e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

DEVELOPMENT OF SMOOTHIE MIX WITH OAT FLOUR AND BANANA FLOUR FOR SUSTAIN ENERGY RELEASE

Nirmal Raaj S*1, Nandkumar Nair*2

*1Department of Food Technology, Parul institute of Applied Science, India.

*2Department of Food technology, Parul Institute of Technology, India.

DOI: https://www.doi.org/10.56726/IRJMETS72088

ABSTRACT

In order to improve nutritional content and give a prolonged energy release, this study investigates the creation of a smoothie mix made with oat flour and banana flour. Because of their high fiber, protein, and vital nutrients, oat and banana flours are selected to provide a gluten-free, functional food option. 30g of banana flour, 30g of oat flour, 20g of milk powder, 15g of jaggery powder, and 5g of malt extract powder were combined to create the smoothie mix, which produced a nutrient-dense product with 7.42% protein, 11.89% dietary fiber, 14.77% fat, and 22.42% carbohydrates. With 252.29 kcal per serving, the smoothie mix provides a balanced dose of protein, carbs, and healthy fats for long-lasting energy release. The results of the proximate analysis showed a high dietary fiber content, an excellent mineral profile (2.42% ash content), and moderate moisture level (5.14%). With an overall acceptability score of 8.65, the sensory evaluation, which was conducting by using 9-point hedonic scale, showed great acceptability and positive consumer response. Additionally, the mixture had a pleasing odor, mouthfeel, and texture. To sum up, the smoothie mix wade with oats and banana flour shows promise as a functional food item that is both nourishing and well-liked. For health-conscious people, it provides a quick, gluten-free, and energy-sustaining option. With additional optimization, it may find wider commercial use.

Keywords: Oats Flour, Banana Flour, Smoothie Mix, Nutritional Value, Functional Foods, Energy Sustaining.

I. INTRODUCTION

1.1. General information about green banana flour

The name “banana” refer as species or hybrids in the Musaceae family’s genus Musu. Specifically, the mainstays of the export trade are banana cultivars belonging to the Cavendish subgroup (M. cavendishii) (segundo et al.,2017). The banana accounts for almost 16% of global fruit output, making it the second most produced fruit after citrus. Postharvest losses cause more than 30% of India’s 16.81 million metric tons of bananas to be squandered each year. This fruit is perishable and quickly spoils. The banana’s low acidity and high concentration of soluble solids and minerals make it a good choice for industrial processing. Accordingly to the new economic plan, food waste should be used more than variety of creative items. This contains the process of turning unripe banana flour, which is then used to make high-fiber bread, slowly digested cookies, and edible films (Pragati et al.,2014). Rich in iron, potassium, calcium, zinc, salt, and vitamin A, mature unripe plantain pulp is low in protein and fat and has a water content of roughly 61% while it is unripe and 68%, when it ripens. The breakdown of carbohydrates (sugars, starches, and fibers) during the plantain’s ripening process is probably that causes the increase the water. Carbohydrates are broken down into their component parts to provide energy to conduct cellular processes, which keeps the fruit’s cells alive. During the ripening stages, the starch that is primarily found in unripe plantains as amylase and amylopectin is hydrolysed to produce sucrose, fructose, and glucose (Idahosa et al.,2020). Dietary fiber (DS) is made up of a wide variety of structurally different carbohydrates that are absorbed and digested in the upper gastrointestinal tract. Diets high in fiber that also assist maintain normal blood cholesterol levels, reduce transit time, decrease postprandial glycemic response, bulk up the feces, and diminish the risk of coronary heart disease. Banana bunches that are too tiny for shipping are eliminated when they arrive at central collecting points, as those with ruined or damaged portions that could lead to microbial contamination of the bunch. Bananas that are rejected are typically disposed of inappropriately. Consequently, the issue would be resolved if the culled bananas were successfully used in industry (Segundo et al.,2017). Depending on the drying site, the current method sun drying outside exposes the product to dirt, insert, damage, bacterial infestation, fungal spore deposition, and a variety of other

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

environmental contaminants. Therefore, it is clear that a sanitary, efficient drying technique is required. Oven and solar drying are examples of contemporary drying technique. Both of them use heat to evaporate the food's moisture content to the lowest possible level. These contemporary drying techniques are employed to dry plant material over a predetermined amount of time at particular temperature (Yarkwan et al.,2015).

