

EFFECT OF FERMENTATION CONDITIONS ON ALCOHOL CONTENT AND SENSORY VALUES OF FERMENTED WATERMELON RIND BEVERAGE

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ARTICLE INFO

Received: 30/12/2024

Revised: 21/01/2025

Accepted: 10/02/2025

Keywords: Alcohol content, fermentation, sensory evaluation, watermelon rind juice

ABSTRACT

*This study investigates the potential of using watermelon rind, a commonly discarded byproduct, to produce fermented beverages. Watermelon rind, which constitutes 30% of the fruit's weight, is rich in fiber and amino acids, offering significant nutritional benefits. The aim was to optimize the fermentation process by adjusting factors such as total soluble solids, pH, yeast concentration, and fermentation time to enhance both alcohol production and the sensory qualities of the beverage. Watermelon rind extract was adjusted to Brix values of 18, 20, and 22 °Bx and pH values of 3.8, 4.0, and 4.2, with *Saccharomyces cerevisiae* RV100 yeast added at concentrations of 0.1, 0.2, and 0.3 g/L, and fermentation was conducted at room temperature for 1, 2, and 3 days without agitation. The study found that the optimal fermentation conditions were 20°Brix with a pH of 4.0. Specifically, using 0.2 g/L of yeast and fermenting for two days resulted in a beverage with 5.00% alcohol by volume and high sensory scores for appearance, color, aroma, and taste. These results demonstrate that watermelon rind can be repurposed into a valuable product, reducing waste and supporting the growing fermented beverage market. Future research will focus on product stability, shelf life, and nutritional benefits.*

1. INTRODUCTION

Vietnam, a nation with a tropical monsoon climate, is one of the world's biodiversity hotspots (Hoi & A.N, 2014), offering a variety of fresh fruits, including watermelon (*Citrullus lanatus*). Watermelon is locally known by several names, such as “tây qua,” “dưa đỏ,” and “hàn qua” (Yen, 2013). Typically, the flesh is consumed as a dessert or processed into products such as candy and juice, while the rind, which makes up 30% of the fruit's total weight, is often discarded, leading to significant waste (Bang, 2015; Dubey et al., 2022). Research has

shown that watermelon rind contains more amino acids (165 mg/100 g) than the flesh (146 mg/100 g) (Du et al., 2022), and is also rich in fiber, which supports digestion and can help prevent certain diseases (Lam, 2018; Zeng et al., 2014).

Given the rapid expansion of the fermented beverage market, watermelon rind, with its high nutritional value, presents a promising opportunity. This study investigates the effects of various fermentation conditions on alcohol content and sensory qualities of fermented watermelon rind beverages, aiming to reduce waste by utilizing this byproduct.

2. EXPERIMENTAL

2.1. Material and preparation

For consistency, watermelon rinds from the Thanh Long variety were used, sourced from a garden in Trung Binh Commune, Tran De District, Soc Trang Province. Fresh, green rinds, free from physical damage, were selected. The green outer and white inner layers of the rind were separated and washed thoroughly to remove impurities. The prepared rind, shown in Figure 1, was then analyzed for various physicochemical properties.

Saccharomyces cerevisiae RV100 (Angel Yeast Co., Ltd.), a commercial yeast strain, is pre-activated prior to use at a 1:10 ratio (yeast to rind extract, w/v).



Figure 1. Watermelon rind material

Analyzed Parameters: Moisture content (%), total acid content (%), total soluble solids ($^{\circ}$ Brix), pH value, reducing sugar and total sugar content (mg%), ash content (%).

2.2. Experimental design

After extracting juice from the watermelon rind, a single-layer cloth was used to filter it. The Brix level of the juice was adjusted to 18, 20, and 22 $^{\circ}$ Brix by adding sugar, and the pH was adjusted to 3.8, 4.0, and 4.2 using citric acid. The juice mixture was then sterilized by

adding 120 mg/L of NaHSO₃ and left for 2 hours. Subsequently, the sterilized juice was inoculated with *Saccharomyces cerevisiae* yeast at concentrations of 0.1, 0.2, and 0.3 g/L. The fermentation process was conducted at room temperature for 1, 2, and 3 days without shaking. Following fermentation, the juice was filtered through 16 layers of cloth, and 0.7 g/L of pectin was added to the filtrate. The fermented juice was then bottled in sterilized glass containers (at 121 $^{\circ}$ C for 5 minutes) and pasteurized at 70 $^{\circ}$ C for 10 minutes to inhibit and eliminate any remaining microorganisms. The final product was then evaluated based on several parameters.

