

Original Research Article

Development and Organoleptic Evaluation of Edible Basket Using Multigrains and Nori Sheet

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Abstract

Food packaging and preservation technologies are currently facing challenges in prolonging the shelf life and material containment of food products. The uses of eatable cone have advanced significantly during the last few years. The vegan cone is eco friendly and biodegradable, and the greatest option in place of paper cutlery. A vegan eatable cone was developed in this study using rice flour, bajra, and whole wheat flour with nori sheets. 20% rice flour, 5% bajra, 5% whole wheat flour, 30% refined flour, 20% multigrains, 10% corn starch and 10% nori sheet were used to completely replace refined wheat flour while making a cereal-based cone. Cereals are known for being more nutrient-dense foods that include protein, fats, and minerals, and for being connected with greater diet quality. The sensory panel was used to determine the texture, rated according to hardness, crispness and overall acceptability. Panelists used a hedonic scale for sensory evaluation, 9=Like extremely; 1=Dislike extremely, to rate the overall acceptability of the cones formulations which ranked higher (9) and (8.9) respectively compared to the control (9) in consumer acceptance. This sheet produced a healthy nutrients, texture and colors when combined with cereal and multigrains. Because complete eradication is impractical given their ongoing need and usage, a better alternative can reduce the use of paper. Hence, a basket made of plant-based components like wheat flour, rice flour, bajra, and nori sheet would be a better alternative. Because it is environmentally friendly and biodegradable, the edible cone is the greatest option in place of paper cutlery. Since consumers can first eat the murmura before also eating the basket, which has a delicious flavour, there is less paper waste as a result of the edible basket.

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Keywords: Multigrains, Nori sheet, Edible Basket, Bajra, Organoleptic evaluation

1. Introduction

Today's end users are more discriminating, demanding, and aware about food, and they have higher standards for products in terms of safety, value, and sensory quality [1]. Thus, it is crucial for the food production process to understand consumer preferences and impressions of the sensory features of texture. Both sensory and scientific methods can be used to measure texture. The development of the vegan eatable cones revealed that the most significant ($P < 0.05$) correlations between the vegan basket appearance ($r = 0.856$) and texture ($r = 0.806$) and overall acceptability were found. According to these findings, it is crucial to optimise the cone development appearance and texture in subsequent investigations. Consumers place the most importance on how crisp basket feels when describing its texture [2]. Although its exact meaning is unclear and variable, it is generally accepted that crispy

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products are mechanically fragile and break with a distinctive sound [3-5]. In order to improve the texture of the cereals multigrain basket, this study used sensory analysis to identify differences in product texture (hardness, crispness, and overall acceptability) caused by modifications in the formulation. For the analysis, a trained panel was utilised. In the production and marketing of novelty items, edible cones are a crucial component [6]. The primary ingredients for baking edible basket are flour, sugar, nori sheet, while minor ones include salt, dry mango powder, Maggie masala, water, oil, baking soda.

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Some ancient crops such as wheat flour, rice flour, bajra flour, refined flour, multigrains, corn starch are rich in micronutrient and phytonutrients and they have traditionally played the role of staple food in many cultures, but have been neglected currently [9]. Their high dietary fibre content is also linked to therapeutic health benefits such as gut health, bowel transition, blood glucose decrease, and cholesterol reduction [10]. Nori offers one of the broadest range of nutrients of any food, including many found in human blood such as... Chemical composition of seaweed is so close to human blood plasma and they are excellent at regulating and purifying our blood [11].

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Refined flour is best in helping digestion process as well as preventing weight gain. It is mainly used in making cone, basket, and so many fast food as well as crispy and tasty dishes(). It reduces chronic inflammation and it has demonstrated digestive system benefits(). Atta made from whole wheat is nutrient-rich. In the majority of nations, it is a basic food and it has a higher level of vegetable protein than other cereals [12].

Rice flour is best food for gluten free diet. Gluten intolerance is linked to illnesses like Celiac disease. A good exfoliating agent is needed to remove all the dead skin cells that might be stealing your natural glow. Japanese and Koreans mainly uses this flour and its water is also beneficial for our skin and hair. Rice flour's high zinc content supports a healthy immune system. It has a good level of fiber, which helps to curb hunger and facilitates weight loss().

