



## Sensory evaluation and consumer acceptability of sweet corn products

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### Abstract

The current study aimed to assess how much consumers liked different flavoured sweet corn products. Four sweet corn versions were created: sweet corn with chaat masala, sweet corn with black pepper and salt, sweet corn with butter, and sweet corn with salt, lemon, and red chili. About 100 people took part in the study.

The research methods included an initial questionnaire survey, a hedonic rating test, and a follow-up questionnaire survey. Sensory evaluation used a 9-point hedonic scale to measure parameters like appearance, taste, texture, aroma or flavour, and overall acceptability.

The results showed that all products received general approval from consumers. However, sweet corn with salt, lemon, and red chili had the highest overall acceptability score among all the versions. Participants highly praised the product for its balanced mix of spicy, salty, and tangy flavours. The butter-flavoured sweet corn also ranked well, while the black pepper and chaat masala versions received more moderate scores.

The study's findings suggest that flavouring ingredients have a big impact on how much consumers accept and enjoy sweet corn products. The study concludes that sweet corn with salt, lemon, and red chili has considerable market potential as a ready-to-eat snack.

**Keywords:** Sweet Corn, sensory evaluation, hedonic rating scale, consumer acceptability, flavoured sweet corn, value-added products

### Introduction

The current study aimed to prepare different flavored popcorn samples, including salted, buttered, mint, and masala, and to assess their sensory appeal among college students using a 9-point hedonic scale. Additionally, we studied consumer behavior, purchasing habits, flavor preferences, and awareness of popcorn consumption through pre-testing and post-testing questionnaires. Sweet corn, also known as sugar corn, is one of the most popular cereal vegetables consumed around the world due to its naturally sweet taste, appealing flavor, soft texture, and high nutritional value. Maize was first domesticated in Mexico nearly 10,000 years ago and is now grown globally for food and industrial uses. The main types of corn are dent corn, flint corn, popcorn, flour corn, pod corn, and sweet corn. Among these, sweet corn has become well-known as a healthy and convenient snack.

The market value of sweet corn products in India is rising quickly because consumer preferences are shifting toward healthy, ready-to-eat foods. Ready-to-eat flavored sweet corn products are gaining popularity in malls, food courts, colleges, metro stations, and street food markets. Several companies and brands, such as SupaCorn, Corn Club, Neo Foods, and 4700BC, produce and sell flavored, frozen, and ready-to-eat sweet corn products in various forms, including kernels, corn cups, and corn on the cob. The increasing availability and consumer demand show that there is growing commercial potential for sweet corn products.

Adding value is crucial for improving the sensory quality, shelf life, market value, and consumer appeal of food products. Various flavoring ingredients such as butter, lemon, black pepper, chili powder, herbs, and chaat masala can improve the taste and acceptability of sweet corn

products. The development of value-added sweet corn products also allows for product diversification and better use of agricultural produce.

Sensory evaluation is a key scientific method for assessing the quality and acceptability of food products through human senses, including appearance, color, flavor, taste, texture, and overall appeal. For sensory evaluation studies, about 25 to 40 grams per person is the usual sample size for proper assessment without causing fatigue. In this study, we provided around 30 grams of each flavoured sweet corn sample to the panelists for evaluation and comparison among different treatments. Consumer acceptability studies help researchers understand consumer preferences and identify products with greater market potential.

Thus, this study was conducted to evaluate the sensory attributes and consumer acceptability of various value-added sweet corn products made with different flavor combinations. The results may support the development of nutritious, appealing, and commercially viable sweet corn-based products.

### Objectives of Study

1. To prepare different flavoured sweet corn products
2. To evaluate sensory characteristics using hedonic rating scale
3. To compare consumer acceptability of different formulations
4. To identify the most preferred product

### Materials and methods

#### Materials used

The raw materials for making flavoured sweet corn products included fresh sweet corn kernels, butter, black pepper

powder, red chili powder, chaat masala, common salt, and lemon juice. Fresh, high-quality ingredients were sourced from the local market. Clean water, disposable serving cups, spoons, tissue papers, and questionnaire sheets were also used during the sensory evaluation process.