Evaluated parameters: Alcohol content (% v/v) and sensory qualities, including appearance, color, aroma, and taste.

2.3. Analytical methods

The analytical and evaluation methods employed in this study included moisture content (%) was determined by oven-drying to a constant weight at 100–130 $^{\circ}$ C (Hanh et al., 2022).

Total acid content (%) was measured by titration with a standardized base using phenolphthalein (Anh et al., 2020).

Total soluble solids ($^{\circ}$ Brix) was assessed with a handheld refractometer, while pH was measured using a pH meter.

Reducing sugar and total sugar content (%) were quantified using the dinitrosalicylic acid method (Miller, 1959).

Alcohol and ash contents were determined according to Vietnam standards (TCVN8008:2009; TCVN10691:2015).

Sensory evaluation was performed using a preference rating scale from 0 to 5 points, where differences in appearance, color, aroma, and taste were compared based on TCVN3215-79 (TCVN3215-79). A panel of 10 university students with expertise in food

and sensory evaluation techniques conducted the assessment. The evaluation focused on the following parameters: appearance, color, aroma, and taste.

2.4. Data processing

Experimental data were presented as means and standard deviations using Microsoft Excel 2010, with each experiment repeated three times. Statistically significant differences between samples were evaluated using ANOVA with Statgraphics Centurion XV.I and mean values were compared using the Least Significant Difference (LSD) test with a significance level of 5%.

3. RESULTS AND DISCUSSION

3.1. Analysis of physicochemical properties and chemical composition of watermelon rind

In the production of fermented beverages, understanding the composition of raw materials is crucial to optimizing fermentation parameters. The analysis of the chemical composition and physicochemical properties of watermelon rind is shown in Table 1.

Table 1. Physicochemical properties and chemical composition of watermelon rind

Component	Unit	Content
Moisture content	%	94.51 ± 0.63
Total soluble solids	°Brix	3.00 ± 0.00
pH value	-	5.64 ± 0.02
Total acid content	%	0.55 ± 0.06
Total sugar content	%	1.05 ± 0.28
Reducing sugar content	%	0.68 ± 0.35
Ash content	%	0.78 ± 0.00

Note: The values in the table were the averages of three repetitions

The results in Table 1 indicate that watermelon rind consists primarily of water,

accounting for 94.51% of its total weight. This is consistent with findings from Athmaselvi et al. (2012), who reported that watermelon rind contains approximately 95% water (Athmaselvi et al., 2012). The ash content, which measures the inorganic components present in the rind, was 0.78%, indicating the proportion of mineral mineral compound proportions found in the rind (Odewunmi et al., 2015).

The soluble solids content of watermelon rind was measured at 3.00°Brix, which is relatively low for a substrate intended for fermentation. This low Brix (3.00 °Brix) value suggests that the natural sugar content of the rind is not sufficient for producing a significant amount of alcohol during fermentation (Hanh et al., 2022). Therefore, adjusting the soluble solids by adding sugar was necessary to achieve a balanced flavor and an acceptable level of alcohol production.

Watermelon rind was found to have a total acid content of 0.55%, and both total sugar (1.05%) and reducing sugar (0.68%) levels were relatively low. Moreover, the initial pH value of 5.64 is higher than the optimal pH range for fermentation, which is typically between 3.8 and 4.2 (Thanh et al., 2013). A higher pH may hinder yeast activity and fermentation efficiency. Thus, to achieve a product with desirable sensory qualities and adequate alcohol content, it was essential to adjust the pH and soluble solids content before fermentation.

3.2. Investigation of the effects of soluble solids and pH on alcohol content and sensory qualities of the product

Throughout the fermentation process, the levels of soluble solids and the pH of the medium played a crucial role in influencing the outcome of fermentation. The closer the added sugar content and pH value were to the optimal pH, the more favorable the fermentation process would be (Phong et al., 2017). The effects of initial soluble solids

content and pH on alcohol content were shown in Table 2.

