***Original Research Article***

**Formulation of Jackfruit based Functional Greek Yoghurt and its influence on sensory attributes**

**Abstract:**

The research was conducted to formulate Jackfruit based Functional Greek Yoghurt and its effect on sensory attributes. Greek yoghurt was prepared according to standard protocol. After being heated to 90˚ C for five minutes, the cow's milk was cooled to 45˚ C. Freeze-dried DVS Yoghurt culture was added at concentration of 0.30 per cent and the product was then incubated at 45˚C for 4 hours. The product was further de-wheyed and blended with different levels of jack fruit pulp with sugar @ 20, 30, 40 per cent .The developed functional greek yoghurt was given for judges to adjudge the sensory attribute of the product based on 9-point hedonic scale .The best optimized product with 40 % jack fruit was selected

Key words: Greek yoghurt, Jack fruit pulp and Sensory attributes

**Introduction:**

A fermented dairy product with many health advantages is yoghurt. *Streptococcus thermophilus and Lactobacillus delbrueckii subsp. bulgaricus* are combined in yoghurt starter cultures. Indian cuisine now includes more than 700 different yoghurt and cheese products. Yoghurt consumption benefits the host's health in a number of ways, including by enhancing bone health, enhancing food quality, and lowering the prevalence of chronic illnesses including obesity and heart disease. Additionally, yoghurt may be fortified with a number of important minerals, such as protein, calcium, potassium, phosphorus, and vitamins B2 and B12 (Dewan and Tamang, 2007). These strained yoghurts are best known as Greek-style yoghurts are characterised by protein content usually around 9% to 10%. Their creamy texture and their natural, nutritive and low-fat attributes have made them very popular in the past few years (Ramakrishna *et al*. 2024).

*Artocarpus heterophyllus* is the scientific name of jackfruit which the fruit belong to the family of Moracea and native to Southeast Asia. Researchers have looked at how the phytochemicals in jackfruit can prevent or treat a variety of disorders, including high blood pressure, heart disease, stroke, bone loss, and muscle and nerve dysfunction. These phytonutrients aid in the body's removal of cancer-causing free radicals. Because to the presence of vitamin B6, jackfruit lowers blood homocysteine levels, reducing the risk of heart disease. Jackfruit is high in magnesium (54 mg/100 g in seeds and 27 mg/100 g in young fruit), which aids in calcium absorption and may fortify bones, preventing bonerelated diseases like osteoporosis (Mbaeyi-Nwaoha *et al*., 2019).

The jackfruit's high fibre content (3.6 g/100 g) promotes smooth bowel movements, reduces constipation, and protects the colon mucous membrane by eliminating cancer-causing substances from the large intestine. According to a research, unripe jackfruit has a glycemic load (glucose level) that is approximately half that of rice or wheat. This is the rationale behind how unripe jackfruit aids in the treatment of diabetes. Processed, dried, and marketed as a dry powder, ripe jackfruit pulp is used in the production of juice, biscuits, chutney, jam, jelly, toffee, paste, leather, bars, nectar, squash, and pickles. Additionally, it is preserved in syrup and canned, either alone or combined with dehydrated bulbs, chutney, preserves, candy, concentration, and powder. (Swami *et al*., 2018). The crude methaolic extracts of the stem and root, barks, pulp and root heart-wood, leaves, fruits and seeds of *Artocarpus heterophyllus* and their subsequent partitioning with petrol, dichloromethane, ethyl acetate and butanol gave fractions that exhibited a broad spectrum of antibacterial activity .

**Materials and Method:**

The Fresh Cow milk was procured from Students Experimental Dairy Plant (SEDP) of Dairy Science College, Hebbal, Bengaluru. Whey protein concentrate superior quality Whey protein concentrate (WPC) was procured from NAKPRO PERFORM, Bengaluru. Starter Culture Good quality of starter culture was procured from Danisco pvt Ltd, Denmark. Jackfruit pulp Good quality processed jackfruit pulp was procured from Hebon Jackfruit product limited, Bengaluru. A 9-point hedonic scale was used by the selected panel of judges to evaluate the generated study sample's sensory qualities, including colour and appearance, body and texture, flavour, and overall acceptability. Peryam and Pilgrim, (1957). The highest-scoring output was further used for statistical analysis using R software (R. version 4.0.3), the data collected for the research investigations was examined to evaluate the significant or non-significant effects of various treatments and trials obtained for the current study. The mean and critical difference was calculated.