Bajra is a traditional Hindi name for the *Pennisetum glaucum* crop — also known as pearl millet. It is used because it is gluten free and have high phytochemicals, polyphenols, and other advantageous plant compounds that are all recognised to support good human health in various ways (). It is best for type 2 diabetes patients. Regular eating of bajra as part of your diet could help prevent protein, vitamin, B6 niacin, folate iron and zinc deficiencies.

Wheat flour has many more qualities and that is why it was used in basket development. Wheat prevent gallstone, diabetes, and breast cancer and childhood asthma. Whole wheat may be a decent source of several vitamins and minerals, including selenium, manganese, phosphorus, copper, and folate. Wheat are a staple food in India.

Adding more than two grains together results in multigrain goods. Increased nutrients are provided. In addition to providing more than what is typically provided by a single grain, they also make up for the nutrients that other grains lack [12].

Corn starch are also a good source of energy and the main source of a range of nutrients in diets of many individuals. Apart from starch, they contain fibre, calcium, iron and B vitamins. It was used in basket development because of crispiness and as a thickening agent. Nori can actually contain up to 10 times more calcium than milk. Nori is packed full of vitamins too. It offers vitamins A, B, C, D, E and K, as well as niacin, folic acid and taurine, and due to the level of vitamin C it contains, the bioavailability of its abundant iron content is increased [13].

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Apart from the measurable amounts of polyphenols like carotenoids and flavonoids, nori contains other phytonutrients, including several types of alkaloids with antioxidant properties. Nori also contains

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chlorophyll (a pigment that makes plants green) which is a powerful, natural detoxifier that can help eliminate waste products from our body [16]. Nori is also loaded with fibre and protein. In fact 30-50 percent of nori's dry weight is protein, and much of the rest of it is digestible fibre.

2. Materials & Methods

2.1 Materials

Refined wheat flour, whole wheat flour, rice flour, bajra flour (pearl millet), corn starch (lullu mall lucknow) powdered sugar, baking powder (local market lucnow) Nori sheet were purchased by the New Delhi Nature's India.

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2.1.1 Process for basket manufacturing

This study prepared a vegan edible basket by Using multigrains, cereals and nori sheet. After various trials were conducted to optimize each constituent's development process and concentration for all formulations, any of the formulations was also analysed by organoleptic test. Fig. 1 depicts the process of making edible basket.

2.1.2 Preparation of refined wheat flour-based basket

Commercially available basket using refined wheat flour, potato and so many product were prepared and used as the control batch. But in this study refined flour, wheat and some multigrains were used. Table 1 lists the amount of each ingredients used in the basket.

2.1.3 Preparation of base ingredients for composite flour basket

Before formulating composite flour basket, baskets using individual flours were prepared. These gluten free flours included rice flour, bajra flour, wheat flour, refined wheat flour and corn starch was a significant ingredients in the baskets. Rice flour, corn starch and bajra flour are gluten-free; therefore rice and corn are binding of the basket batter. Various trials were performed to optimize the perfect dough for making the basket. Table 2 represents all the formulations for the gluten-free flours. Edible basket were developed using individual gluten-free flour according to the procedure depicted in Fig 1.

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2.1.4 Development of composite flour edible basket

On composite flour, basket prepared with bajra flour, rice flour, refined wheat flour, whole wheat flour, corn starch were tested for moisture content, basket holding time, and sensory evaluation. The quality was determined by comparing these flours' moisture content holding and basket holding duration in this study. The flour combination of 20% rice flour, 5% bajra, 5% whole wheat flour, 30% refined flour, 20% multigrains, 10% corn starch were used in the composite flour edible basket. Table 3 shows the ingredients concentration for edible basket and figure 1 is a flow chart of a composite edible basket preparation to the end product.

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Dry Ingredients



Mix all the ingredients



Prepare a dough



Make a roti



Give a shape of basket



Fig1: Flow chart of edible basket preparation and the image of final product

2.2 Organoleptic evaluation

The organoleptic evaluation of samples was performed using the Nine-point hedonic scale method by a trained panel of ten members. At room temperature (30°C), the samples were served in cups. Appearance, texture, taste, mouth feel, flavour and overall acceptability were used to assess the product.