Alcohol content index

During fermentation, yeast converts part of the substrate into biomass and the remaining substrate into ethanol and by-products such as glycerol and pyruvate (Minebois et al., 2020). The alcohol content is largely dependent on the sugar concentration in the fermentation medium (Mohd Azhar et al., 2017). Data from Table 2 shows that increasing the soluble solids from 18°Brix to

20°Brix enhanced the alcohol content after two days of fermentation. However, further increasing the Brix level to 22°Brix resulted in a reduction in alcohol content. The typical fermentation range for commercial *Saccharomyces cerevisiae* RV100 that optimal performance is between 18 and 24°Brix, with peak performance at 20–22°Brix. Beyond 22°Brix, increased osmotic pressure likely inhibited yeast growth, leading to lower alcohol yields (Hien et al., 2022).

Table 1. Alcohol content and sensory evaluation of the product at different soluble solids and pH levels

Brix	pH	Alcohol content (% v/v)	Sensory evaluation			
			Appearance	Color	Aroma	Taste
18	3.8	2.83 ^a	3.67 ^{ab}	3.53 ^{ab}	2.77 ^a	2.80 ^a
	4.0	3.30 ^b	3.57 ^{ab}	3.43 ^{ab}	2.83 ^{ab}	3.10 ^b
	4.2	3.57 ^c	3.53 ^{ab}	3.40 ^a	2.93 ^{abc}	3.43 ^{cd}
20	3.8	4.47 ^f	4.13 ^c	4.00 ^d	3.83 ^d	4.17 ^f
	4.0	5.03 ^h	4.70 ^d	4.57 ^e	4.43 ^e	4.70 ^g
	4.2	4.83 ^g	4.10 ^c	3.97 ^{cd}	3.77 ^d	4.33 ^f
22	3.8	4.43 ^f	3.83 ^{bc}	3.70 ^{bc}	3.00 ^{abc}	3.67 ^{de}
	4.0	4.00 ^d	4.00 ^c	3.87 ^{cd}	3.20 ^c	3.37 ^{bc}
	4.2	4.20 ^e	3.40 ^a	3.27 ^a	3.07 ^{bc}	3.83 ^e
		F = 34.040	F = 3.4500	F = 3.9000	F = 3.7700	F = 8.0900
		P = 0.0000	P = 0.0090	P = 0.0043	P = 0.0054	P = 0.0000

Note: Values with different letters in the same column are significantly different ($p < 0.05$)

Additionally, pH plays a crucial role in fermentation. Raising the initial pH from 3.8 to 4.0 within the same °Brix level increased alcohol production, but a further increase to 4.2 reduced alcohol yield. This is because pH affects yeast cell wall permeability, which impacts nutrient absorption and fermentation efficiency (Quan et al., 2016). The sample with 20°Brix and a pH of 4.0 produced the highest ethanol content (5.03% v/v), meeting the desired alcohol content for fermented juice products, which is around 6.0% v/v (Tu, 2019).

Sensory evaluation index

The sensory evaluation results, shown in Table 2, reveal the influence of soluble solids content and pH on the sensory attributes of the fermented watermelon rind beverage. Overall, significant differences were observed across the treatments in terms of appearance, color, aroma, and taste.

The treatment with 20°Brix and a pH of 4.0 received the highest sensory scores, with ratings of 4.70 for appearance, 4.57 for color, 4.43 for aroma, and 4.70 for taste. At this

combination of soluble solids and pH, the product exhibited a smooth, uniform liquid without any suspended solids or sediment. It retained the characteristic green color of the watermelon rind, had a mild alcoholic aroma typical of fermented beverages, and preserved the distinct aroma of the raw material.

In terms of taste, the balance between sourness and sweetness was particularly well-received by the testers, making the beverage both easy to drink and highly appealing. This harmonious combination of flavor components contributed to the high sensory scores across all categories.

By comparison, the treatments with higher or lower Brix and pH levels tended to produce beverages with less favorable sensory attributes. For example, the sample with 18°Brix and pH 3.8 had a lower taste score (2.80), which was likely due to insufficient sugar content, resulting in a less balanced flavor. On the other hand, samples fermented at 22°Brix with a higher pH level (4.2) showed diminished aroma and taste qualities, possibly due to cross-over fermentation or excessive sugar levels, which affected the overall flavor profile.