1.2. General information about oat flour

Like all other grain varieties, oats are a member of the poaceac family and one of the cereals with the highest nutritional fiber content. Oats have a long history dating back to around 2000B.C. Compared to wheat and barley, oats seem to have originated much later as a crop. Oats were initially discovered in Egypt and among the ancient swiss lake people. Although they can grow in acidic soil can be low pH as 4.5, oats thrive in soil with a pH of 5.3 to 5.7 (sangwan etal.,2014). Based on recognition of several of unique properties, oats is prepared differently than other cereal grain. The characteristics is includes a higher lipid content than most cereal grains, a hull that is not attached to the endosperm, and a high quantity of soluble dietary fiber. The primary components of oats hull are cellulose, hemicellulose, and lignin. It contains the softer groat than other grains, oats are most frequently processed as whole grains. Some grains like wheat, layer protein, neutral lipids, b-glucan, phenolics, and niacin are all found in significant amount in groat, which is occasionally separated to create oat bran. Therefore, converting the seed in foods includes milling and other processing steps. Cereal grains is currently one of the most necessary foods on the globe thanks in large part to the development of cereal processing, proteins, carbohydrates, and b-glucan make up the inner endosperm, whereas lipids and proteins predominate in the germ. Because of these components and their distinct physiological makeup, oats must be processed differently than other grains. They also give them special nutritional properties that make them a valuable but underutilized food product, which is sometimes an ingredient in other food products (decker et al., 2014). About oat has an 60% starch and 14% carbohydrate, protein, 7% are lipids, and 4% are β-glucan. Avenanthramides, which are specific to oats, have garnered a lot attention among them. Numerous scientific research conducted over the years have demonstrated the health benefits of oats in lowering blood cholesterol, glycemic index response, gut microbiota balance, and blood pressure. They have also shown that soluble fiber from oat products can help lower the risk of heart disease. The positive impact of oats on blood glucose levels has received particular attention in this scientific study. The most popular way to eat oats is as whole grains, which has retain nutrients effectively and are advised to help prevent disease (zhang et al., 2021).

1.3. General information about smoothie mix

Smoothies are ideal in a market whereas buyers want the best choice to get products possible- convenient well-labeled, little processed, with fresh flavours, taste, and looks. These goods are usually bought fresh from juice bars or processed (lightly pasteurized) for the store`s chilled section (wang et al., 2014). However, food consumers frequently make poor food choices and wind up eating readily available but harmful meals, which leads to the development of lifestyle disease including diabetes, obesity, cardiovascular disease, constipation, renal disorders, etc. One customer can eat convenience foods without having to do any significant preparation or cooking beforehand. These cuisines were developed as a result of rapid urbanization, industrialization, and changes in people`s eating patterns brought about by globalization. Generally referred to as "Ready-To-Eat (RTE)", "Ready-To-Cook (RTC)", and "Ready-To-Serve (RTS)" foods, they include a broad range of processed and semi-processed foods. It takes two to ten minutes to produce the Ready-To-Reconstitute (RTR) mixtures in water (Neeharika et al., 2024).

II. MATERIALS AND METHODS

2.1 Materials:

Banana flour, oat flour, jaggery powder, milk powder, malt extraction powder was collected take for development of smoothie mix with oat flour and banana flour for sustain energy release.