Fresh cow milk

(Fat-4.5 % & SNF- 9.0 %)

Heat treatment (90 ̊C/no hold)

Cooling to 45 ̊C

Addition of Whey Protein Concentrate (**5%**)

Addition of **0.30**% freeze dried DVS culture at 1:1

(*Streptococcus thermophilus* and *Lactobacillus bulgaricus*)

Incubation (45°C/ 4h)

De-wheying (cloth bag filtration at 4°C/overnight)

Greek Yoghurt

Addition of Jackfruit Pulp with Sugar (20, 30, **40%**)

Blending and Storage (50C)

Chart 1- **Functional Jack fruit Greek Yoghurt**

**Results and discussion**

**Effect of Jackfruit pulp with sugar on the sensory attributes of functional Greek Yoghurt**

The sensory acceptance mirroring the effect of Jackfruit pulp with sugar is tabulated in table 1 and figure1.The control sample's mean colour and appearance , Body and Textue, flavor and overall acceptability score was 8.05, 7.35, 7.45, 7.75 respectively . The sequential observation indicated that the jack fruit pulp with sugar had an remarkable influence for sensory perception The functional Greek yoghurt with 40 percent jack fruit had a maximum score of 8.50 8.25, 8.45, and 8.50 for Colour and appearance, Body & texture, flavor and overall acceptability respectively. Statistical analysis is in accord with the sensory results The research study conducted by Dissanayaka *et al* 2019., studied the acceptance of jack fruit pulp with frozen yoghurt and Ara *et al*., (2015) found the results concurring with the present experiment where flavour and taste scores of jackfruit yoghurts were better than those of plain Dahi.Jackfruit pulp enhances the taste and aroma which could have resulted in the better acceptability. The results were in line with Dey, K.C *et al.,* (2014) who reported higher acceptability with 15% pure jackfruit pulp. The main volatile compounds detected were ethyl isovalerate, propyl isovalerate, butyl isovalerate, isobutyl isovalerate, 3-methylbutyl acetate, 1-butanol, and 2-methylbutan-1-ol.Kanhed *et al* 2023 also emphazied that the yoghurt smoothie prepared with jack fruit pulp with sugar had an excellent sensory acceptability. The improved buffering capacity of a casein micelle suspension with increasing micellar content was the reason behind firm body and texture and firmer physique was caused by milk's greater protein content. Prior to fermentation, a protein net with greater protein content was smaller and more compact, with reduced permeability.

**Table 1: Effect of Jackfruit pulp with sugar on the sensory attributes of functional Greek Yoghurt**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Jackfruit pulp with sugar**  **(%)** | **Colour and appearance** | **Body and texture** | **Flavour** | **Overall**  **acceptability** |
| Control | 8.05c | 7.35c | 7.45b | 7.75c |
| 20 | 7.33b | 7.55b | 7.80ab | 7.77b |
| 30 | 8.00bc | 7.75ab | 7.50c | 8.00c |
| 40 | 8.50a | 8.25a | 8.45a | 8.50a |
| CD *(P=0.05*) | 0.60 | 0.47 | 0.54 | 0.55 |

**Note:**

All the values are average of three trials

Similar superscripts indicate non - significance at the corresponding critical difference

Sensory analysis – 9-point hedonic scale

**Figure 1: Effect of Jackfruit pulp with sugar on the sensory attributes of functional Greek Yoghurt**

**Conclusion:**

Greek yoghurt is traditionally obtained by straining normal yoghurt, which gives a thicker texture. It is a concentrated fermented milk as defined by Codex Alimentarius, which specifies that the protein content must be at least 5.6g per 100g. The Greek yoghurt is gaining Para most importance due to its nutritional aspects further value addition with jack fruit which is rich in therapeutic prospects can improvise the product. In this study Greek yoghurt was blended with jack fruit pulp and subjected for sensory studies. The study revealed the highest acceptance. Besides contribute to the functional and nutritional benefits of one's wellbeing- strengthening the farming community and uniting the food web. They also channel technology in a creative way to guarantee consumers a fully nutrient product.