### Preparation of sweet corn products

Fresh sweet corn kernels were washed thoroughly and boiled until soft and palatable. After boiling, excess water was drained and the corn was divided into four equal

portions for flavour formulation. Four different sweet corn products were prepared:

1. Sweet Corn with Chaat Masala
2. Sweet Corn with Red Chili, Salt, and Lemon
3. Sweet Corn with Black Pepper and Salt
4. Sweet Corn with Butter

Each formulation was mixed uniformly to ensure even distribution of flavouring ingredients. The prepared samples were served warm to the panellists for sensory evaluation.



### Pre-test questionnaire analysis

#### a. Results and discussion

##### Frequency and Preferences

PART 1: FREQUENCY AND PREFERENCES				
Q. No.	QUESTION	OPTIONS	NO. OF RESPONDENTS (n = 107)	PERCENTAGE (%)
1.	How often do you eat sweet corn?	Sometimes	58	54.21
		Rarely	31	28.97
		Often	16	14.95
		No Response	2	1.87
2.	Do you like eating sweet corn?	Yes	94	87.85
		No	10	9.35
		No Response	3	2.80
3.	Which type of taste do you prefer in corn?	Spicy	40	37.38
		Salty	26	24.30
		Cheesy	23	21.50
		Sour	15	14.02
		No Response	3	2.80
4.	Would you buy your favourite flavour if available in the market?	Yes	79	73.83
		Maybe	23	21.50
		No	3	2.80
		No Response	2	1.87
5.	Do you like trying new flavours in sweet corn?	Yes	77	71.96
		No	28	26.17
		No Response	2	1.87

**b. Flavor and Seasoning Preferences**

<b>PART 2: FLAVOR AND SEASONING PREFERENCES</b> (Total Respondents = 107)				
Q. No.	QUESTION	OPTIONS	NO. OF RESPONDENTS (n = 107)	PERCENTAGE (%)
6.	Do you prefer mild or spicy flavour?	Mild	55	51.40
		Spicy	50	46.73
		No Response	2	1.87
7.	How much saltiness do you prefer in corn?	Medium	85	79.44
		Low	20	18.69
		No Response	2	1.87
8.	Do you like cheesy flavour?	Yes	64	59.81
		No	41	38.32
		No Response	2	1.87
9.	Do you like tangy flavour in corn?	Yes	64	59.81
		No	41	38.32
		No Response	2	1.87
10.	Do you prefer butter in your sweet corn?	Yes	51	47.66
		No	28	26.17
		Occasionally	26	24.30
		No Response	2	1.87
11.	Do you like chaat masala or spice mix in sweet corn?	Yes	76	71.03
		Moderate	18	16.82
		No	10	9.35
		No Response	3	2.80