2.2 Preparation of smoothie mix powder:

Collection of raw material and weight sample add altogether into bowl mixed the flour well it. Take measuring scale add water to the proportion to smoothie mix into shaker and mix with water 10-15 sec after that keep sample in refrigeration 30-45mins and serve in cup.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

2.3 Flowchart of smoothie mix:

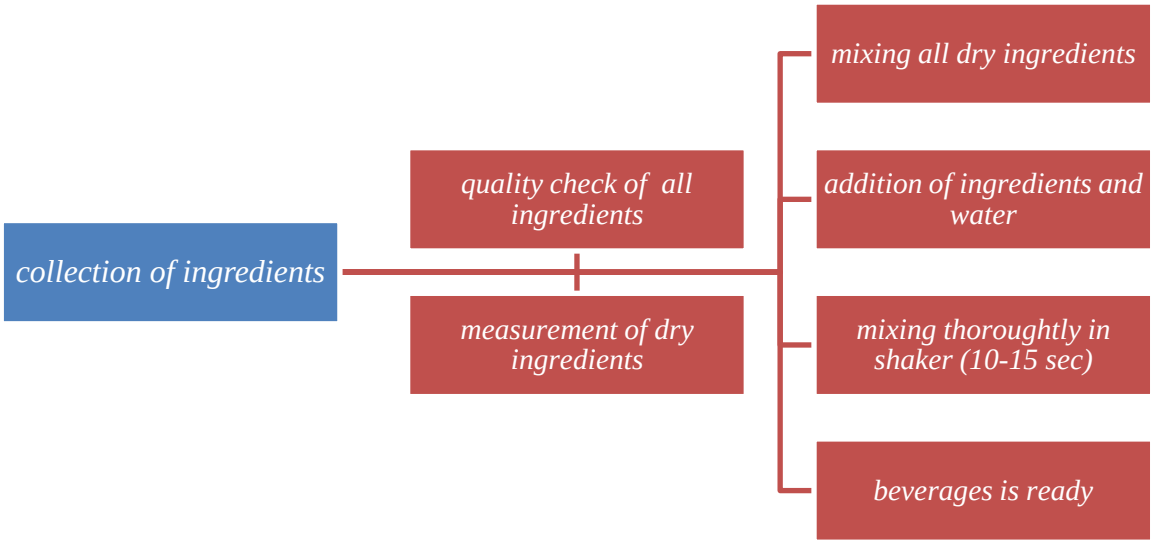

Figure 1: flowchart of development of smoothie mix with oat flour and banana flour for sustain energy release.

2.4 Proportion of smoothie mix powder:

Table 1: proportion of sample ingredients:

Ingredients	Weight of sample (g)
Banana flour	30
Oat flour	30
Milk powder	20
Grounded Jaggery	15
Malt extract powder	5
Total	100

2.5. Proximate analysis:

2.5.1. Moisture analysis

The moisture content of the product was determined by following the (AOAC,1999) official method. The weight of empty dish can be id and recorded. 5g of the sample was taken and evenly distributed and the dish was placed at hot air oven for 105˚C for 3 hours. After drying the sample was kept in desiccator for cooling. The moisture content was calculated by using this method,

$$Moisture\ (\%) = \frac{weight\ of\ the\ sample\ before\ drying - weight\ of\ residue\ after\ during}{weight\ of\ the\ sample\ before\ drying} \times 100$$

2.5.2. Ash analysis:

The ash content was measured by using in this method (AOAC,2016). A sample is collected for moisture and all chemicals are destructed by charring it. After burn the sample at the high temperature for 550˚C at 4 hours in muffle furnace and cool it in desiccator. The ash content was calculated by using this method,

$$Ash(\%) = \frac{weight\ of\ ash}{initial\ weight} \times 100$$

2.5.3. Protein:

The protein was calculated using the kjeldahl method described in (AOAC, 1980). A kjeldhal digestion flask was used to hold a sample of 0.5g of free fat. Add a pinch of the digestion mixture to 10ml of concentrated sulphuric

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

acid. Following digestion processed, in this material was added to volumetric flask containing 100ml of distilled water. A kjeldhal flask was filled with a 10ml aliquot of the digestion material. The kjeldhal flask containing the sample was filled with 1oml of 50% sodium hydroxide (NaOH) and 10ml of distilled water and the distillation assembly was attached. Ten to fifteen minutes were spent boiling the material. A flask with 2-3 drops of mixed indicator and 10ml of 2% boric acid was used to collect the released ammonia. 0.02N sulphuric acid was used to titrate this until a pink hue development. Diluted sulphuric acid was obtained and used as a sample for the 5ml blank.

