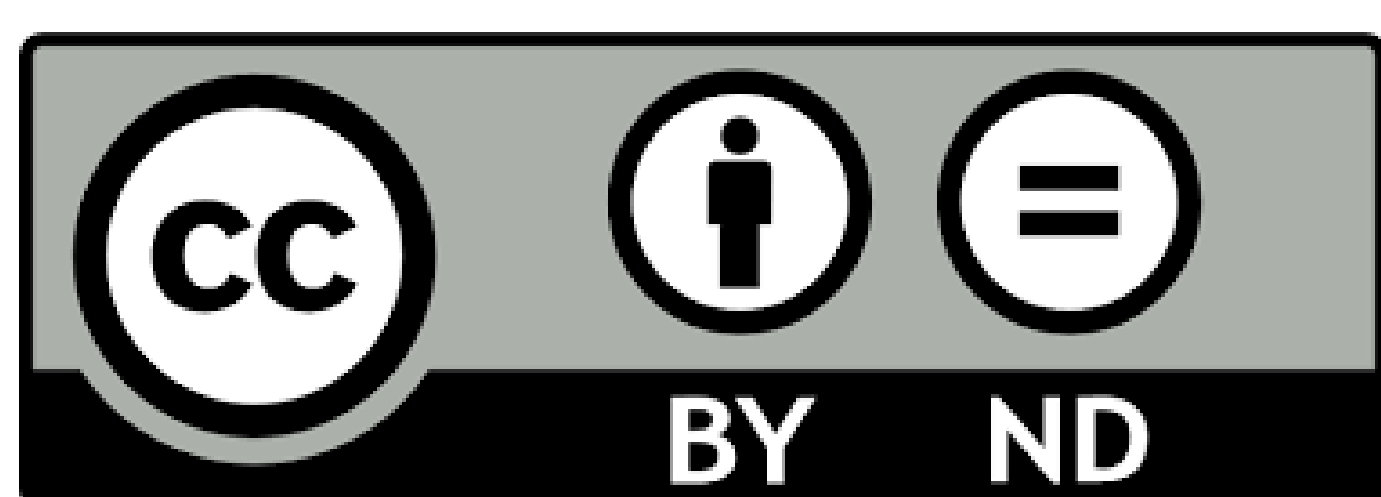




INFOGRAPHIC

NGHIÊN CỨU ỨNG DỤNG NẤM MEN BÁNH MÌ NHƯ NGUỒN MEN BỔ TRỢ TRONG CHẾ BIẾN CƠM RƯỢU TRUYỀN THỐNG

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Năm xuất bản: 2026



Nghiên cứu ứng dụng nấm men bánh mì như nguồn men bổ trợ trong chế biến cơm rượu truyền thống © 2026 bởi **Lê Quỳnh Như** được cấp phép theo **CC BY-ND 4.0**.

APPLICATION OF BAKER'S YEAST AS AN ALTERNATIVE STARTER IN TRADITIONAL VIETNAMESE FERMENTED GLUTINOUS RICE

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Abstract

Rice and wine is a traditional Vietnamese fermented glutinous rice product, but its quality is unstable due to reliance on artisan starters (bánh men). This study evaluated the feasibility of using commercial baker's yeast (*Saccharomyces cerevisiae*) as an alternative starter. Four trials were conducted using a completely randomized design (CRD, n = 5): (TN1) sugar ratio 1–9%, (TN2) baker's yeast ratio 0.5–1.4%, (TN3) fermentation time 2–5 days, and (TN4) comparison between optimized formula (BY-OPT) and traditional control (TRAD-CTRL). Physicochemical parameters (pH, TTA, °Brix, ethanol) and sensory attributes (9-point hedonic, JAR) were analyzed using one-way ANOVA, Tukey's test, and RM-ANOVA (p < 0.05). The optimal formula was 3% sugar, 1.1% baker's yeast, and 4-day fermentation. BY-OPT showed comparable overall liking to TRAD-CTRL (7.37 vs 7.30) but differed in TTA and ethanol. These results suggest baker's yeast is a potential alternative starter; however, further microbial and storage studies are needed.