**c. Texture, aroma and quality preferences**

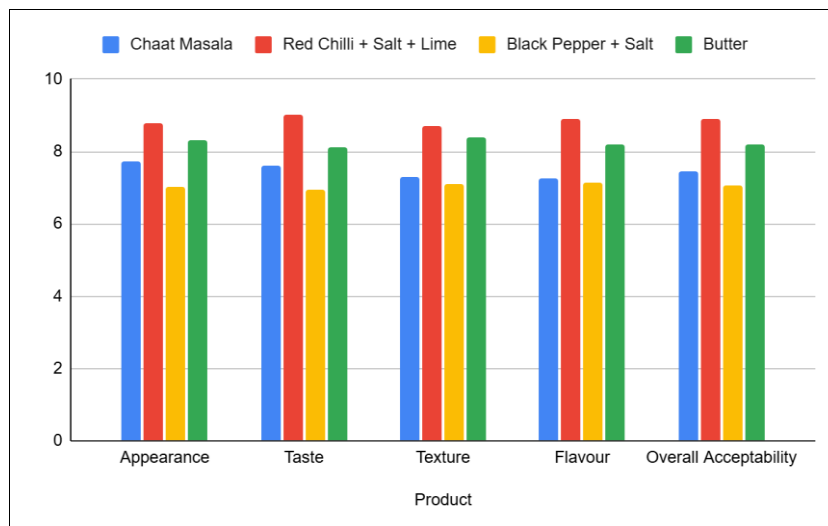
<b>PART 3: TEXTURE, AROMA, AND QUALITY PREFERENCES</b> (Total Respondents = 107)				
Q. No.	QUESTION	OPTIONS	NO. OF RESPONDENTS (n = 107)	PERCENTAGE (%)
12.	How important is texture to you?	Important	79	73.83
		Not important	26	24.30
		No Response	2	1.87
13.	Does aroma affect your choice of flavour?	Yes	83	77.57
		No	21	19.63
		No Response	3	2.80
14.	How important is flavour to you?	Very important	52	48.60
		Moderate	48	44.86
		Not important	5	4.67
		No Response	2	1.87
15.	Do you like juicy kernels in sweet corn?	Yes	70	65.42
		No	33	30.84
		No Response	4	3.74
16.	How important is color uniformity in sweet corn?	Moderate	57	53.27
		Very important	37	34.58
		Not important	9	8.41
		No Response	4	3.74

Consumption, Habits, Market and Brand Awareness

PART 4: CONSUMPTION HABITS, MARKET AND BRAND AWARENESS (Total Respondents = 107)				
Q. No.	QUESTION	OPTIONS	NO. OF RESPONDENTS (n = 107)	PERCENTAGE (%)
17.	Do you think flavoured corn is a healthy snack?	Yes	72	67.29
		No	33	30.84
		No Response	2	1.87
18.	What is your preferred serving style of sweet corn?	Cup	72	67.29
		Cob	20	18.69
		Packet	11	10.28
		No Response	4	3.74
19.	At what time do you usually prefer eating sweet corn?	Evening	66	61.68
		Anytime	33	30.84
		Morning	6	5.61
		No Response	2	1.87
20.	Do you prefer homemade or street-style sweet corn?	Street Style	60	56.07
		Homemade	45	42.06
		No Response	2	1.87
21.	Do you prefer sweet corn served:	Warm	76	71.03
		Hot	24	22.43
		Cold	5	4.67
		No Response	2	1.87
22.	Do you prefer garnished sweet corn (with herbs/spices)?	Yes	83	77.57
		No	21	19.63
		No Response	3	2.80
23.	Do you prefer freshly prepared sweet corn over stored one?	Yes	95	88.79
		No	9	8.41
		No Response	3	2.80
24.	Do you like sweet corn as a standalone snack or with other foods?	Standalone	76	71.03
		With other foods	27	25.23
		No Response	4	3.74
25.	Would you recommend flavoured corn to others?	Yes	94	87.85
		No	11	10.28
		No Response	2	1.87
26.	Would you try new experimental flavours of corn?	Yes	79	73.83
		No	26	24.30
		No Response	2	1.87
27.	What price range do you prefer for a corn cup?	Medium	84	78.50
		Low	18	16.82
		High	3	2.80
		No Response	2	1.87
28.	Which brand of corn do you prefer for homemade sweet corn?	Any brand randomly	39	36.45
		Golden Corn	35	32.71
		Del Monte	11	10.28
		Happy Harvest	10	9.35
		Steam Crisp	9	8.41
		No Response	3	2.80
29.	Are you aware of corn brands available in the market?	No	54	50.47
		Yes	50	46.73
		No Response	3	2.80
30.	Which of the following corn brand have you used before?	None of these	45	42.06
		Del Monte	28	26.17
		Green Giant	11	10.28
		Urban Platter	9	8.41
		No Response	5	4.67
		<i>(Other combinations like "Del Monte, Green Giant" represent &lt;3% each)</i>		
31.	According to you, which brand offers the best quality?	Not sure	53	49.53
		Del Monte	23	21.50
		Local brands	17	15.89
		Green Giant	10	9.35
		No Response	4	3.74
32.	Which type of corn do you consider safer?	Fresh street corn	66	61.68
		Both are the same	19	17.76
		Branded packaged corn	16	14.95
		No Response	6	5.61
33.	Which type of packaged corn do you prefer?	Fresh corn	69	64.49
		No preference	15	14.02
		Canned corn	9	8.41
		Frozen corn	7	6.54
		No Response	7	6.54