$$\%N = \frac{titre\ value\ (sample - blank) \times 0.028\ \times 100}{weight\ of\ the\ sample}$$

2.5.4. Fat

The fat content of the product was analysed according (AOAC, 1980). The fat was extracted using petroleum ether from the dehydrated sample. Evaporation was used to remove the solvent and the fat residue that was still in the same round-bottom flask was weighted. In an extraction thimbe, a well-grounded, dehydrated sample weighting around 2 grams was obtained. With 25ml of petroleum ether inside, the thimble was put in the soxhlet equipment extractor. The extractor of the petroleum ether was evaporated. The flask containing the Fat residue was chilled in desiccators, weighed and dehydrated for 50-60˚C for 20 minutes in hot air oven.

$$fat(\%) = \frac{weight\ of\ the\ emply\ flask + fat - weight\ of\ the\ empty\ flask \times 100}{weight\ of\ the\ sample}$$

2.5.5. Carbohydrates

The carbohydrate content of the product was determined by (AOAC, 1999). The method of the difference is a popular technique for calculating total carbohydrates. The calculation method uses the mass balance approach instead of a direct measurement of carbohydrates, were,

$$total\ carbohydrates = 100 - (moisture + protein + fat + ash)$$

2.5.6. Dietary fibre analysis

Dietary fibre was calculated using (AOAC 985.29) Enzymatic- Gravimetric method. For this 5g of defatted sample was taken.

1. Starch and protein hydrolysis: The pH of sample was adjusted to 6.0 to 6.5 to bring the solution closer to the pH optimum of amylase and protease. The suspension was cooled to 30˚C before incubation overnight with 10mg of alpha amylase and 10mg of protease. The incubation was accompanied by slow stirring using magnetic stirrer.
2. Isolation of insoluble dietary fibre (IDF): the suspension was filtered and that is insoluble residue was washed with water. The filtrate was kept for next step. The residue was washed with alcohol, acetone before being dried at 70˚C in oven for overnight. The dried residue is IDF.
3. Isolation and precipitation of soluble dietary fibre (SDF): Few drops of concentration hydrochloric acid was added on filtrated to make pH 2 to 3,4 volume of ethanol was slowly added and the suspension was left to stand for 1 hour. Filter the precipitate and wash with 75% ethanol, absolute ethanol and acetone before drying at 70˚C in oven for overnight. The residue was weighted in crucible to give SDF.
4. Total dietary fibre (TDF): the sum of insoluble dietary fibre and soluble dietary fibre was calculated.

2.5.7. Energy

Energy in food is calculated on general factor, which assign the caloric value to macronutrients,

$$Energy(Kcal) = (carbohydrates \times 4) + (protein \times 4) + (fat \times 9)$$

2.6. Functional properties:

2.6.1. Water holding capacity (WTC)

The capacity to store water was measured as follows: Protein samples received 30% water (Millipore H2O) based on sample weight (60µl water /200mg sample). After carefully mixing and sealing the samples, they were left to equilibrate for the entire night. Samples were heated at a rate of 5˚C per minute to 135˚C and then held for one hour in order to evaluate them on the TGA after equilibrium. Following a measurement of the weight loss following an 80 minute run, the amount of water bound in the sample was determined by subtracting the

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

initial water content from the weight of the sample (water added + sample moisture). The results were then expressed as g water/g protein (Kaur et al., 2017).

2.6.2. Foaming capacity (FC)

This method was used to determine foaming capacity (FC). A high-speed homogenizer (WiseTis, korea) was used to homogenize two grams of flour and 100 milliliters of distilled water at pH values of 2,4,6,8 and 10 for one minute at 10,000 rpm. By measuring the foam volume after an hour, foam stability was ascertained and foaming capacity was computed as the percentage increase in volume (Shah et al., 2016).

$$emulsion\ capacity\ (100ml) = \frac{height\ of\ the\ emulsified\ layer}{total\ height\ of\ tube\ contents} \times 100$$

