

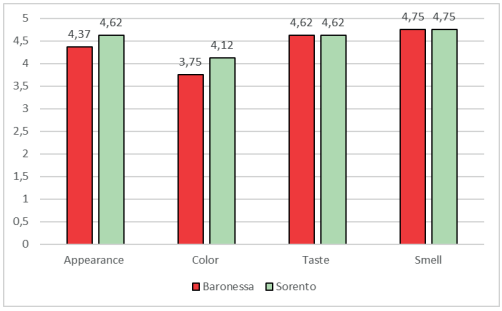

Figure 9. Results obtained from tasting the pickle mix

As regards the pickled vegetable mix analyzed organoleptically, it was found to have the following characteristics:
- appearance: relatively uniform, mosaic-like
- consistency: the split melon rind is penetrated by the vinegar solution, undistintegrated and firm,
- the taste and smell is typical of pickled vegetables.

The values obtained between the two hybrids are close, because the same spiced vinegar solution and the same ratio of divided vegetables were used.

The analysis of the tasting sheet showed that the product obtained from the peel of the Sorento hybrid was more highly valued, with higher scores for smell (4.75), taste (4.62), color (4.12) and consistency (4.62) than the product obtained from the peel of the Baronesa hybrid, which scored higher for smell (4.75), taste (4.62), color (3.75) and consistency (4.37) (Figure 9).

CONCLUSIONS

Based on the present study, it was found that a perishable and seasonal raw material can be efficiently valorized by processing and end products appreciated by consumers can be obtained.

Fruit quality influences the ratio between the pulp of melons and the quantity of by-product, the yield in processing being a characteristic of the variety;

The opportunity of valorizing the melon peel from Sorento and Baronesa hybrids by processing both sweet and pickled products was highlighted.

The final products obtained were appreciated differently by the consumers, most of them appreciating those obtained from the peel of the Sorento hybrid more highly.

The products obtained from watermelon rind (jam and pickle mix) can be classified under the categories "Jam" and "Acidified vegetable preserves (in vinegar)".

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