# DEVELOPMENT OF A NANJANGUD RASA BALE BANANA-BASED HEALTH BAR

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**Keywords:**

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**Introduction:**

The Nanjangud rasa bale, Musa sp. var. is a unique variety of banana grown exclusively in Nanjangud taluk of Mysore district. Due to various reasons, the fruit has seen a decline in its cultivation and even faced a brink of extinction in 2005. The GI tag provided to the fruit in 2006 with a hope of reviving it also did not succeed, resulting in less than 5% of farmers in the Nanjangud taluk cultivating this plant.

Reviving the Nanjangud Rasabale banana (Musa sp. var) based on its rich nutritional composition presents a multifaceted opportunity for local farmers in Karnataka. By promoting its health benefits through scientific evidence and leveraging government support, farmers can enhance their livelihoods while preserving an important legacy of the state of Karnataka. This approach not only benefits individual farmers but also strengthens community resilience and contributes to regional food security. The pre and probiotic potential of this variety of banana is not evaluated. According to our literature review, we have noted that although different parts of this plant like the pseudo stem, leaves, inflorescence have been reported to have numerous therapeutic properties, the fruit has received little attention.

Reviving the Nanjangud Rasabale banana through the popularization of its prebiotic and probiotic potential presents an opportunity to enhance both agricultural sustainability and public health. Also, preparation of fruit bars is highly preferred as they will be nutritious, have good eye appeal, taste delicious, easy to transport and

convenient with good shelf life. By focusing on scientific research, community engagement, and effective marketing strategies, this heritage fruit can regain its prominence in local diets while supporting the livelihoods of farmers in Karnataka.

**Objectives:**

1. To revive the Nanjangud rasa bale fruit backed by scientific exploration of its pre and probiotic quality
2. To develop a patentable prebiotic bar with the fruit and other parts of the plant

**Methodology:**

**Estimating the prebiotic potential of the fruit:** Prebiotic potential of the banana was tested using specific Lactobacillus species (MTCC-29212) and the well-known standard prebiotic fructo-oligosaccharide (FOS) was used as the prebiotic control. The prebiotic potential was tested by quantifying probiotic bacteria growth in culture media. A concentration of 1,100,500,1000,2000 mg/ml of the banana was evaluated. Similar concentrations of positive control were also used. The banana was weighed, mashed and made into a slurry using PBS. This was used as the extract for all tests.

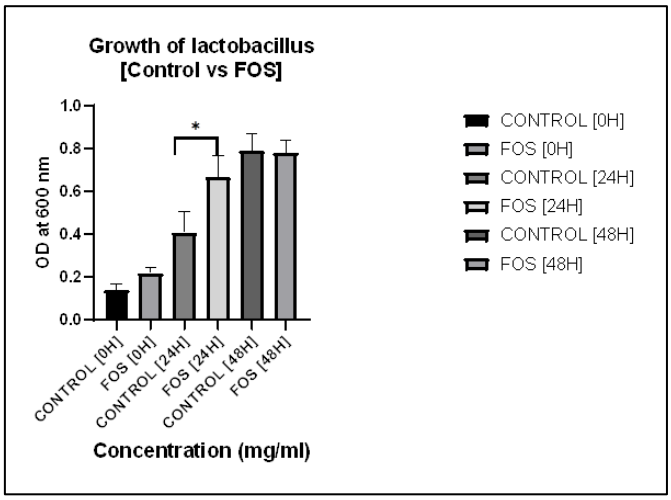
**Estimating the probiotic ability of the fruit:** The fruits were first washed using 70% (v/v) ethanol, and sterile demineralized water for 2– 3 min. About 1 g of the fruit pulp was suspended in 0.1 M phosphate-buffered saline (PBS) and homogenized to obtain a slurry. 1 mL of this slurry was enriched in 9 mL de Mann, Rogosa Sharpe (MRS) broth at 37 ◦C under anaerobic conditions for 48 h in multiple replicates. Following enrichment, 1 mL of this mixture will be serially diluted (up to 10−10) in 0.1 M PBS and plated onto MRS agar plates. After incubation at 37 ◦C under anaerobic conditions for 48 h, morphologically distinct and pinpoint colonies will be randomly selected and repeatedly streaked onto MRS agar plates until pure colonies were obtained.

