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Optimization and Development of Dragon Fruit Flavoured Oat Milk Probiotic Drink

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ABSTRACT: Fermented drinks are regarded as healthy food due to their probiotic nature. Vegan consumers who choose sustainable diet and people allergic to dairy products demand alternatives for dairy products. Oat grains are good source of protein, fibre, minerals and many other compounds that show antioxidant activity with their vitamins, avenanthramides, phenolic acids, sterols, phytic acid and flavonoids. Oat milk was used as an alternative raw material of cow milk, for production of yoghurt. Oat milk was prepared from oat flakes. We aimed to develop a non-dairy plant-based yogurt from oats milk which was developed using oat milk and probiotics (*Streptococcus thermophilus* and *Lactobacillus bulgaricus*). Fruit Flavored probiotic drink is more popular with consumers, the addition of fruit to probiotic drink improves the flavor making the probiotic drink product more appealing to consumers. Dragon fruit (*Hylocereus undatus* L.), which is rich in vitamin C, fiber and natural antioxidants, is one of the most popular commercial fruits available in sri lanka. However, dragon fruit is still an underutilized fruit due to its exotic taste. The present study investigated the possibility of developing a flavored probiotic drink incorporated with dragon fruit and evaluated its quality parameters. Dragon fruit has been used in probiotic drink production to enhance the nutritional and physiological characteristics of the final product. The use of oat milk by replacing cow milk in probiotic drink decreases fat content and the major problems associated with cow milk fat, cholesterol and lactose contents and this increasing desire for oat milk dragon fruit based flavoured probiotic drink.

KEYWORDS: Energy efficient algorithm; Manets; total transmission energy; maximum number of hops; network lifetime

I. INTRODUCTION

In recent years, consumers have grown more conscious of the link between health and food. Customers are now seeking healthier goods with higher nutritional qualities and particular ingredients in order to prevent health issues, enhance their quality of life, and extend their lifespan. Culminating in the creation of “functional foods” and “nutraceuticals,” are foods that improve consumer health and lower their chance of developing chronic illnesses E. (Valero-Cases et al.,2020),. Due to growing public knowledge of the advantages of probiotics for health, preserving the balance of the intestinal microbiota, and enhancing mucosal defenses against pathogens, the demand for functional foods containing microorganisms with probiotic qualities is rising quickly. Probiotics are advantageous bacteria that have therapeutic benefits on host organisms that consume them. Probiotic products include live microorganisms to have a positive impact on the human body, and also it must be able to tolerate the challenging circumstances found in the human digestive system [1].

Among other health benefits, probiotics enhance immunity, reduce inflammation, relieve gastrointestinal pain, and prevent diarrhea. It works through a variety of different mechanisms. They produce antimicrobial substances like organic acids or bacteriocins, control the immune response by secreting immune-globulin A (IgA) against potential pathogens, lower the risk of allergy development, enhance the function of the intestinal mucosal barrier, increase the stability or promote the recovery of the commensal micro flora when it is disturbed, modulate the expression of host genes, and release functional proteins L. [2].

FRUIT FLAVOURED PROBIOTIC DRINK

Fruit juices, which are generally consumed and are regarded as healthful goods, might serve as an alternate medium for incorporating probiotic bacteria. Fruit juices also include a lot of carbohydrates, minerals, and vitamins that probiotics use as a substrate. This together with the fact that probiotic cells pass through the stomach's acid quickly, results in a high viability for probiotic cells. [3]. Fruits are beneficial for health and energy supply taste, and they could be



probiotic-friendly. They are regarded as perishable goods, and need to be processed right away to minimize post-harvest losses, and the creation of probiotic products may be a strategy to improve the market value and accessibility of fruits and their value-added products [4]. Production of probiotics is an example of value addition to fruits which can help to prevent post-harvest losses. Fruit drinks that have been prebiotically modified may sell for high price since they include healthy bacteria. As the cell culture breaks down fermentable carbohydrates to create by-products like lactic acid (LA), which has antibacterial characteristics and transforms the end product to have a tangy and sour taste, fermentation utilizing probiotic strains might improve the aroma and taste profile along with increasing the shelf-life. Fruit or flavored varieties of drinks are more popular with consumers. The addition of the dragon fruit to fermented drink improves the flavor making the final product more appealing to consumers; also presents a range of products for consumers to choose from. In addition, the dragon fruit enhances the nutritional and physiological characteristics of the final product [5-6].