2.6.3. Swelling properties of flour:

The most defined measures for comprehending and assessing the integrity of starch granules are swelling power and solubility. The water solubility and swelling power of banana flour at different temperatures are demonstrated. The strength of the water-binding forces is used in granules starch of indicated by their swelling capacity. In this temperature rises, due to the mobility of starch molecules has increases because of binding forces have high the potential for swelling. The findings demonstrated that GBF's swelling power get larger at the temperature rose. The heating process releases the intra-granular linkages due to the cause the starch granules in flours to expand. It has hydrogen bonding in regions that are amorphous. Depending on the amount of amylopectin in the bananas, the swelling power changed. Between 80˚C and 90˚C, the monthan and saba flour showed an exponential rise in swelling power, suggesting that have a larger in amylase concentration and a different amylopectin structure than other flours (kumar et al., 2019).

2.7. Sensory analysis:

A sensory evaluation was carried out to determine the resulting smoothie mix acceptability based on sensory attributes. A panel of trained and unskilled volunteers assessed the samples, concentrating on physical appearance, texture, color, taste and overall acceptability. Panelists were asked to rate the product on a scale of 0 to 9 to indicate how much they liked or disliked it. This was done using the 9-point hedonic scale, a popular tool for sensory analysis.

III. RESULT AND DISCUSSION

The primary goal of this research was to create smoothie mix formulate the concentration of the oat flour and banana flour. The oat flour and banana flour are nutritional conventional foods and widely acceptable foods. The highest overall acceptability score among the sample was obtained by the sample is taste. Hence it is conducted as the oat flour and banana flour could be successfully fortified in the smoothie mix, which increases nutritional value without majorly affecting the sensorial and textural quality profile of oat flour and banana flour smoothie mix.

3.1. Proximate Analysis

Table 2: proximate analysis of smoothie mix powder

Serial no	Parameters	Results
1.	Moisture analysis	5.14%
2.	Ash analysis	2.42%
3.	Fat analysis	14.77%
4.	Dietary fibre analysis	11.89%
5.	Protein analysis	7.42%
6.	carbohydrate	22.42%
7.	Energy (kcal)	252.29

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

3.1.1. Moisture content:

Moisture content of the oat flour and banana flour smoothie mix was obtained to be 5.14%. Moisture content is crucial factor in determining the shelf life and texture of beverages product. This moisture content showed in the smoothie mix is have moderate water activity level, which contributes to their granules and small particles that ensuring the shelf life. The moisture content below 7% is generally desirable for solid property in smoothie mix to prevent microbial growth and spoilage.

3.1.2. Ash content:

Ash content represents the total mineral content present in the smoothie mix. The ash content in 2.42% indicates a good mineral profile, which would be attributed to the presence of oat and banana flour, it is rich in potassium, iron, magnesium, phosphorous, calcium. These minerals contribute to various physiological function, including heart health and weight management.

3.1.3 Fat content:

Fat is play important role for mouthful and consistency in overall flavor in smoothie mix. Fat content 14.77% because of adding the milk powder and other ingredient in smoothie mix it is also health way to give by formulation. Fat is used to help in satiety, creaminess and texture and nutritional absorption in smoothie mix, enhancing their sensory properties. It has an very low fat and give quick energy boost.

3.1.4. Protein content:

Protein is a crucial macronutrient in gluten free products, as many gluten free diets lack sufficient protein sources. The protein content of 7.42% in oats and banana flour smoothie mix containing, in various based on the ingredients. But the protein content has in oat flour (10-15%) is significantly higher than in banana flour (2-5%), making oat flour is primary contributor to protein in the mix. This can be provide for energy drinks, busy professionals, ready-to-mix products.

3.1.5. Dietary fiber content:

Dietary fiber is essential for digestive health, supporting regular bowel movements and prolonged satiety. The fiber content of 11.89% in smoothie mix is made from oat flour and banana flour. It is higher in oat and banana flour in oats contain (7-10%) and it has soluble and insoluble fiber that help in lower cholesterol and improve digestion and banana flour have an 8-12% fiber and act as an resistant starch (RS) it used supports gut health and act as prebiotic.

