

Development of Probiotic Fermented Aromatic Rice Water Beverage (“Rice Cool”)

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1. Background and Rationale

Rice is the principal staple food of eastern India where traditional rice-based fermented foods and beverages form an integral component of daily dietary practices. Fermented rice water, locally known as ‘Torani’ or ‘Tanka Torani’, has historically been consumed as a refreshing, digestive-supportive beverage during hot climatic conditions in Odisha. With increasing consumer awareness towards functional foods, probiotic beverages, and low-sugar natural alternatives to carbonated drinks, there is significant scope for scientific standardization and commercialization of traditional fermented rice water.

The present technology focuses on the development of a standardized probiotic rice-based beverage using the aromatic rice variety Geetanjali, developed at ICAR-CRRI, Cuttack. The product combines traditional knowledge with scientific validation of physicochemical and antioxidant properties, ensuring safety, nutritional enhancement, and commercial scalability.

2. Objectives of the Technology

The primary objective of this technology is to develop a standardized protocol for the preparation of fermented rice water beverage and to evaluate its physicochemical, nutritional, and shelf-life characteristics. Specific objectives include:

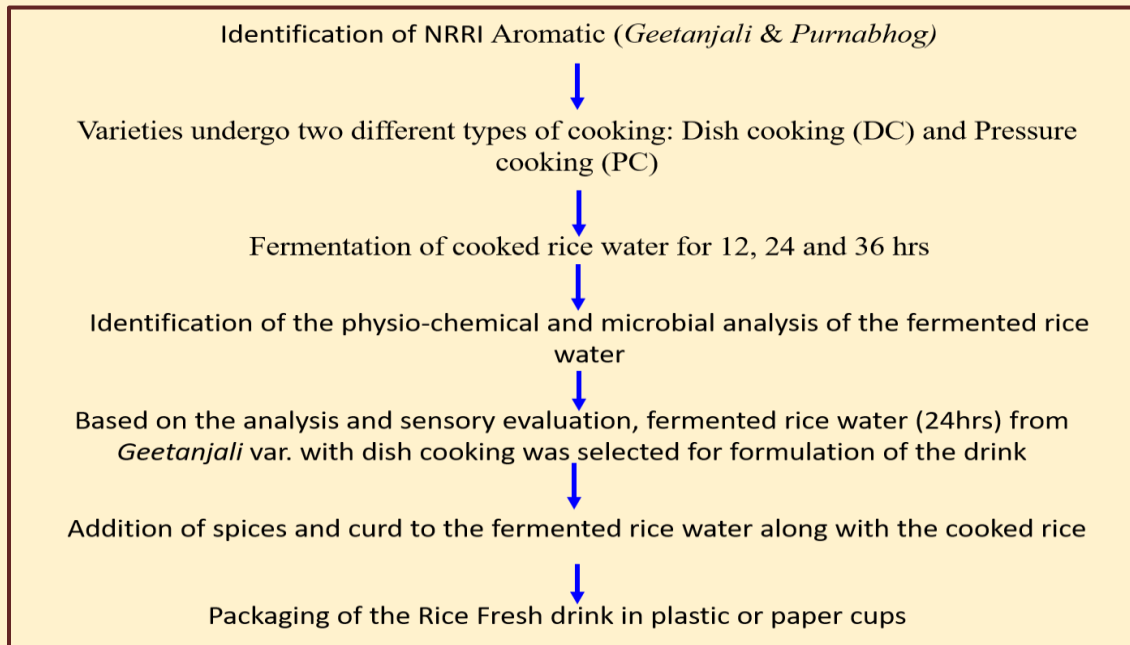
- Standardization of fermentation duration.
- Assessment of pH and electrical conductivity changes.
- Quantification of total phenolics and flavonoids.
- Evaluation of packaging systems and refrigerated shelf life.

- Identification of commercialization potential

3. Technology Description and Preparation Protocol

The technology utilizes cooked rice water obtained from Geetanjali variety. Rice is cooked either by pressure cooking or conventional dish cooking methods. In the dish-cooking method, excess water is drained and fresh potable water is added before fermentation. The collected rice water is allowed to ferment naturally for 0–36 hours under ambient conditions, with 24 hours identified as the optimum fermentation duration based on antioxidant enrichment and acidity balance.

After fermentation, natural ingredients including curd (as starter culture), lemon juice, salt, and selected spices are incorporated to enhance flavor and functional attributes. The beverage is then packed in food-grade plastic or paper cups and stored under refrigeration below 10°C.



4. Physicochemical and Antioxidant Changes During Fermentation

Fermentation resulted in a progressive decrease in pH from 7.41 to 3.92, indicating acidification due to organic acid production by lactic acid bacteria (*Lactobacillus acidophilus*). Electrical conductivity increased from 0.361 to 0.424, suggesting enhanced ionic activity during fermentation.