Introduction

Rice and wine is a traditional Vietnamese fermented glutinous rice product with cultural significance and high consumer acceptance. However, its production still relies heavily on artisan *yeast cake* with unstable microbial communities, leading to inconsistent quality, variable ethanol content, and food safety concerns. Using commercial baker's yeast (*Saccharomyces cerevisiae*) as a supplementary starter is a scientifically grounded approach to standardize the process and enhance product stability. However, replacing the traditional starter with baker's yeast poses challenges regarding fermentation kinetics, ethanol yield, and sensory balance. Therefore, this study was conducted to determine the optimal technological factors for producing *com ruou* using baker's yeast with stable quality and consumer acceptance.

Materials and methods

Experiment	Factor	Levels	Parameter	Method
Exp 1	Sugar ratio	1%, 3%, 5%, 7%, 9%	Physicochemical	pH, TTA, °Brix, ethanol
Exp 2.1	Baker's yeast ratio	0.5%, 0.8%, 1.1%, 1.4%	Sensory	9-point hedonic scale, JAR 5-point
Exp 2.2	Fermentation time	2, 3, 4, 5 days at room temperature	Microbiological	LAB on MRS, E. coli on
Exp 3	Control comparison	BY-OPT (100% baker's yeast) vs TRAD-CTRL (100% traditional yeast cake)		
Parameter	Method	Replication		
pH	pH meter (Mettler Toledo), calibrated with pH 4.0 / 7.0 / 10.0 buffers at 25°C	n = 5		
TTA	Titration with 0.1 N NaOH using phenolphthalein indicator; expressed as % lactic acid	n = 5		
°Brix	Refractometer, 25°C	n = 5		
Ethanol	Distillation followed by alcohol meter measurement	n = 5		
Sensory	30 trained panelists; 9-point hedonic scale; 5-point JAR scale; served at 10–12°C	n = 30		
Microbiology	LAB on MRS agar, 37°C/48 h, anaerobic; E. coli on CCA, 37°C/24 h; detection limit < 10 CFU/g	n = 3		
Statistics	One-way ANOVA + Tukey HSD (or Games-Howell); Friedman + Wilcoxon for sensory; independent t-test for 2-sample comparison; SPSS 24; p < 0.05			

Results and Discussion

Effect of Sugar Ratio

Table 1. Effect of sugar ratio on product quality

Parameter	1%	3%	5%	7%	9%
pH	4.27 ± 0.06 ^a	4.23 ± 0.07 ^a	3.96 ± 0.03 ^b	3.94 ± 0.07 ^b	4.04 ± 0.07 ^b
TTA (%)	0.80 ± 0.00 ^a	0.80 ± 0.00 ^a	0.80 ± 0.00 ^a	0.80 ± 0.00 ^a	0.80 ± 0.00 ^a
°Brix	24.50 ± 1.00 ^c	27.50 ± 0.87 ^{ab}	27.80 ± 0.57 ^a	26.10 ± 0.74 ^{bc}	27.00 ± 1.00 ^{ab}
Ethanol (mL/100g)	0.80 ± 0.00 ^a	0.40 ± 0.00 ^b	0.40 ± 0.00 ^b	1.00 ± 0.00 ^a	0.40 ± 0.00 ^b
Overall liking	6.15 ± 1.49 ^a	6.41 ± 1.08 ^a	4.56 ± 1.19 ^b	4.70 ± 1.27 ^b	4.89 ± 1.34 ^b

Note: Values are means ± standard deviation (n = 5). Values with different superscript letters in the same row indicate statistically significant differences (p < 0.05).