OBJECTIVES

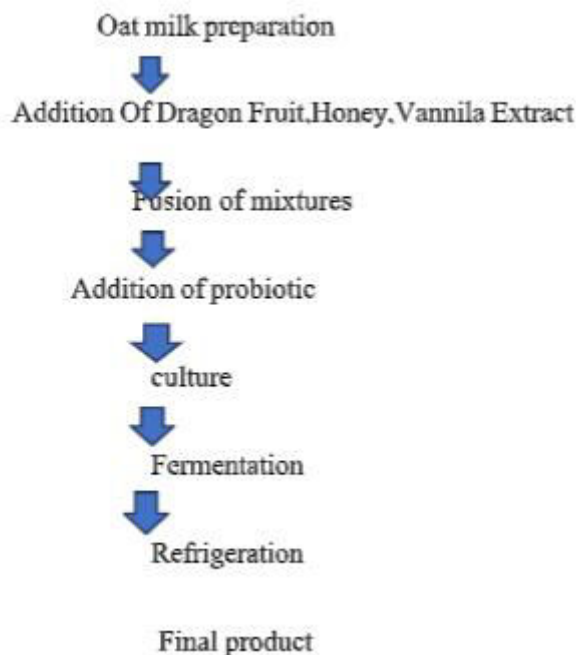
- To develop a Vegan, non dairy milk product
- To produce a Probiotic drink suitable for lactose intolerant individuals
- To incorporate Dragon fruit into the fermented drink
- To enhance the nutritional profile of the final product

II. PROPOSED METHODOLOGY

RAW MATERIALS:

- Oat
- Dragon Fruit
- Honey
- Probiotic Capsule
- Vannila Extract
- Water

III. METHODOLOGY





PREPARATION OF OAT MILK

1. 100g Oats was soaked in 400ml water for 30 mins (The ratio of 400 ml water is chosen for consistency in texture and flavor of the oat milk. Adjusting this ratio may alter the viscosity and taste of the final product)
2. Grinded the oats to obtain Oat Milk
3. Strained the mixture to remove the sediments (100g Oats yield 300ml Oats Milk)

PREPARATION OF DRAGON FRUIT EXTRACT

Dragon Fruit was peeled to remove the skin

Cut into small slices

Blended finely to obtain Dragon Fruit Extract

(A single Dragon fruit weighing 200gm yields 120ml extract of Dragon Fruit)

PREPARATION OF PROBIOTIC DRINK

In the blender, combined the strained oat milk, dragon fruit extract, honey or agave syrup, and vanilla extract for added flavour.

Mixed well until it attains smooth texture

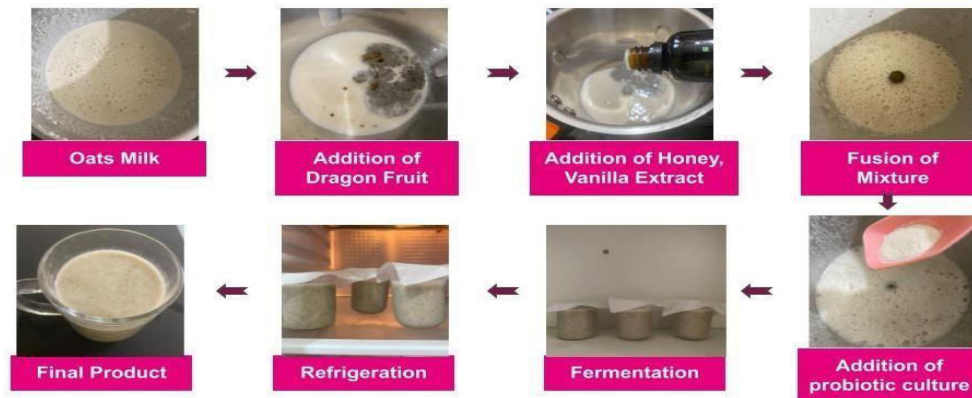
Added the probiotic culture (containing Lactobacillus acidophilus and Bifidobacterium bifidum strains) to the mixture.