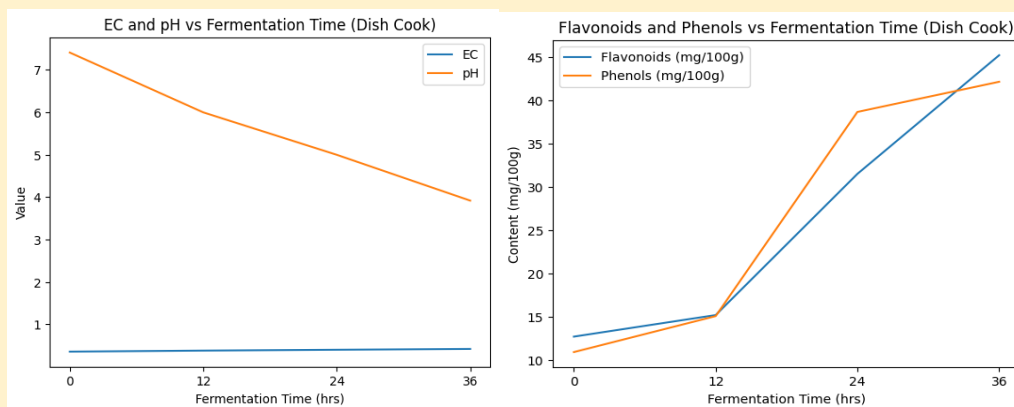


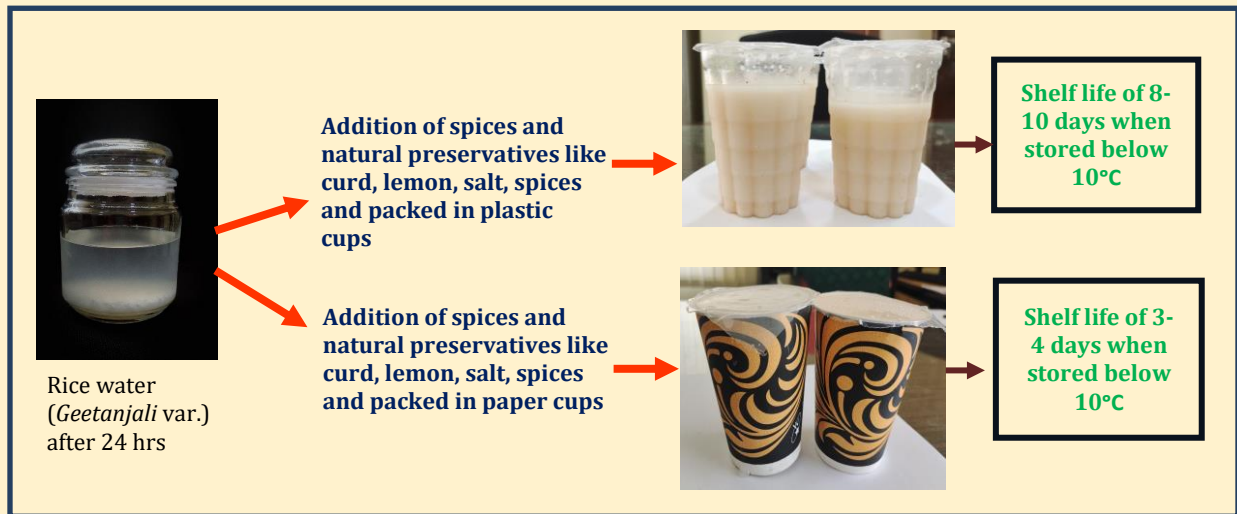
Figure 1. Changes in pH, EC, total phenolic and flavonoids content during fermentation

A significant increase in total phenolic content was observed during fermentation. Total phenolics increased from 10.97 mg/100g at 0 hours to 42.16 mg/100g at 36 hours in dish-cooked samples, demonstrating substantial enhancement in antioxidant potential. These

findings confirm that fermentation improves bioavailability of functional bioactive compounds.

5. Shelf-Life and Packaging Evaluation

Shelf-life studies under refrigerated storage (below 10°C) revealed that the beverage remained microbiologically stable and organoleptically acceptable for 8–10 days when packed in food-grade plastic cups. In contrast, paper cups showed reduced shelf life by 3–4 days due to higher moisture permeability and potential contamination risks.



6. Advantages of the Technology

- Utilizes traditional knowledge with scientific validation
- Low production cost and minimal infrastructure requirement
- Enhanced antioxidant and probiotic properties
- Suitable for cottage-scale and industrial production
- Provides healthier alternative to sugar-sweetened beverage
- Providing healthier and easy utilization of left over rice while preventing food waste
- Potential income generation for SHGs and FPOs

7. Commercial and Socio-Economic Potential

The technology has strong potential for commercialization in summer beverage markets, temple-based distribution systems, coastal tourism regions, and rural entrepreneurship programs. Approximately 100 g of rice can yield nearly 2.25 L of formulated beverage, demonstrating high value addition potential. The technology is suitable for transfer to Self-Help Groups (SHGs), Farmer Producer Organizations (FPOs), and small-scale beverage industries.

8. Technology Readiness Level (TRL)

Based on laboratory validation, physicochemical characterization, and shelf-life assessment, the technology is categorized at TRL 5–6. The process is ready for pilot-scale validation and demonstration prior to full commercial deployment.

9. Conclusion

The developed Rice Cool Drink represents a scientifically validated functional beverage derived from traditional fermented rice water. Fermentation enhances acidity, antioxidant potential, and probiotic characteristics while ensuring acceptable shelf stability under refrigeration. The technology integrates cultural heritage with modern food science and offers promising opportunities for commercialization and rural income generation.



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