3.1.6. Carbohydrate content:

Carbohydrates serve as the primary energy source in a smoothie mix, ensuring sustained energy while maintaining a balance with other macronutrients. The carbohydrate content of 22.42% ensures that the smoothie mix made with oat flour and banana flour provides a well-rounded carbohydrate profile, combining complex carbohydrates, fiber, and resistant starch for better digestion and energy release. It is a better choice to consuming smoothie mix to reduce the blood sugar level and managing diabetes.

3.1.7. Energy value:

The total calorie content of 252.29 kcal per serving suggests that in smoothie mix substantial amount of energy, making them a satisfy drink. The smoothie mix has balanced macronutrient profile which is made with oat and banana flour, guarantees and gradual release of energy and avoids sharp increases in blood sugar levels. In comparison to commercially available gluten-free options, which frequently lack sufficient protein and fiber, this smoothie mix is nutrient dense due to its mixture of protein, fiber, and healthy fats.

3.2. Sensory Analysis

Sensory evaluation was undertaken to check the acceptability of development oat and banana flour smoothie mix using hedonic scale. On the basis of overall acceptability, physical appearance, texture, colour, and taste panelist had to mark the score of 9 where being extremely liked and 1 being extremely disliked. The smoothie mix is got highest score for color is (8.38), indicating an appealing visual appearance. Texture (8.45) and mouthfeel (8.6) were also well-rated, suggesting a pleasant mouthful drinks can be consumed. Taste (8.68) and odor (8.4) scored slightly lower, possibly due to the natural taste by adding oat and banana flour. The overall

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

acceptability (8.65) that the smoothie mix can be were well-received and have strong in resistant starch and gluten-free drink.

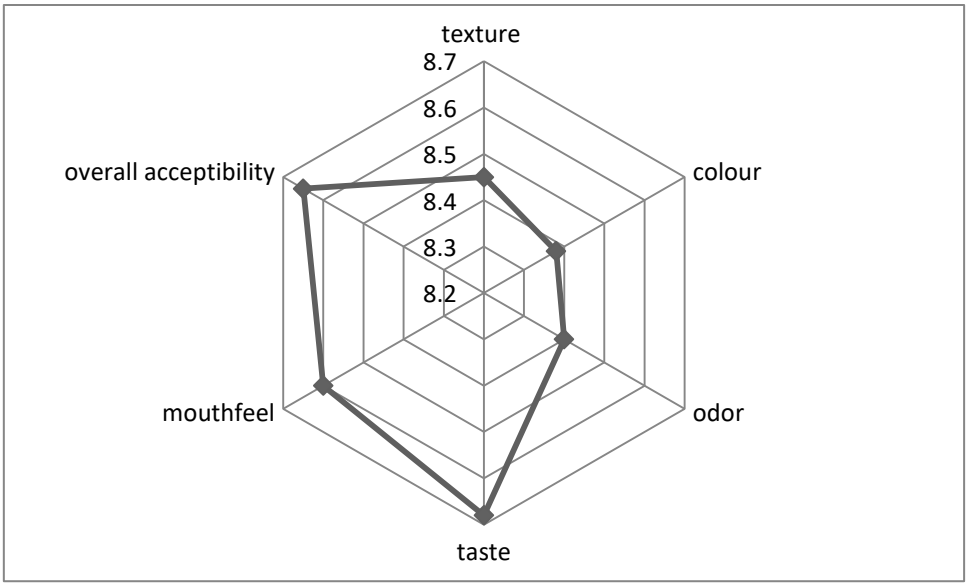

Figure 1: Hedonic scale rating for oat and banana flour smoothie mix.