Hedonic Scale Sensory Evaluation Result  
Sample observation table (number of participants =100)

Product	Appearance	Taste	Texture	Flavour	Overall Acceptability
Chaat Masala	7.71	7.62	7.29	7.24	7.47
Red Chili + Salt + Lime	8.8	9	8.7	8.9	8.9
Black Pepper + Salt	7.02	6.94	7.10	7.15	7.05
Butter	8.3	8.1	8.4	8.2	8.2



## Post Sensory evaluation results

### Sweet corn sensory evaluation survey report

#### 1. Overall preference & taste

##### Which sweet corn product did you like the most?

- Red Chili + Salt + Lime: 68 (68%)
- Chaat Masala: 26 (26%)
- Black Pepper + Salt: 3 (3%)
- Butter: 3 (3%)

##### 2. Which product had the best overall taste?

- Red Chili + Salt + Lime: 56 (56%)
- Chaat Masala: 24 (24%)
- Black Pepper + Salt: 18 (18%)
- Butter: 3 (3%)

##### 3. Which product would you prefer to eat again?

- Red Chili + Salt + Lime: 58 (58%)
- Chaat Masala: 24 (24%)
- Black Pepper + Salt: 12 (12%)
- Butter: 6 (6%)

##### 4. According to you, which is the BEST sweet corn product overall?

- Red Chili + Salt + Lime: 65 (65%)
- Chaat Masala: 18 (18%)
- Butter: 12 (12%)
- Black Pepper + Salt: 6 (6%)

### Flavor, seasoning & sensory profile

##### 5. Which sample had the best flavor balance?

- Red Chili + Salt + Lime: 59 (59%)
- Chaat Masala: 35 (35%)
- Black Pepper + Salt: 6 (6%)

##### 6. Which sample was the most flavorful?

- Red Chili + Salt + Lime: 68 (68%)
- Chaat Masala: 18 (18%)
- Black Pepper + Salt: 9 (9%)
- Butter: 6 (6%)

##### 7. Which product had the best seasoning?

- Red Chili + Salt + Lime: 65 (65%)
- Chaat Masala: 18 (18%)
- Black Pepper + Salt: 15 (15%)
- Butter: 3 (3%)

##### 8. Which flavor combination was the most unique?

- Red Chili + Salt + Lime: 56 (56%)
- Chaat Masala: 22 (22%)
- Black Pepper + Salt: 16 (16%)
- Butter: 6 (6%)

##### 9. Which product had the best tangy flavor?

- Red Chili + Salt + Lime: 65 (65%)
- Chaat Masala: 35 (35%)

##### 10. Which product had the richest taste?

- Red Chili + Salt + Lime: 50 (50%)
- Chaat Masala: 24 (24%)
- Butter: 15 (15%)
- Black Pepper + Salt: 12 (12%)

##### 11. Which product had the most natural corn flavor?

- Butter: 41 (41%)
- Red Chili + Salt + Lime: 32 (32%)
- Black Pepper + Salt: 15 (15%)
- Chaat Masala: 12 (12%)

##### 12. Which product had the strongest flavor?

- Red Chili + Salt + Lime: 68 (68%)
- Chaat Masala: 18 (18%)
- Black Pepper + Salt: 15 (15%)

### Spice, salt, and ingredient integrity

##### 13. Which product had the best spice level?

- Red Chili + Salt + Lime: 79
- Black Pepper + Salt: 9 (9%)
- Chaat Masala: 6 (6%)
- Butter: 6 (6%)

##### 14. How would you rate the spice level overall?

- Balanced: 76 (76%)
- Too Spicy: 12 (12%)
- Too Mild: 12 (12%)