These results indicate that a balance of 20°Brix and pH 4.0 produces the most favorable sensory qualities in a fermented watermelon rind beverage. The combination yielded a product that was visually appealing, had a pleasant aroma, and offered a balanced, enjoyable taste. Thus, the sample with an initial Brix level of 20 and a pH of 4.0 was the most suitable for the product's requirements.

3.3. Impact of yeast content addition on alcohol content and sensory values of products

The amount of yeast added during fermentation had a significant effect on both

the alcohol content and the sensory qualities of the final product, as shown in Figure 2.

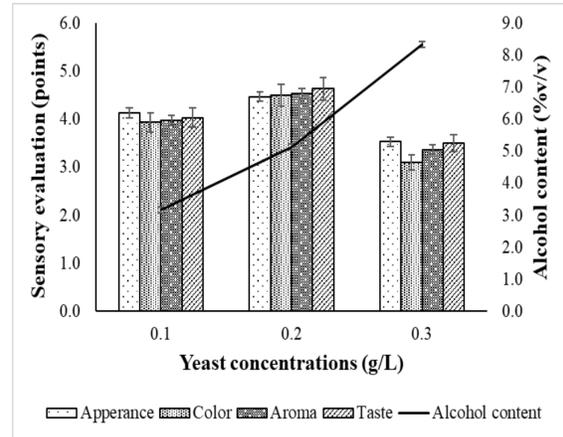


Figure 2. Alcohol content results and sensory evaluation of products at different yeast concentrations

Alcohol content index

Yeast concentration significantly affected the soluble solids, pH, and ethanol content of the fermented products, which in turn influenced the sensory qualities. Low yeast density could lead to prolonged fermentation, reduced ethanol production, and the risk of spoilage. In contrast, high yeast density primarily increased biomass production, resulting in a beverage with a bitter taste and strong aroma due to the overproduction of ethanol and by-products (Mi & Tien, 2021).

While a low yeast concentration may extend fermentation time and reduce efficiency, leading to poor product quality, excessive yeast supplementation can accelerate initial fermentation but hinder subsequent processes. Rapid fermentation at high yeast density also increases production costs due to the extended propagation required (Tam et al., 2021).

Figure 2 illustrates that alcohol content varied significantly with yeast concentrations of 0.1 g/L, 0.2 g/L, and 0.3 g/L. As yeast concentration increased, ethanol production

also rose, with the lowest ethanol content (3.17% v/v) observed at 0.1 g/L and the highest (8.33% v/v) at 0.3 g/L. However, excessive yeast led to lower product quality due to the generation of undesirable by-products during metabolism, such as higher alcohols and esters, which negatively impacted the sensory characteristics of the beverage (Tam et al., 2021).

Therefore, while increasing yeast concentration improves ethanol yield, it is essential to balance yeast levels to avoid compromising product quality with undesirable flavors and aromas.

Sensory Evaluation Index

The sensory evaluation results, summarized in Figure 2, show that yeast concentration significantly affected the appearance, color, aroma, and taste of the product. The sample with 0.2 g/L yeast addition achieved the highest overall sensory scores, with scores of 4.47 for appearance, 4.50 for color, 4.53 for aroma, and 4.63 for taste.

Among the sensory attributes evaluated, aroma received the highest score, likely because a moderate yeast concentration allowed for optimal ethanol production while avoiding the excessive production of by-products that can negatively affect the aroma (Dong, 2014). In contrast, the sample fermented with 0.3 g/L yeast exhibited a strong yeast aroma and a bitter taste, which resulted in lower sensory scores and reduced consumer acceptability.

Thus, the addition of 0.2 g/L yeast was found to be the most effective in producing a balanced product with desirable sensory characteristics. This concentration provided sufficient ethanol production without compromising the flavor or aroma of the beverage.