Whisked briefly to incorporate the probiotics.

Poured the mixture into a clean, airtight container and allowed it to ferment at room temperature for 12 hours based on desired tartness.

Once fermented, refrigerated the probiotic drink below 5°C for 8 hours

Now Ready to Drink (RTD) fermented probiotic drink is prepared.



IV. RESULTS AND DISCUSSION

NUTRITIONAL ANALYSIS

Energy (Calories): The energy content of 127 kcal per serving provides a moderate amount of energy, suitable for sustaining daily activities without excessive calorie intake.

Protein: With 3.8 grams of protein per serving, this beverage contributes to muscle repair and growth, as well as providing a feeling of satiety.

Fat: The total fat content of 2.6 grams includes both saturated and unsaturated fats, essential for providing energy and supporting various bodily functions.

Carbohydrates: The 18.8 grams of carbohydrates provide the primary source of energy, while the dietary fiber content of 2.54 grams aids in digestion and promotes a feeling of fullness.

Calcium: Each serving provides 306.0 mg of calcium, essential for maintaining strong bones and teeth, as well as supporting nerve function and muscle contraction.

Iron: With 2.23 mg of iron per serving, this beverage helps prevent iron deficiency anemia and supports oxygen transport throughout the body.

Vitamins: The beverage is rich in vitamins, including vitamin D (4.76 mcg), vitamin B12 (2.54 mcg), and vitamin C (20.86 mg), which play essential roles in immune function, bone health, and energy metabolism. Overall, this beverage provides a balanced mix of macronutrients, vitamins making it a nutritious option for supporting overall health and well-being.

STORAGE CONDITION

Dragon Fruit Flavoured Oat Milk Probiotic Drink samples were segregated into three unique storage settings such as Freezing Compartment (-18°C), Refrigeration Unit (5°C), Ambient Room Temperature (24°C) for 15 days and checked every 8 hours periodically.



SHELF LIFE OBSERVATION

Upon examination under different storage conditions, the following observations were made for the Dragon Fruit Oat Milk Probiotic Drink:

When stored in the freezer, the drink maintains its optimal quality for up to 30 days. Under refrigeration, the Dragon Fruit Oat Milk Probiotic Drink retains its quality for 18 days. For ambient conditions, it is advisable to consume the Dragon Fruit Oat Milk Probiotic Drink within 8 hours of preparation. These results highlight the varying shelf lives of the drink based on storage conditions, with freezer storage offering the longest duration, followed by refrigeration, and then ambient conditions, which require more immediate consumption.

V. CONCLUSION AND FUTURE WORK

Among the various combinations tested for the probiotic drink, combination C4 emerged as the clear winner, boasting a harmonious blend of oat milk and probiotic content that delighted the senses with its appealing aroma and taste. Furthermore, storage condition analysis revealed valuable insights into the drink's shelf life. Freezer storage proved most effective, preserving quality for up to 30 days, followed by refrigeration for 18 days, and ambient conditions requiring consumption within 8 hours. These observations underscore the critical role of proper storage in maintaining product freshness and highlight the importance of adhering to recommended storage guidelines to ensure consumer satisfaction. Overall, the probiotic drink offers a nutritious and flavorful beverage option, with combination C4 standing out as the epitome of sensory excellence and practicality in storage.

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