Sugar is the main substrate for yeast fermentation. Increasing sugar from 1% to 9% raised °Brix from 24.50 to 27.80. However, excessive sugar creates osmotic stress, inhibiting yeast and reducing ethanol yield. The 3% level achieved the highest overall liking (6.41) and the best balance between sweetness and fermentation efficiency

Effect of Baker's Yeast Ratio

Table 2. Effect of baker's yeast ratio on product quality

Parameter	0,5%	0,8%	1,1%	1,4%
pH	4.02 ± 0.11 ^b	4.11 ± 0.04 ^{ab}	3.88 ± 0.22 ^b	4.28 ± 0.09 ^a
°Brix	34.20 ± 2.77 ^a	33.60 ± 1.34 ^a	25.40 ± 3.29 ^b	23.80 ± 3.63 ^b
Ethanol(mL/100g)	2.32 ± 0.34 ^d	3.10 ± 0.25 ^c	4.18 ± 0.22 ^b	5.12 ± 0.12 ^a
Overall liking	6.57 ± 0.90 ^c	6.97 ± 0.77 ^c	8.43 ± 0.97 ^a	7.70 ± 0.65 ^b

Note: Values are means ± standard deviation (n = 5). Values with different superscript letters in the same row indicate statistically significant differences (p < 0.05).

Baker's yeast ratio significantly affected ethanol content (p < 0.05). Increasing yeast from 0.5% to 1.4% raised ethanol from 2.32 to 5.12 mL/100g. However, the 1.1% level achieved the highest overall liking (8.43), indicating that excessive yeast (1.4%) may produce a strong yeast odor or harsh alcohol taste, reducing sensory acceptance. The 1.1% level was selected as optimal.

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Table 3. Effect of Fermentation Time

Parameter	2 days	3 days	4 days	5 days
pH	4.56 ± 0.24 ^a	4.54 ± 0.15 ^{ab}	4.40 ± 0.13 ^{ab}	4.26 ± 0.07 ^b
°Brix	13.80 ± 1.79 ^a	11.20 ± 1.64 ^{ab}	10.00 ± 1.87 ^b	8.80 ± 1.64 ^b
Ethanol (mL/100g)	1.44 ± 0.1 ^d	2.20 ± 0.16 ^c	3.00 ± 0.16 ^b	3.62 ± 0.19 ^a
Overall liking	6.73 ± 1.44 ^a	6.70 ± 1.29 ^a	6.60 ± 1.33 ^a	6.59 ± 1.24 ^a

Note: Values are means ± standard deviation (n = 5). Values with different superscript letters in the same row indicate statistically significant differences (p < 0.05).

During fermentation from 2 to 5 days, °Brix decreased from 13.80 to 8.80 as sugar was consumed. pH decreased from 4.56 to 4.26 due to organic acid accumulation. Ethanol increased from 1.44 to 3.62 mL/100g. However, at day 5, 40% of panelists rated the product as "too sour," and overall liking did not increase compared to day 4. Therefore, 4 days was selected as optimal.

