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## Consumer acceptability based on sensory evaluation of flavoured kand namkeen

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### Abstract

This study evaluated the sensory attributes of eleven flavoured Kand Namkeen treatments, focusing on flavour, texture, aroma and overall acceptability. The treatments T<sub>6</sub> and T<sub>9</sub> achieved the highest scores, demonstrating strong consumer preference and potential for commercial acceptance.

**Keywords:** Sweet potato, cassava, tapioca, sensory evaluation, flavours, food products, processing

### Introduction

Among various vegetables, tuber crops are highly important food sources, serving as staple foods for millions of people across tropical, subtropical and temperate regions. They are valued for their high calorific content, resilience to adverse soil and climatic conditions, and their ability to produce high yields per unit area and time. Additionally, tuber crops are drought-tolerant and can thrive even on undulated or nutrient-poor soils (Rahman and Awerije, 2016). These tuber crops play a significant role in improving the socio-economic conditions of small and marginal farmers, particularly in tribal areas, by contributing to both food and nutritional security. Their popularity continues to grow not only because of their nutritional value but also due to their importance as raw materials in the food and starch-based industries.

AICRP on Tuber Crops, Central Experimental Station, Wakawali (Dr. B. S. K. K. V., Dapoli) has introduced an innovative snack product Kand Namkeen, developed by combining tapioca flavour and boiled sweet potato in 1:1 ratio to enhance taste and nutritional value.

Cassava (*Manihot esculenta* Crantz.) is the fifth most important crop grown globally after wheat, rice, maize, and potato, and serves as a staple food in many developing and developed countries. Belonging to the family Euphorbiaceae, it is a perennial woody shrub that produces enlarged tuberous roots (Zhu, 2015) [3]. Originating in South America, cassava is now widely cultivated across tropical and subtropical regions of Asia, Africa, and Latin America, where it ranks as the third most important source of calories after rice and maize (FAO, 2017) [4].

Cassava is generally recognized for its high content of dietary fiber, magnesium, sodium, riboflavin, thiamine, niacin and citrate (Bradbury & Holloway, 1988). Vitamin C, which plays a key role in enhancing mineral absorption in the gut, is present in fresh cassava in relatively higher amounts than carotenoids (Ayetigbo *et al.*, 2018) [1].

Sweet potato (*Ipomoea batatas* L.) is a major tuber crop globally, ranked seventh among the world's food crops and noted for its exceptionally high edible energy yield per hectare per day. In India, it is cultivated across diverse regions as a versatile, low-input crop with significant potential for processing into snack foods, starch-based products, desserts and animal feed. Its year-round availability and wide scope for value addition make it an important crop for enhancing food security and supporting sustainable agricultural and nutritional systems.

Sweet potato is a nutrient-dense crop that provides substantial energy along with essential vitamins, including  $\beta$ -carotene (vitamin A), vitamins B<sub>6</sub>, C, and E, as well as dietary fiber, while remaining low in fat and cholesterol. Its roots contain 25-30% carbohydrates and 58-72% water, and they also supply important minerals such as iron, potassium, calcium, zinc, sodium, magnesium, and manganese (Srivastava *et al.*, 2012) [6].

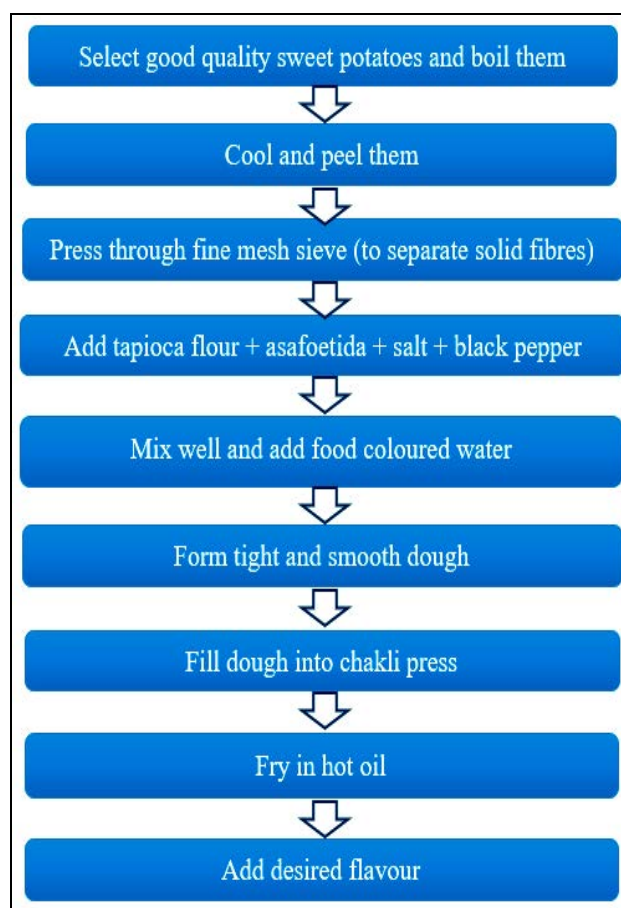
Different flavours of food products significantly influence consumer acceptance, as taste, aroma, texture and overall palatability vary with each flavour. Consumers tend to prefer flavours that offer a balanced combination of seasoning, crispiness and aftertaste, making sensory evaluation a key factor in determining market preference.

