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Shelf-life and consumer acceptance of rice and tiger nut plant-based fermented beverages

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INTRODUCTION & AIM

The development of innovative fermented beverages from Mediterranean plant materials represents a promising approach to meet growing consumer demand for healthy, sustainable alternatives to dairy products [1]. This study evaluated the shelf life under refrigeration storage (through microbiological, physicochemical and sensory parameters) and consumer acceptance of fermented plant-based beverages made from rice and tiger nut [2]

METHOD

Phase 1: shelf-life study

•**Sample preparation:** Two fermented plant-based beverages (rice, tiger nut) were produced in two stages: (1) base beverage preparation, (2) fermentation using VEGE061 starter culture at 37°C until pH 4.0-4.5.

•**Storage conditions:** 10 days at refrigeration temperature (1/3 samples at 4°C, 2/3 at 8°C)

•**Analysis performed:**

1) Microbiological: Aerobic mesophiles, lactic acid bacteria, pathogens (*Salmonella spp., Listeria monocytogenes, Escherichia coli, Bacillus cereus*)

2) Physicochemical: pH, water activity

3)Sensory evaluation: Trained panel (n=7) using descriptive-quantitative and preference tests (UNE-ISO 6658:2008, UNE-ISO 4121:2006)

Phase 2: consumer acceptance test

•**Samples evaluated**: Rice and tiger nut fermented beverages (carob excluded due to fermentation failure)

•**Consumer panel**: n=60 (73% female, 52% aged 18-34 years, 65% monthly consumption frequency)

•**Testing conditions**: Blind tasting in individual booths (March 11, 2025).

Monadic sequential presentation with randomized three-digit codes. Samples served cold (50 mL per portion).

•**Tests performed:**

1) Hedonic acceptability: 9-point hedonic scale (1=dislike extremely, 9=like extremely) for appearance, odor, flavor, texture, and overall liking

2) JAR (Just-About-Right): 5-point scale for sweetness intensity with penalty analysis

3) Purchase intent: 5-point scale (1=definitely would not buy, 5=definitely would buy)

4) Preference ranking: Direct comparison between both beverages

5) Statistical analysis: T-test for differences (*p*= value < 0.05), Compusense software

RESULTS & DISCUSSION

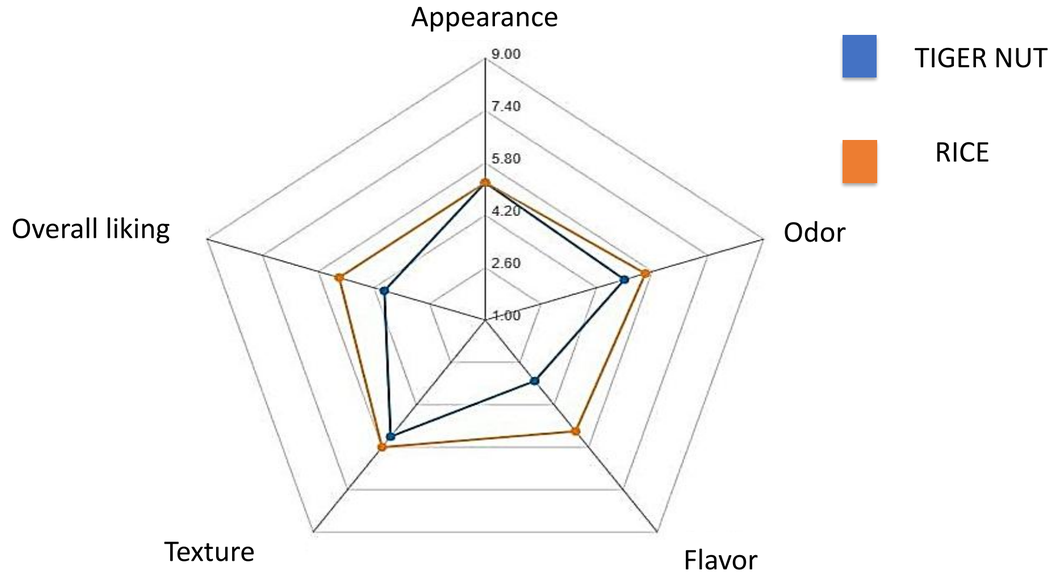
1. Phase 1: shelf-life study

Parameter	Rice	Tigernut
B. cereus	<2 log CFU/g	3.28 → 2.65 log CFU/g
E. coli	<1 log CFU/g	<1 log CFU/g
Salmonella	N.D. in 25g	N.D. in 25g
L. monocytogenes	N.D. in 25g	N.D. in 25g
pH (Day 0 → 10)	4.05 → 3.82	4.12 → 3.95
aw	0.97	0.97