##### 15. How would you rate the saltiness of the products?

- Balanced: 79 (79%)
- Too Salty: 15 (15%)
- Too Bland: 6 (6%)

##### 16. Which product had the most balanced ingredients?

- Red Chili + Salt + Lime: 53 (53%)

- Chaat Masala: 26 (26%)
- Black Pepper + Salt: 15 (15%)
- Butter: 6 (6%)

#### Physical & aesthetic attributes

##### 17. Which product had the most attractive aroma?

- Red Chili + Salt + Lime: 44 (44%)
- Chaat Masala: 32 (32%)
- Butter: 12 (12%)
- Black Pepper + Salt: 12 (12%)

##### 18. Which product looked the most appealing?

- Red Chili + Salt + Lime: 59 (59%)
- Chaat Masala: 21 (21%)
- Black Pepper + Salt: 15 (15%)
- Butter: 6 (6%)

##### 19. Which product had the best color and appearance?

- Red Chili + Salt + Lime: 56 (56%)
- Chaat Masala: 22 (22%)
- Black Pepper + Salt: 12 (12%)
- Butter: 9 (9%)

##### 20. Which product had the best texture?

- Red Chili + Salt + Lime: 44 (44%)
- Chaat Masala: 26 (26%)
- Butter: 15 (15%)
- Black Pepper + Salt: 15 (15%)

##### 21. Which sample had the best mouthfeel?

- Red Chili + Salt + Lime: 56 (56%)
- Chaat Masala: 29 (29%)
- Butter: 9 (9%)
- Black Pepper + Salt: 6 (6%)

##### 22. Which product had the best aftertaste?

- Red Chili + Salt + Lime: 59 (59%)
- Chaat Masala: 26 (26%)
- Black Pepper + Salt: 9 (9%)
- Butter: 6 (6%)

##### 23. Which sample tasted the freshest?

- Red Chili + Salt + Lime: 42 (42%)
- Chaat Masala: 30 (30%)
- Black Pepper + Salt: 18 (18%)
- Butter: 9 (9%)

##### 24. Which sample had the best balance between softness and crunchiness?

- Red Chili + Salt + Lime: 47 (47%)
- Butter: 22 (22%)
- Chaat Masala: 19 (19%)
- Black Pepper + Salt: 12 (12%)

#### Consumer segmentation & market potential

##### 25. Which product was the most satisfying overall?

- Red Chili + Salt + Lime: 65 (65%)
- Chaat Masala: 21 (21%)
- Black Pepper + Salt: 9 (9%)
- Butter: 6 (6%)

##### 26. Which product would you recommend to others?

- Red Chili + Salt + Lime: 64 (64%)
- Chaat Masala: 24 (24%)

- Black Pepper + Salt: 6 (6%)
- Butter: 6 (6%)

##### 27. Which product would be most suitable for children?

- Butter: 71 (71%)
- Black Pepper + Salt: 12 (12%)
- Red Chili + Salt + Lime: 12 (12%)
- Chaat Masala: 6 (6%)

##### 28. Which product would be best as a regular snack?

- Red Chili + Salt + Lime: 47 (47%)
- Butter: 21 (21%)
- Chaat Masala: 18 (18%)
- Black Pepper + Salt: 15 (15%)

##### 29. Would you buy any of these products if available in the market?

- Definitely Yes: 68 (68%)
- Maybe: 21 (21%)
- Not Sure: 6 (6%)
- No: 6 (6%)

##### 30. Which do you think has the highest market potential?

- Red Chili + Salt + Lime: 68 (68%)
- Chaat Masala: 18 (18%)
- Black Pepper + Salt: 9 (9%)
- Butter: 6 (6%)

#### Discussion

This research aims to assess how sensory appealing different flavored sweet corn products are to consumers. Four flavor formulations were prepared for the study: sweet corn with chaat masala; sweet corn with black pepper and salt; sweet corn with butter; sweet corn with salt, lemon, and red chili. A 9-point hedonic rating scale was used for evaluating the sensory characteristics of each sweet corn product.