3.4. Impact of fermentation time on alcohol content and sensory values of products

Fermentation time had a significant effect on both the alcohol content and the sensory attributes of the final product. If the fermentation process occurs too quickly, yeast fermentation might be incomplete, leading to a product with a low alcohol content and poor overall quality. Conversely, excessively long fermentation times result in higher alcohol content, as the yeast completely converts the available sugars into ethanol. While this may be suitable for alcoholic beverages, it is less desirable for fermented juice products. Prolonged fermentation can also lead to contamination by undesirable microorganisms, which causes spoilage and makes storage more difficult (Dong, 2014; Tam et al., 2021). The statistical results of alcohol content were presented in Table 4, and the sensory scores of the products were shown in Figure 3.

Table 4. Alcohol content results of products at different fermentation times

Fermentation time (days)	1	2	3
Alcohol content (% v/v)	2.00 ^a	5.00 ^b	8.67 ^c
	F = 1204.00		
	P = 0.00000		

Note: Values with different letters in the same column are significantly different ($p < 0.05$)

Alcohol content index

During the fermentation process, the yeast needed time to acclimate and reach an optimal cell density in its new environment, while the short fermentation period limited the yeast's fermentation capacity, resulting in lower alcohol production (Phong et al., 2017). As the yeast fully developed, it utilized the available sugar in the anaerobic environment to convert it into ethanol. Consequently, the

ethanol content gradually increased over the following days, peaking at the third day at 8.67% v/v, a statistically significant difference compared to the other treatments at the 5% significance level. The ethanol concentration on the first day was the lowest, at 2% v/v. Based on the analysis and data processing, it was determined that the second day was the optimal time to conclude the fermentation process, producing an ethanol content of 5% v/v, which is suitable for fermented juice. The F-value of 1204.00 in Table 4 indicated a relatively large value; the larger the F-value, the greater the relative variance between the mean values of the treatments. This demonstrated that fermentation time had a significant impact on the alcohol content of the product.

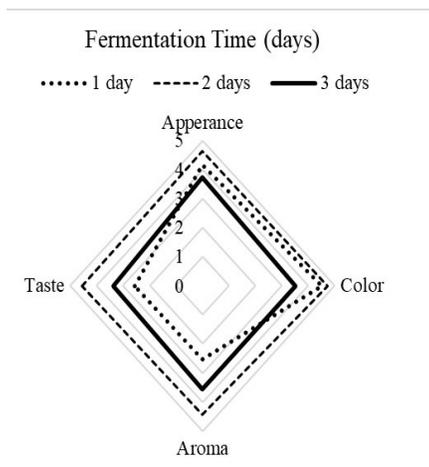


Figure 3. Sensory evaluation results of products at different fermentation times

Sensory evaluation index

Fermentation time is considered one of the critical factors in determining the quality of the final product (Tam et al., 2021). This was evident in the clear differences observed among the various treatments. The treatment with a fermentation time of two days achieved the highest sensory scores, with ratings for appearance, color, aroma, and taste at 4.63, 4.73, 4.43, and 4.57, respectively (Figure 3). The F-statistics for aroma and taste ($F = 106.38$

and $F = 121.88$, respectively) were higher than those for appearance and color ($F = 17.060$ and $F = 53.690$, respectively). This indicates that the differences in aroma and taste among the treatments were more pronounced than those for appearance and color. Furthermore, the sensory evaluation results showed P-values below 0.05 for all criteria (data not shown), confirming statistically significant differences among the treatments.

4. CONCLUSION

This study aimed to investigate the effects of different fermentation conditions on the alcohol content and sensory qualities of fermented watermelon rind beverage. The analysis revealed that watermelon rind, with its high moisture content of 94.51% and a relatively high pH of 5.64, is a viable substrate for fermentation. However, due to its low sugar content (1.05%), adjustments to the initial conditions were necessary to produce a desirable fermented product.

The factors influencing the fermentation process of watermelon rind extract were systematically evaluated, and the optimal conditions were identified as 20°Brix and pH 4.0, with 0.2 g/L of yeast and a fermentation time of two days. Notably, fermentation time emerged as the most significant factor affecting alcohol content and sensory properties, as evidenced by the highest F-value obtained in the study. Under these conditions, the beverage achieved an alcohol content of 5.00% v/v and was well-received in sensory evaluations, scoring high in appearance, color, aroma, and taste.