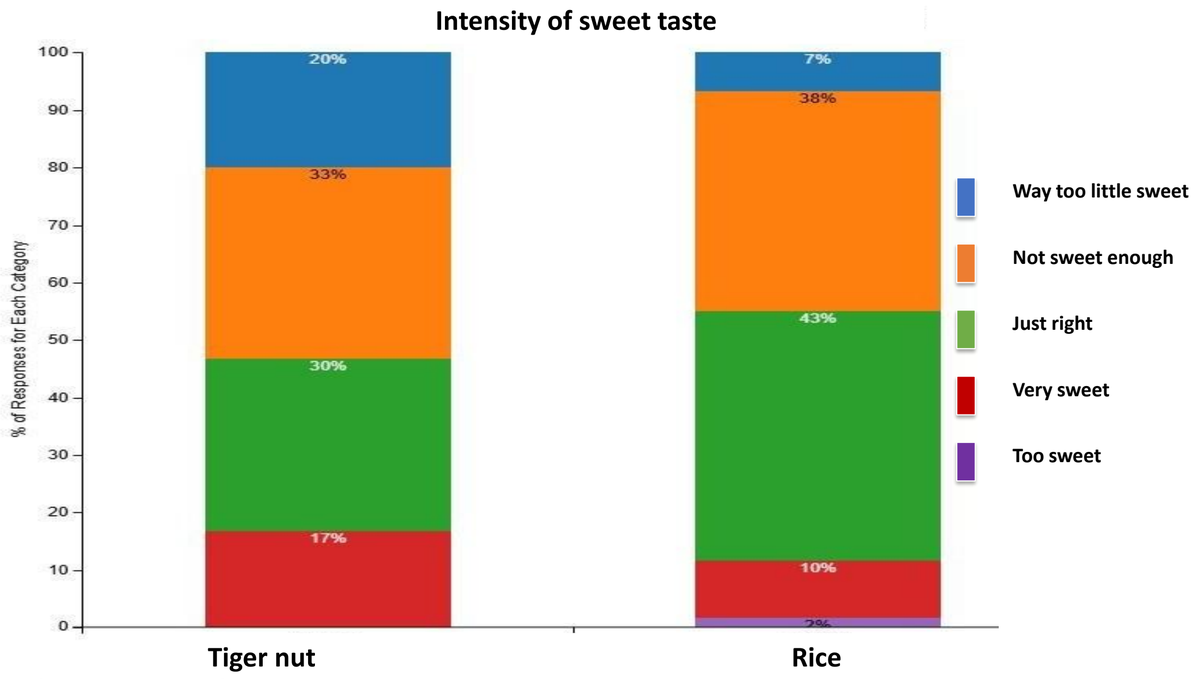
N.D. = Not Detected in 25g Safety limits: EC 2073/2005 (Salmonella, L. monocytogenes) & CNTA guidelines (B. cereus <4 log CFU/g, E. coli <2 log CFU/g)

RESULTS & DISCUSSION (cont.)

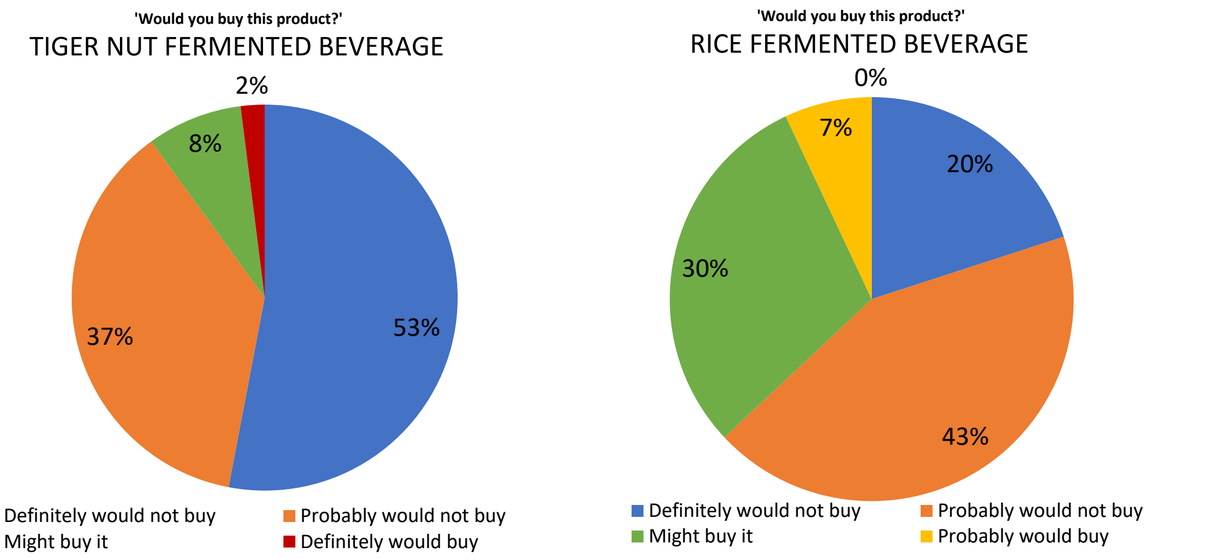
2. Phase 2: consumer acceptance test



3. Phase 2: sweetness perception (just-about-right analysis)



4. Phase 2: purchase intent



5. Phase 2: preference ranking

🏆 **Rice:** 👤👤👤👤👤👤👤👤 (48/60)
Tiger nut: : 👤👤 (12/60)

CONCLUSION

- 10-day shelf life confirmed under refrigeration (4-8°C).
- Rice beverage preferred: 80% consumer preference, higher acceptance (p<0.05).
- Sweetness optimization and formulation improvements required for commercial viability.

These findings demonstrate the potential of Mediterranean plant-based fermented beverages

REFERENCES

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