Comparison of BY-OPT and TRAD-CTRL

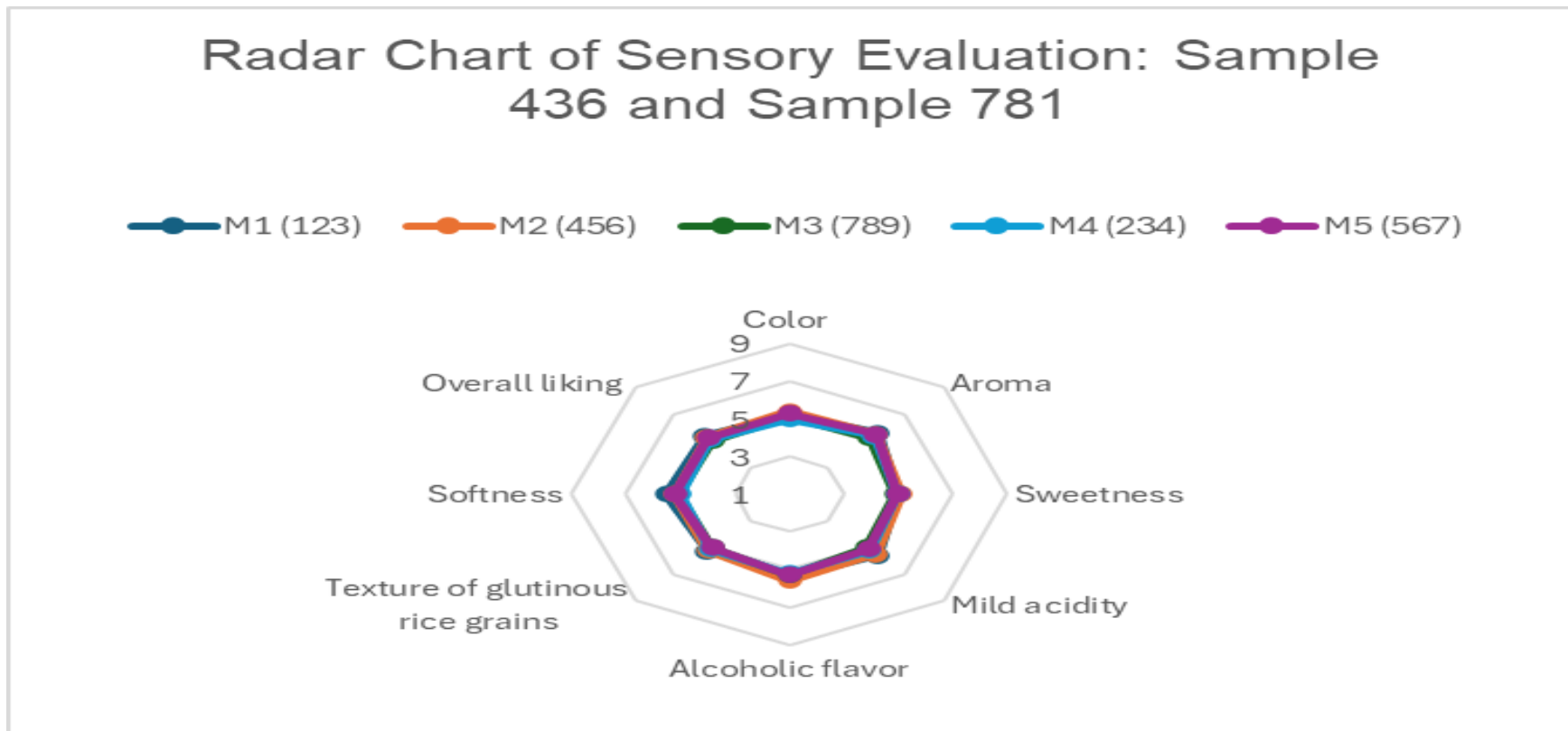
Table 4. Comparison of main parameters between BY-OPT and TRAD-CTRL

Parameter	BY-OPT	TRAD-CTRL
pH	4.21 ± 0.18 ^a	3.65 ± 0.05 ^b
TTA	6.68 ± 1.36 ^b	12.36 ± 0.26 ^a
°Brix	26.20 ± 3.03 ^a	26.20 ± 1.10 ^a
Ethanol(mL/100g)	8.30 ± 3.05 ^b	14.00 ± 3.96 ^a
Overall liking	7.37 ± 0.76 ^a	7.30 ± 0.79 ^a

Note: Values are means ± standard deviation (n = 5). Values with different superscript letters in the same row indicate statistically significant differences (p < 0.05).

BY-OPT showed comparable overall liking to TRAD-CTRL despite lower ethanol and TTA, indicating potential for baker's yeast as a substitute.