## 2. Materials and Methods

### 2.1 Ingredients

Cassava flour - 500 g, boiled sweet potatoes - 500 g, black pepper, asafoetida, salt according to taste, oil and food colour.

### 2.2 Preparation of Kand Namkeen



### 2.3 Treatment details

| S. No. | Treatment       | Flavour combinations                                                                                                          |
|--------|-----------------|-------------------------------------------------------------------------------------------------------------------------------|
| 1      | T <sub>1</sub>  | Red chilli, citric acid, rock salt and sugar                                                                                  |
| 2      | T <sub>2</sub>  | Oregano, mixed herbs, garlic powder, rock salt and chilli flakes                                                              |
| 3      | T <sub>3</sub>  | White pepper, garlic powder, ginger powder, coriander powder, aamchur, rock salt and sugar                                    |
| 4      | T <sub>4</sub>  | Turmeric (1 pinch), red chilli powder, garlic powder, ginger powder, jeera powder, rock salt, citric acid (1 pinch) and sugar |
| 5      | T <sub>5</sub>  | Garlic powder, black pepper, rock salt and oregano                                                                            |
| 6      | T <sub>6</sub>  | Cheese + T <sub>1</sub>                                                                                                       |
| 7      | T <sub>7</sub>  | Cheese + T <sub>2</sub>                                                                                                       |
| 8      | T <sub>8</sub>  | Cheese + T <sub>3</sub>                                                                                                       |
| 9      | T <sub>9</sub>  | Cheese + T <sub>4</sub>                                                                                                       |
| 10     | T <sub>10</sub> | Cheese + T <sub>5</sub>                                                                                                       |
| 11     | T <sub>11</sub> | Control (No flavour added)                                                                                                    |

**Note:** Specific proportions of the flavouring components are not provided due to confidentiality agreements. The study focuses solely on the sensory evaluation of the final product.

### 2.4 Score card for organoleptic evaluation

| Organoleptic score | Scale (Rating)                    |
|--------------------|-----------------------------------|
| 9                  | Liked extremely (LE)              |
| 8                  | Liked very much (LVM)             |
| 7                  | Liked moderately (LM)             |
| 6                  | Liked slightly (LS)               |
| 5                  | Neither liked nor disliked (NLND) |
| 4                  | Disliked slightly (DS)            |
| 3                  | Disliked moderately (DM)          |
| 2                  | Disliked very much (DVM)          |
| 1                  | Disliked extremely (DE)           |

## 2.5 Sensory Evaluation

Trained panelists or consumer participants were engaged to evaluate the sensory quality of the chips.

The sensory attributes assessed included taste, aroma, texture, colour, and overall acceptability.

Each attribute was rated using a 9-point hedonic scale based on

predefined evaluation criteria.

Statistical analysis was carried out using a Completely Randomized Design (CRD) to compare sensory scores among the different flavour formulations.

## 3. Results and Discussion

**Table 1:** Score of sensory attributes

| Sr. No. | Treatment       | Colour | Flavour | Texture (crispness) | Overall acceptability |
|---------|-----------------|--------|---------|---------------------|-----------------------|
| 1       | T <sub>1</sub>  | 7.71   | 7.14    | 8.00                | 7.93                  |
| 2       | T <sub>2</sub>  | 7.07   | 6.86    | 7.57                | 7.57                  |
| 3       | T <sub>3</sub>  | 6.43   | 6.86    | 7.29                | 7.29                  |
| 4       | T <sub>4</sub>  | 7.71   | 7.43    | 7.57                | 7.93                  |
| 5       | T <sub>5</sub>  | 6.57   | 6.43    | 7.57                | 7.21                  |
| 6       | T <sub>6</sub>  | 7.71   | 7.43    | 8.00                | 7.79                  |
| 7       | T <sub>7</sub>  | 7.36   | 7.14    | 7.43                | 7.36                  |
| 8       | T <sub>8</sub>  | 6.79   | 7.21    | 8.07                | 7.43                  |
| 9       | T <sub>9</sub>  | 8.00   | 7.50    | 7.79                | 7.64                  |
| 10      | T <sub>10</sub> | 6.57   | 6.57    | 7.50                | 6.64                  |
| 11      | T <sub>11</sub> | 7.86   | 7.29    | 7.79                | 7.43                  |