Sensory evaluation results showed that all of the tested products were well accepted by the respondents; however, there were statistically significant differences among each product with regards to sensory characteristics. Sweet corn with salt, lemon, and red chili was the formulation receiving the highest number of sensory score points from sensory evaluation, making it the most preferred product of the study.

Sweet corn with salt, lemon, and red chili may be preferred by consumers because of its pleasing combination of balanced spicy, salty, and tangy flavors, which enhances the overall eating experience and increases consumer satisfaction. There was also a high purchase intention for sweet corn with salt, lemon, and red chili based on the post-questionnaire, which suggests that this application could have good potential within the marketplace.

From the results of the study, flavoring ingredients play a major role in enhancing the sensory quality and overall acceptability of sweet corn products. Therefore, consumer-based flavor combinations may be beneficial in developing improved or value-added ready-to-eat sweet corn products

#### Result

The sensory evaluation of sweet corn formulations was conducted using hedonic scoring for five attributes:

appearance, taste, texture, flavour, and overall acceptability. As shown in the table below, there were significant differences in sensory evaluations of all sweet corn products among the various seasoning treatments.

Results from this study demonstrate that sweet corn with red chillies, salt, and lime outperformed all other formulations across all hedonic evaluation criteria, earning average scores of 8.8 for appearance, 9.0 for taste, 8.7 for texture, 8.9 for flavour, and 8.9 respectively for overall acceptability. This indicates strong preference among panelists for this particular seasoning combination because of its balanced spicy and tangy flavours.

Butter-flavoured sweet corn ranked behind the red chilli-salt-lime combination in consumer preferences, receiving scores of 8.3 for appearance, 8.1 for taste, 8.4 for texture, 8.2 for flavour, and 8.2 for overall acceptability. Butter flavour provides a pleasant texture through mouth-feel, which is also rated favourably by consumers.

Chaat masala sweet corn was rated moderately acceptable with an overall score of 7.47. In terms of individual sensory criteria, chaat masala sweet corn scored 7.71 for appearance, 7.62 for taste, 7.29 for texture, and 7.24 for flavour. Although the chaat masala sweet corn product had acceptable sensory evaluations from panelists, its overall evaluations were considerably lower than both red chilli/lime and butter-flavoured products.

Black pepper and salt sweet corn received the lowest sensory evaluations and consequently was not very well accepted based on overall sensory evaluations.

## Conclusion

An evaluation of consumer preferences, sensory perception and market acceptance of flavoured sweet corn products was carried out by way of a survey of 100 respondents. Overall, results showed that sweet corn can be considered as one of the most popular snacks because of how positively participants viewed sweet corn for many of the product attributes, such as taste, flavour, texture, and overall quality. The sweet corn flavour preferences were for a high degree of spiciness and saltiness, while respondents had a moderate interest in cheesy and tangy flavours. Overall, the majority of respondents preferred warm and freshly prepared sweet corn presented in a cup, which indicates that how it is served (serving style) and how hot it is (serving temperature) has a significant effect on the consumer's acceptability of sweet corn.

The importance of the sensory attributes of sweet corn (such as aroma, texture, juiciness and flavour intensity) is one of the key factors to be considered when making a purchase decision with respect to flavoured sweet corn and the degree to which the consumer likes the product.

In addition, analysis of consumer preferences for flavoured sweet corn demonstrated that consumers are open to trying new flavours, thereby giving the sweet corn industry a large opportunity for growth due to the potential for value-added product development. While the majority of respondents viewed flavoured sweet corn as a healthy snack food, they were also willing to recommend the product to others.

Moderate levels of brand awareness with respect to the packaged sweet corn products lead to an opportunity for better marketing of packaged corn products and consumer education in the sweet corn category. Overall, this study indicated a significant demand from consumers for flavoured sweet corn products.

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## Limitation of Study

The present study was conducted among college students only; therefore, the results may not represent the preferences of all consumer age groups. In addition, the sensory evaluation was carried out under limited laboratory conditions and within a specific sample size.

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