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All panellists had a background in food technology and were well versed in typical sensory procedures. Sensory analysis was conducted using nine-point hedonic scales (1-9).

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2.3 Characteristics of composite content edible basket

2.3.1 The percentages yield of basket

The percentages yield for every time was calculated using the initial weight of the batter and the batter and the final weight of the basket formed. The formula for percentage yield is-

Percentages yield (%) = $\text{Weight of basket} \times 100 / \text{Weight of dough}$

2.3.2 Determination of baking time

Each basket baking time, including the control time, basket formed using individual flours, and the composite flour baskets were calculated. Baking time was determined in minutes.

3 Result and discussion

Development of edible basket

The refined wheat flour-based edible basket were successfully developed, as shown in Fig.2. These cones were formulated with composite flour, multigrains, nori sheet, some spices and butter.

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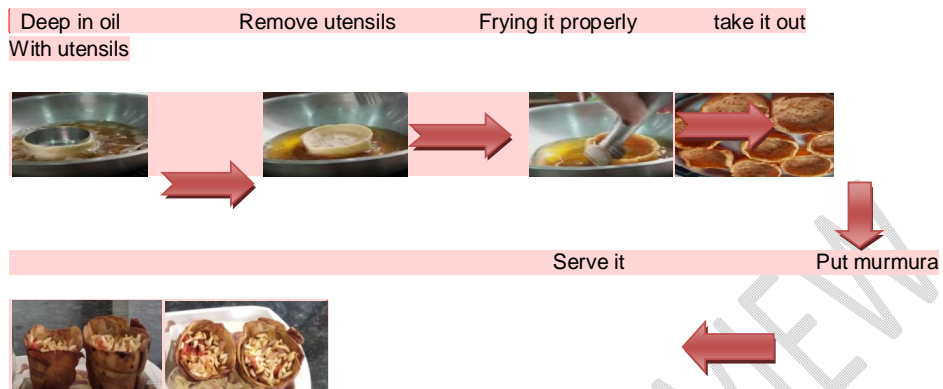
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Table 1. Formulation of multigrains, cereals based edible basket (control batch)

Ingredients	Control batch
Refined wheat flour	22.4%
Powdered sugar	5.2%
Salt	0.5%
Baking powder	0.9%
Melted butter	10.5
spices	1.5%

Table 1. Formulation of multigrains, cereals based edible basket (control batch)

Ingredients	Control batch
Refined wheat flour	22.40%
Powdered sugar	5.20%
Salt	0.50%
Baking powder	0.90%
Melted butter	10.5
spices	1.50%



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Fig.2. Edible basket baking procedure

Table 2. Edible basket formulation from different flour

Ingredients	Bajra	Rice flour	Refined flour	Whole wheat flour
Flour	11.4%	17.4%	18.4%	15.4%
Powdered sugar	10.5%	11.6%	11.6	10.7
Salt	0.6%	0.5%	0.6%	0.8%
Corn starch	2.5%	2.5%	2.5%	2.6%
Melted butter	8.7%	7.5%	7.0%	8.2%
Baking powder	0.6%	0.5%	0.5%	0.5%
Spices	1.5%	1.5%	1.5%	1.5%

Percentage yield

The percentage yield of all the formulations, including the control batch, individual basket and the composite flour basket, as shown in Table 4, was calculated using the percentage yield formula.

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Baking time

The baking time of all the formulation is shown in Table 4. The baking performance of edible basket depends upon dough tightness influenced by flour characteristics and added salts. Hence every basket formulation showed quite different baking time.

Table 3. Concentration of ingredients for composite flour edible basket

Ingredients	Concentration
Composite flour	25.4%
Powdered sugar	10.4%
Salt	0.5%
Corn starch	15.5%
Melted butter	10.5%
Baking powder	1%
Rice flour	10.8%
Bajra flour	2.2%
Multigrains	8.5%

Table 4. Percentage yield of all edible basket

Ingredients	(%) yield	Baking time (min: sec)
Control	52.53±0.29	02:00±0.04 ^a
Bajra	60.85±0.56 ^c	02:33±0.034 ^c
Composite flour	80.3±0.18 ^e	03:00±0.044 ^d
Rice flour	55.5±0.45 ^c	02:00±0.02 ^b

*Mean values with standard deviation are expressed in the table. Mean in the same columns with different alphabetical letters is significantly different ($p < 0.05$)

Organoleptic evaluation

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Sensory evaluation was performed for all the formulation for appearance, texture, taste, mouth feel, taste, flavour, and overall acceptability of edible basket.