**Reference**

Ayar, A and Gurlin E.2014.production and sensory, textural, physic-chemical properties of flavoured spreadable yoghurt. *J Life Sci*.,**11** (4):58-65.

Dissanayaka, T.M.P.M., Gimhani, K.H.I. and Champa, W.A.H. 2019. Evaluation of Nutritional, Physico-chemical and Sensory Properties of Jackfruit (Artocarpus heterophyllus) Incorporated Frozen Yoghurt. *Int. J. of Sci. and Res***. 9** (6):627-632

Dewan, S. and Tamang, J. P. 2007. Dominant lactic acid bacteria and their technological properties isolated from the Himalayan ethnic fermented milk products. *Ant. v. Leeu*., **92** (3): 343-352.

Dey, K.C., Begum, R., Rahman, M.R.T., Sultana, A., Akter, S. and Janny, R.J. 2014. Development of Fruit Juice Yogurt by Utilization of Jackfruit Juice: A Preliminary Study 115 on Sensory Evaluation, Chemical Composition and Microbial Analysis. *Int. J. of Eng. Res*., 3 (4): 1074-1079

Mbaeyi-Nwaoha, D., Elizabeth, I., Nnamani, M., Lynda, C., Ndukwe, D. and Okoro, O. 2019. Evaluation of the Effects of Pectin Extracted from Jackfruit (*Artocarpus Heterohyllus*) and Passion Fruit (*Passiflora Edulis Var Flavicarpa Deg*.) Peels on the Quality Attributes of Yoghurt from Skimmed Milk. *Sch. Middle East Pub*., **4** (4) :371-38

Peryam, D.R. and Pilgrim, F.J. 1957. Hedonic scale method of measuring food preferences. *Food Technology*., **15** (6): 9-14

Swami, S. B. 2018. Jackfruit (Artocarpus heterophyllus): Biodiversity, Nutritional Contents and health. In: Bioactive Molecules in Food, Edt. Killa Roha, Swami,S.B. and Kalse,S.B. Edn 1 st ., *Springer Nature publication*,Switzerland,pp.2-23

Kanhed, M.I., Harinivenugopal, Arunkumar, H., Manjunatha, H. and BG, S., 2023.Formulation of WPC enriched ready to serve yoghurt smoothie. *International zResearch Journal of Modernization in Engineering Technology and Science.* **5**(5): 2582-5208.

Ramakrishnan, V., Harinivenugopal., Aruun Kumar H., Venkatesh M., Manjunath H and Pushpa B P., 2024.Effect of concentration of starter culture and incubation time on sensory attributes of RTE functional Greek Yoghurt. *J Sci.Res.Rep*., **30** (7):340-345.

**ANNEXURE**

**DAIRY SCIENCE COLLEGE, KVAFSU, BENGALURU-24**

**DEPARTMENT OF DAIRY TECHNOLOGY**

**Score card for Sensory Evaluation Using 9-Point Hedonic Scale**

**Name of the Judge: Date:**

You are requested to assess the product in terms of general acceptability on a 9-point hedonic scale score system.

**score system:**

Like extremely 9

Like very much 8

Like moderately 7

Like slightly 6

Neither like nor dislike 5

Dislike slightly 4

Dislike moderately 3

Dislike very much 2

Dislike extremely 1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sensory Characteristics** | **Sample Code** | | | | | |
|  |  |  |  |  |  |
| Color and Appearance |  |  |  |  |  |  |
| Body and Texture |  |  |  |  |  |  |
| Flavour |  |  |  |  |  |  |
| Overall Acceptability |  |  |  |  |  |  |

**Comments: Signature**