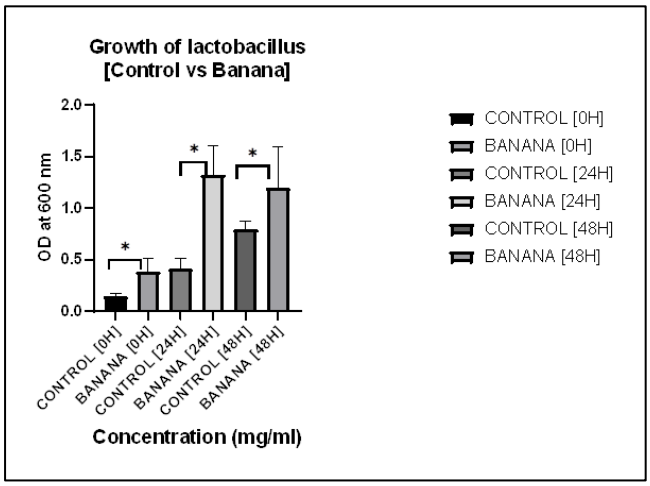
**Preparation of banana for health bar**: Two forms of banana was used for the product preparation. Firstly, the raw banana as such was used. Secondly, the banana was dried under shade and in oven. The dried fruit was then made into a powder and it was used for product preparation.

**Preparation of health bar:** Mashed fresh banana was mixed with specific proportion of oats. This mixture was baked till golden-brown at 180°C, for 5-7 mins with continuous flipping every 30 secs. Dried banana was also used to make the health bar in the same protocol. Both the products were used to assess the prebiotic property. The protocol for the preparation of the bar was provided by TFF, Hyderabad.

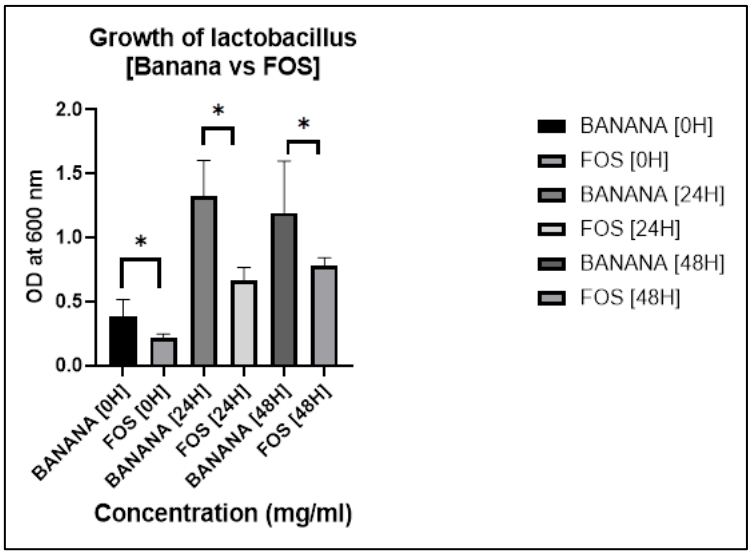
**Results & Conclusions:**

**Estimating the prebiotic potential of the fruit:** Addition of banana extract led to a steady increase in the optical density (OD) and decrease in the pH, indicating increasing growth of Lactobacillus species for up to 48h. Decreasing pH and increasing




optical density (OD) values were comparable with FOS prebiotic at all concentrations and time intervals



**Graph 1:** Evaluation of microbial growth following treatment with different concentrations of banana extract, positive control-FOS and products. Triplicates of each concentration was used. Results are represented as mean ± SD. * indicates significant difference in growth of organisms in the presence of banana extract or FOS in comparison to control tubes where the organisms received only media for growth.