Refined wheat flour-based basket were rated high because it can easily made and gave smooth texture with amazing mouth feel, flavour, and overall acceptability Table 5. Due to the presence of the gluten, the control batch is rated higher for overall texture individual and composite flour. Among the formulations prepared using individual flours, rice flour, multigrain were rated higher to flavour compared to the other formulation of dough. Overall when we using these ingredients together the final edible basket taste, mouth feel, texture and overall acceptability is amazing and extraordinary.

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The edible basket was evaluated by 5 expert panel members on following characteristics:

- Appearance
- Flavour/ taste

- Aroma
- Texture
- Overall acceptability (7)

Table 5: Average scores of all five sensory parameters

S no.	Parameters	Average Score	Percentage
1	Appearance	8.8	39.5
2	Flavour/ taste	9	39.9
3	Aroma	8.2	37.85
4	Texture	8.6	39
5	Overall Acceptability	8.8	39.9

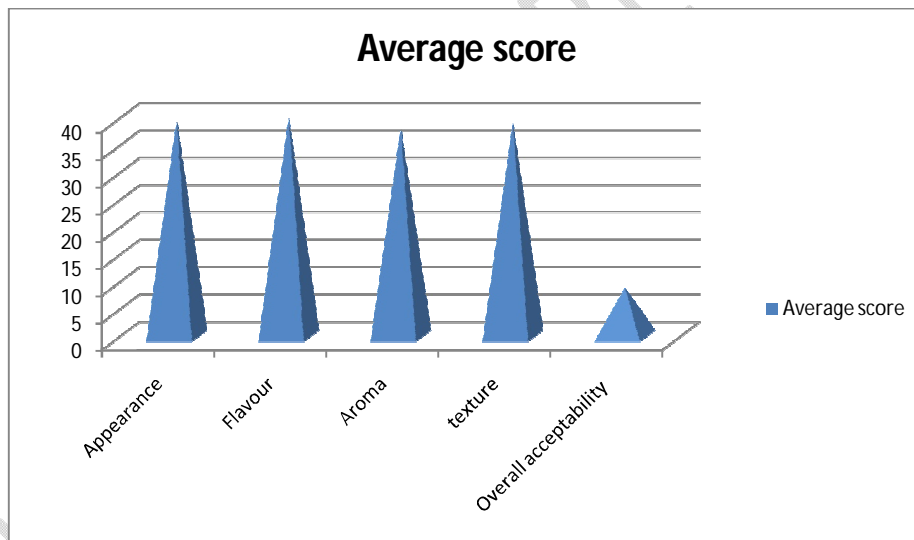


Fig 3: Graph of the average scores of sensory analysis

The edible basket received a good sensory rating on the 9 pointer hedonic scale. The highest average score was of flavour/ taste (9) which was liked extremely by all five panel members followed by appearance and overall acceptability (8.8). Texture of basket is (8.6) the sensory attributes which received the lowest rating among all parameters was Aroma (8.2).

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Conclusion

Plastic garbage disposal is the main source of worry in solid waste management. The proximal components of a spoon that is both edible and biodegradable were studied. The developed basket was found to be rich in fibre content 12.55%, whole wheat flour, corn starch, bajra are responsible for this high fibre content. Apart from this the basket contain a decent amount of vitamin C because of nori sheet (15.55mg). The basket was also analysed for its organoleptic properties by hedonic rating and it was liked extremely in terms of flavor by all the panel members. The overall acceptability of the basket received an average score(8.8) which depicts that all over characteristics of developed basket were good. In this edible basket we are using wheat flour, refined flour, rice flour, bajra flour, corn starch. The current study offers a sustainable method of using throwaway basket. To compete with plastic cutlery in the market, more research must be done to develop biodegradable silverware which is cost-effective.

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