This study demonstrates the potential of utilizing watermelon rind, a byproduct that is often discarded, to create a value-added fermented beverage. This approach contributes to reducing waste and expanding the fermented beverage market. Future research should focus on exploring the

stability, shelf life, and nutritional benefits of this product.

References

- Anh, L. T. T., Thao, P. L. P., Trang, D. T. H. and Tho, P. T. (2020), "Effects of potassium metabisulfite and citric acid preservatives on the physico-chemical properties - of soursop pulp during storage" [In Vietnamese], The University of Danang - Journal of Science and Technology, Vol. 18 (No. 9), pp. 1-6.
- Athmaselvi, K., Alagusundaram, K., Kavitha, C. and Arumuganathan, T. (2012), "Impact of pretreatment on colour and texture of watermelon rind", International Agrophysics, Vo. 26 (No. 3), pp. 235-242.
- Bang, N. T. (2015), *Watermelon growing techniques* [In Vietnamese], Phuong Dong inc, Ca Mau.
- Dong, D. H. (2014), "Research production the wine from the fermentation the fruits of cactus thorn in Binh Thuan province", Journal of science, technology & food, Vol. 4, pp. 71-79.
- Du, X., Davila, M., Ramirez, J., and Williams, C. (2022), "Free Amino Acids and Volatile Aroma Compounds in Watermelon Rind, Flesh, and Three Rind-Flesh Juices", Molecules, Vol. 27 (No. 8).
- Dubey, S., Rajput, H. and Batta, K. (2022), "Utilization of Watermelon Rind (*Citrullus lanatus*) in Various Food Preparations: A Review", Chemical Science Review and Letters, Vol. 11 (No. 4), pp 77-84.
- Hanh, P. T. N., Hong, N. T. T. and Hung, N. T. (2022), "Survey on the effects of mixing and yeast ratio to quality of fermented "Sim" - dragon fruit juice", Vietnam Journal of Nutrition & Food, Vol. 16 (No. 1), pp 35-46.
- Hien, T. T., Khang, V. C., Muoi, N. V. and Truc, T. T. (2022), "Production of a fermented beverage from pineapple (*Ananas comosus*) byproduct crumbs". Materials Today: Proceedings, Vol. 60, pp 2034-2042.
- Hoi, N. D. and A.N, K. (2014), "Basic Characteristics of Vietnam Monsoon Tropical Forest", VNU Journal of Science: Natural Sciences and Technology, Vol. 3 (No. 1), pp 26-35.
- Lam, N. T. (2018), "Preventive nutrition and support for treatment of blood lipid metabolism disorders", The Vietnam Journal of Nutrition & Food, Vol. 14 (No. 8), pp 13-21.
- Mi, H. T. N. and Tien, D. T. K. (2021), "Fermentation of pitaya (*Selenicereus undatus*) using *Saccharomyces cerevisiae* RV100", TNU Journal of Science and Technology, Vol. 226 (No. 14), pp 137-145.
- Miller, G. L. (1959), "Use of Dinitrosalicylic Acid Reagent for Determination of Reducing Sugar", Analytical Chemistry, Vol. 31 (No. 3), pp 426-428.
- Minebois, R., Pérez-Torrado, R. and Querol, A. (2020), "A time course metabolism comparison among *Saccharomyces cerevisiae*, *S. uvarum* and *S. kudriavzevii* species in wine fermentation", Food Microbiology, Vol. 90, pp 103484.
- Mohd Azhar, S. H., Abdulla, R., Jambo, S. A., Marbawi, H., Gansau, J. A., Mohd Faik, A. A. and Rodrigues, K. F. (2017), "Yeasts in sustainable bioethanol production: A review", Biochemistry and Biophysics Reports, Vol. 10, pp 52-61.
- Odewunmi, N. A., Umoren, S. A., Gasem, Z. M., Ganiyu, S. A. and Muhammad, Q. (2015), "l-Citrulline: An active corrosion inhibitor component of watermelon rind extract for mild steel in HCl medium", Journal of the Taiwan Institute of Chemical Engineers, Vol. 51, pp 177-185.
- Phong, H. X., Long, B. H. D., Thanonkeo, P., Yamada, M., Qui, L. P. D., Loi, D. M., . . . and Dung, N. T. P. (2017), "Selection of

thermotolerant yeasts and study on fermentation conditions for pineapple wine production”, CTU Journal of Science, Vol. 51, pp 7-15.