IV. CONCLUSION

Oat flour and banana flour have been combined to create a smoothie mix that is both nourishing and energy-sustaining. The smoothie mix's nutritional profile is greatly enhanced by the addition of oat and banana flour, which provides an excellent balance of carbohydrates, protein, dietary fiber, and healthy fats. According to the proximate analysis, the smoothie mix is a nutrient-dense product with 7.42%protein, 11.89% dietary fiber, 14.77% fat, and 22.42% carbs. The smoothie mix is a great option for anyone looking for a gluten-free, easy-to-consume, and healthful solution because of its high energy level of 252.29 kcal per serving, which guarantees a significant and prolonged energy release. Based on sensory study, the smoothie mix received positive scores for flavor, texture, and color, indicating that it's highly acceptable. Customers seem to like the product, as evidenced by its excellent mouthfeel and appearance scores and total appearance scores and total acceptance score of 8.65. oat and banana flour are added to increase the fiber content, which promotes digestive health and prolongs feelings of fullness. To sum up, the smoothie mix made with oat and banana flour is functional food product that shows promise. It may be promoted as a quick, healthful, and every-boosting choice for people looking for high-fiber and gluten-free options. Its potential for wider commercial acceptability may be increased by additional study and product improvement that improves.

V. REFERENCE

[1] Pragati, S., Genitha, I., & Ravish, K. (2014). Comparative study of ripe and unripe banana flour during storage. Journal of Food Processing & Technology, 5(11), 1-6.

[2] Idahosa, K. C., Adebanjo, F. E., & Nwanma, H. I. (2020). Processing and characterisation of dried unripe plantain flour. J Sci Ind Stud, 15, 72-86.

[3] Segundo, C., Román, L., Gómez, M., & Martínez, M. M. (2017). Mechanically fractionated flour isolated from green bananas (M. cavendishii var. nanica) as a tool to increase the dietary fiber and phytochemical bioactivity of layer and sponge cakes. Food Chemistry, 219, 240-248.

[4] Yarkwan, B., & Uvir, R. H. (2015). Effects of drying methods on the nutritional composition of unripe plantain flour. Food Science and Quality Management, 41, 5-10.

[5] Sangwan, S., Singh, R., & Tomar, S. K. (2014). Nutritional and functional properties of oats: An update. Journal of Innovative Biology, 1(1), 3-14.

[6] Decker, E. A., Rose, D. J., & Stewart, D. (2014). Processing of oats and the impact of processing operations on nutrition and health benefits. British Journal of Nutrition, 112(S2), S58-S64.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:07/Issue:04/April-2025 Impact Factor- 8.187 www.irjmets.com

[7] Paudel, D., Dhungana, B., Caffe, M., & Krishnan, P. (2021). A review of health-beneficial properties of oats. Foods, 10(11), 2591.

[8] Zhang, K., Dong, R., Hu, X., Ren, C., & Li, Y. (2021). Oat-based foods: Chemical constituents, glycemic index, and the effect of processing. Foods, 10(6), 1304.

[9] Wang, S., Lin, T., Man, G., Li, H., Zhao, L., Wu, J., & Liao, X. (2014). Effects of anti-browning combinations of ascorbic acid, citric acid, nitrogen and carbon dioxide on the quality of banana smoothies. Food and Bioprocess Technology, 7, 161-173.

[10] Neeharika, B., & Suneetha, J. (2024). Formulation and Evaluation of Ready-to-Reconstitute Smoothie Mix with Little Millet: NOURISHING SHELF STABLE LITTLE MILLET SMOOTHIE MIX. Journal of Scientific & Industrial Research (JSIR), 83(5), 473-482.

[11] Kumar, P. S., Saravanan, A., Sheeba, N., & Uma, S. (2019). Structural, functional characterization and physicochemical properties of green banana flour from dessert and plantain bananas (Musa spp.). Lwt, 116, 108524.

[12] Kaur, M., & Singh, S. (2017). Physical characteristics of different oat cultivars: influence on pasting, functional and antioxidant properties. Quality Assurance and Safety of Crops & Foods, 9(3), 285-293.

[13] Shah, A., Masoodi, F. A., Gani, A., & Ashwar, B. A. (2016). Geometrical, functional, thermal, and structural properties of oat varieties from temperate region of India. Journal of food science and technology, 53, 1856-1866.

[14] Inglett, G. E., Chen, D., & Liu, S. X. (2015). Functional properties of teff and oat composites. Food and Nutrition Sciences, 6(17), 1591-1602.