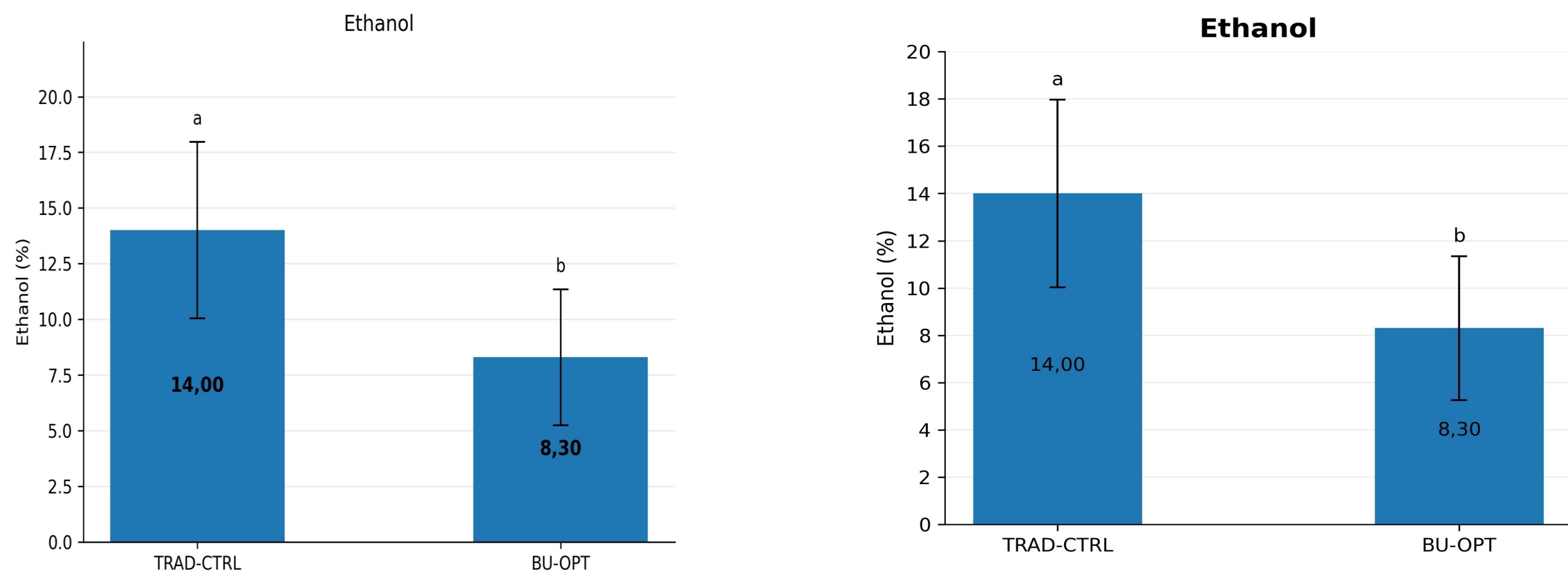
Comparison of Optimal Product (BY-OPT) and Commercial Product (TRAD-CTRL)



Note: Values are means of three independent experimental replicates (n=3) ± standard deviation for instrumental parameters; sensory values are means of 30 panelists (n=30) ± standard deviation.

BY-OPT showed comparable overall liking to TRAD-CTRL (7.37 vs 7.30, p > 0.05) but differed significantly in TTA (6.68 vs 12.36) and ethanol (8.30 vs 14.00). Both samples showed no detection of E. coli.

Product ethanol table (BU-OPT) and (Commercial Product (TRAD- CTRL)



Conclusion

The optimal formulation for rice and wine using baker's yeast was 3% sugar, 1.1% baker's yeast, and 4-day fermentation at room temperature. BY-OPT achieved an overall liking of 7.37, comparable to TRAD-CTRL (7.30), indicating equivalent sensory acceptance. However, BY-OPT differed significantly in TTA (6.68 vs 12.36) and ethanol (8.30 vs 14.00). Both samples showed no detection of *E. coli*. These results suggest that baker's yeast can be used as an alternative starter for rice and wine ; however, further studies on microbial safety, starter stability, and shelf life are needed before recommending complete replacement of traditional yeast cake.

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