Quan, P. T., Phong, H. X., Thanh, N. N., & Dung, N. T. P. (2016), “Ethanol production from cocoa pod hydrolysate by *Saccharomyces cerevisiae*”, Dong Thap University Journal of Science, Vol. 18, pp 77-81.

Tam, H. N. T., Trang, N. N. P., Thi, T. T. M., Nguyen, N. T. T., and Nhi, L. T. (2021), “Determination of fermentation conditions and antioxidant activity of *Phyllanthus acidus* (L.) SKEELS wine”, CTU Journal of Science, Vol. 57 (No. 6), pp 144-150.

TCVN3215-79. Food products sensorial analysis Method by frontingmark. In: State Committee of Science and Technology.

TCVN8008:2009. Distilled liquors - Determination of alcohol. In: Ministry of Science and Technology.

TCVN10691:2015. Fruit and vegetable juices - Determination of ash. In: Ministry of Science and Technology

Thanh, N. V., Cuong, N. P., Toan, H. T., Que, T. T., Thuy, N. M. and Tuyen, N. T. M. (2013), “Using isolated and purified yeast for pineapple (Cau Duc, Hau Giang) wine processing”, CTU Journal of Science, Vol. 27, pp 56-63.

Tu, B. V. (2019), “Optimization of strawberry cider beverage fermentation using a surface method that meets four factors”, Scientific journal - Sao Do University, Vol. 2 (No. 65), pp 9.

Yen, V. Q. (2013), “Water melon”, Journal of Scientific Research and Development, Vol. 1 (No. 99), pp 102-107.

Zeng, H., Lazarova, D. L. and Bordonaro, M. (2014), “Mechanisms linking dietary fiber, gut microbiota and colon cancer prevention”, World J Gastrointest Oncol, Vol. 6 (No. 2), pp 41-51.

ẢNH HƯỞNG CỦA ĐIỀU KIỆN LÊN MEN ĐẾN ĐỘ CỒN VÀ GIÁ TRỊ CẢM QUAN CỦA NƯỚC GIẢI KHÁT LÊN MEN TỪ VỎ DƯA HẦU

TÓM TẮT

Nghiên cứu này khảo sát khả năng ứng dụng vỏ dưa hấu, một sản phẩm phụ thường bị bỏ đi, để sản xuất đồ uống lên men. Vỏ dưa hấu, chiếm 30% trọng lượng quả, rất giàu chất xơ và axit amin, mang lại lợi ích dinh dưỡng đáng kể. Mục đích nghiên cứu là tối ưu hóa quá trình lên men bằng cách điều chỉnh các yếu tố như tổng chất rắn hòa tan, độ pH, nồng độ nấm men bổ sung và thời gian lên men để nâng cao cả khả năng sản xuất rượu và chất lượng cảm quan của đồ uống lên men. Dịch ép vỏ dưa hấu được điều chỉnh theo các giá trị Brix lần lượt là 18, 20, 22 °Bx và các giá trị pH lần lượt là 3,8, 4,0 và 4,2, với nấm men *Saccharomyces cerevisiae* RV100 được thêm vào ở nồng độ 0,1, 0,2 và 0,3 g/L, và quá trình lên men được tiến hành ở nhiệt độ phòng trong 1, 2 và 3 ngày mà không khuấy trộn. Nghiên cứu cho thấy điều kiện lên men tối ưu là 20°Brix với độ pH là 4,0. Cụ thể, sử dụng 0,2 g/L nấm men và lên men trong hai ngày sẽ tạo ra đồ uống có nồng độ cồn 5,00% theo thể tích và đạt điểm cảm quan cao về trạng thái, màu sắc, mùi và vị. Những kết quả này chứng minh rằng vỏ dưa hấu có thể được tận dụng để tạo thành một sản phẩm có giá trị, giảm chất thải và hỗ trợ thị trường đồ uống lên men đang phát triển. Nghiên cứu trong tương lai sẽ tập trung vào tính ổn định, thời hạn sử dụng và các lợi ích dinh dưỡng khác của sản phẩm.

Từ khóa: Độ cồn, lên men, giá trị cảm quan, vỏ dưa hấu