**Estimating the probiotic ability of the fruit:** Isolation of lactic acid bacteria from the fruit is under progress. Colonies (if any isolated) that are pinpoint/small, circular, opaque, and displayed either white or colored morphological characteristics will be selected for further screening and identification.

**Preparation of health bar:** The Nanjangud rasabale banana-based health bar was prepared using oats. Both the products were assessed for the prebiotic activity. It was observed that both the products exhibited a significant prebiotic activity as compared with banana extract.

Fig 1: The picture shows dried banana slices and the powdered form of the same

a

b

Fig 2: Picture ‘a’ shows product with fresh banana and ‘b’ shows product with dried banana powder

**Project Outcome & Industry Relevance (10-15 lines):**

Practical implications of the project in a real-world settings or industries

- **Addressing research gap**: The project addresses a critical research gap—there are no existing studies on the prebiotic impact of this specific banana variety on gut microbiota.
- **Practical outcome:** The creation of a prebiotic fruit bar is a practical outcome that addresses modern dietary preferences while improving health. Collaboration with government agencies and food industries can help popularise this idea on a larger scale.
- **Revival of the Nanjangud Rasabale banana:** The project has the potential to bring back the endangered Nanjangud Rasabale banana by creating a strong market-driven incentive for farmers. This revival will protect a culturally significant crop.
- **Public health relevance:** With increasing awareness about gut health and its impact on metabolic diseases, a product backed by scientific evidence (like the proposed bar) has strong public health relevance. It supports dietary interventions in non-communicable diseases (diabetes, hypertension, etc.) through natural and accessible means.
- **Pilot study for future studies:** The project lays the groundwork for further studies on the health benefits of region-specific fruits, supporting the wider movement toward personalized nutrition and locally sourced functional foods.

**Working Model vs. Simulation/Study:**

The project involved development of a product-Nanjangud rasabale banana based health bar.

**Project Outcomes and Learnings:**

Key Outcomes:

- The project aims to explore and **validate the prebiotic and probiotic potential of the Nanjangud Rasabale banana** (Musa sp. var) through scientific research. This includes evaluating its effects on gut microbiota,

particularly the *Lactobacillus* species, which is significant given the increasing importance of gut health in managing metabolic disorders

- By showcasing the **nutritional and therapeutic benefits of the fruit,** particularly its impact on gut health, the project supports efforts to revive the cultivation of this unique and near-extinct variety, thereby preserving Karnataka's agricultural heritage
- With the help of **government and industrial partnership,** the project may strengthen the livelihoods of local farmers in Nanjangud by creating demand for this crop, thereby encouraging its cultivation and reducing economic vulnerability.

Learning from the project:

- **Multidisciplinary approach to solve complex problems:** The project can provide practical solutions only from integrating biochemistry, microbiology, nutrition, and food technology, highlighting the value of a multidisciplinary approach to solve complex problems.
- **Focusing on consumer needs:** Developing a product like the prebiotic fruit bar taught us the value of focusing on modern consumer needs—convenience, taste, shelf life, and health benefits—while retaining the essence of traditional food systems.
- **Importance of marketing backed with scientific evidence:** Engaging farmers who had shifted away from cultivating the Rasabale banana due to its near-extinct status required strong evidence of market demand and economic viability, underscoring the importance of marketing strategies and community-level outreach

**Future Scope:**

- **Market ready products:** The developed product should be made market ready by collaboration with government agencies or food industries
- **Understanding the prebiotic mechanism:** Prebiotic activity and its mechanism should be studied completely through invivo studies thereby further filling the gap in the literature

- **Increasing consumption of the fruit by increased awareness:** General awareness about the nutritive and therapeutic advantage of this fruit should be increased among the common public to achieve real time increase in its overall consumption and hence increase its agricultural production
- **Pilot study for future studies:** The project lays the groundwork for further studies on the health benefits of region-specific fruits, supporting the wider movement toward personalized nutrition and locally sourced functional foods.