**Table 2:** Statistical analysis of Average Score

| Sr. No.    | Treatment       | Average Score |
|------------|-----------------|---------------|
| 1          | T <sub>1</sub>  | 7.70          |
| 2          | T <sub>2</sub>  | 7.27          |
| 3          | T <sub>3</sub>  | 6.96          |
| 4          | T <sub>4</sub>  | 7.66          |
| 5          | T <sub>5</sub>  | 6.95          |
| 6          | T <sub>6</sub>  | 7.73          |
| 7          | T <sub>7</sub>  | 7.32          |
| 8          | T <sub>8</sub>  | 7.38          |
| 9          | T <sub>9</sub>  | 7.73          |
| 10         | T <sub>10</sub> | 6.82          |
| 11         | T <sub>11</sub> | 7.59          |
| Mean       |                 | 7.37          |
| S.E.m (±)  |                 | 0.017         |
| C. D. @ 1% |                 | 0.069         |

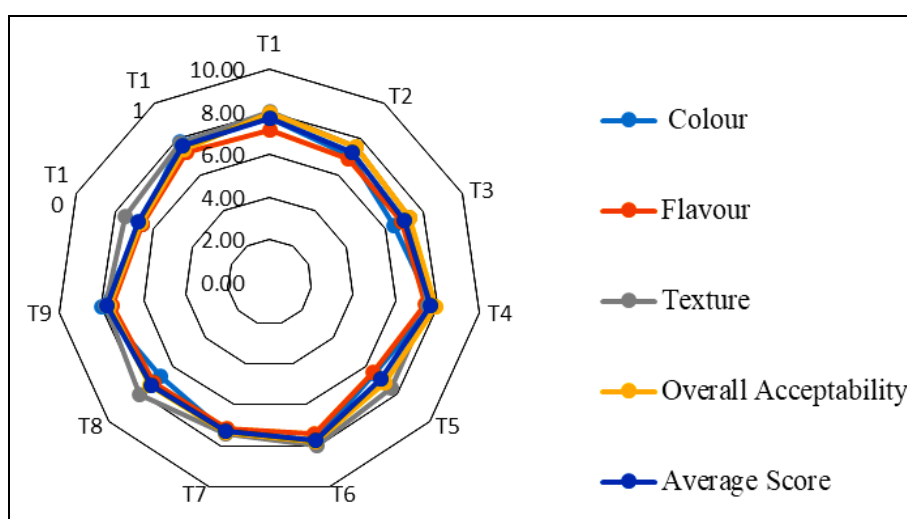


**Fig 1:** Organoleptic profiling and consumer acceptability of Kand Namkeen

## Result and Discussion

The sensory evaluation of flavoured Kand Namkeen revealed that the addition of different flavouring agents significantly influenced the overall acceptability of the product. Among the eleven treatments, T<sub>6</sub> and T<sub>9</sub> recorded the highest average scores of 7.73, which were statistically at par with T<sub>1</sub> (7.70), indicating comparable consumer preference. The other treatments showed

slightly lower scores, ranging from 6.82 to 7.66, suggesting moderate to good acceptability.

The panelists noted that treatments T<sub>6</sub> and T<sub>9</sub> were particularly appealing in terms of flavour, texture and aroma, which contributed to their higher scores. Crispiness, a critical texture attribute in Namkeen products, was consistently rated as satisfactory across all treatments, enhancing overall

acceptability. The slight difference in flavour intensity, seasoning balance, and aroma among other treatments appeared to influence their relatively lower scores. The findings suggest that the incorporation of specific flavour combinations in Kand Namkeen, particularly in T<sub>6</sub> and T<sub>9</sub> can significantly enhance sensory qualities and consumer preference, demonstrating strong potential for market acceptance as a novel and appealing snack product.

### Conclusion

Flavoured Kand Namkeen with specific flavour combinations, particularly T<sub>6</sub> and T<sub>9</sub>, exhibited the highest consumer acceptability, indicating that flavouring significantly enhances sensory qualities. These findings highlight the potential of developing flavoured Namkeen as a marketable and appealing snack product.

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