Original Research Article

Organoleptic Evaluation of Tree Bean (Yongchak) Dishes of Manipur and Value Added Cutlet with Incorporation of Tree Bean (*Parkiaroxbhurghii*)

ABSTRACT

Aims: Tree bean or commonly known as petai or yongchak, scientifically *Parkia roxburghii* is an underrated leguminous plat found in the India's north east region and other South East Asian countries. This study aims at organoleptic evaluation of four commonly eaten tree bean dishes of Manipur and developing a value added tree bean cutlet for acceptability. Even though it is consumed in North eastern India, value addition of tree bean products is very few.
Study design: Descriptive Experimental design
Place and Duration of Study: Department of Food And Nutrition, College of Community Science, Central Agricultural University, Tura, Meghalaya, Between March and April, 2024.
Methodology:9 point hedonic rating scale was used to taste the sensory attribute, with 1 being disliked extremely and 9 being liked extremely.The data were analyzed using the descriptive statistics and Kruskal-Wallis test.
Results: There is significant (p = 0.05) difference in the appearance, texture, taste and aroma among the sample products. Within the ten pairs, four of them were found to be significant which are 30 % fresh- 20 % fresh, 30% fresh- control, 30%powder- 20% fresh and 30% powder- control.
Conclusion: When the sensory qualities were evaluated, the 20 percent fresh and the control sample were found to be the most acceptable, while the 30 percent fresh had the lowest acceptability. It concluded that with the percentage increase in incorporation, the level of acceptance decreases.The findings show that the eromba is the most well-liked dish and the curry is the least. And the smell of tree bean was more in higher formulation percentage. More products can be developed with tree bean addition.

Keywords: Tree Bean, Sensory Evaluation, Acceptability, Sensory Attribute, Kruskal-wallis test.

1. INTRODUCTION

Sensory evaluation is a scientific way of measuring, analysis and interpretation of people's response to products as perceived by their senses (Stone, 2018). The characteristics of food, water, or other substances that a person feels through their senses are referred to as organoleptic qualities. Historically, the terms sensory and organoleptic were interchangeable (Baron, 2021). All individuals have distinct perceptions of sight, flavour, and mouth feel, which make the organoleptic senses extremely sensitive. The outcomes of this tasting vary from person to person and are heavily conditioned by a range of psychological and social factors (Athnikar and Harshal, 2023).
Parkia roxburghii commonly referred to as tree bean is an intriguing plant with both culinary and medical uses. It is also commonly known as "petai" or "yongchak" in the north east India.

This tropical tree is upright and medium-sized, a member of the legume family, or Fabaceae family. And is typically found grown in large quantities in India's northeastern areas. It is readily available in Malaysia and other Southeast Asian nations like Bangladesh, Thailand, and Burma (Firake*et al*., 2013; Singha*et al*., 2021). It is frequently observed growing in forests, jhums, and backyards. Parkia roxburghii is a valuable tree with numerous uses, as well as ecological and commercial value. This tree produces edible blossoms, essential vegetables, and both young and mature pods and seeds (Devi et al., 2023). Parkia roxburghii is a very nutritious plant. Its seeds have high protein content, ranging from 6.0% to 27.5%. Its high fibre content (1.7–2.0%) increases its nutritional worth (Chhikara et al., 2018). Insecticidal, antibacterial, antidiabetic, α-glucosidase and α-amylase inhibitory, and antioxidant actions have all been documented for this plant (Angami et al., 2018).
Consumption occurs in raw, fresh, or sun-dried for the off-season. In Tripura, this bean has grown in importance as a component of numerous dishes. In Manipur, the bean is consumed whole or in making regional specialties such as Hmarcha Deng, Eromba (a boiled Parkia mashed dish with potato and fermented fish), Yongchak Singju (a raw salad made with thinly sliced Parkia mixed with chillies and fermented fish- ngari), or even as a sautéed dish with potato and brinjal or as a curry with fresh fish, peas, and potato. In the Rongmei cuisine, it can be eaten as a salad or cooked with meat, and occasionally, seeds are consumed with dry fish chutney. The Kuki tribe of North Eastern India enjoyed Parkia as a special vegetable, calling it Janglha. It is also highly liked by the Mizo people of Mizoram, who name it zawnglah. They make it with chilli powder, fermented pork known as saum, sodium bicarbonate, and a small quantity of salt; the preparation method is similar to that of Manipur's sathu. The tribes of Khasi, Garo, Naga, Reang, and Mizos consume it as vegetable. Raw or cooked with meat, adult blooms and seeds are also eaten. Because of the bitter flavour, Parkia are cooked or roasted before being consumed (Singh, 2023).
Even though it is consumed in North eastern India, value addition of tree bean products is very few.So taking this to a new level, the different dishes of Parkia like Yongchak curry, salad, stir fried and eromba (boiled and mashed dish) were recreated for sensory evaluation purpose. A new value added cutlet was developed with incorporation of both fresh and dried tree bean and sensory attributes were evaluated.

2. MATERIAL AND METHODS

The study was conducted in the food science laboratory of department of Food science and nutrition in college of community science, Central Agricultural University, Tura, Meghalaya. For the different Manipuri dishes of Parkia, four dish namely- tree bean curry or “yongchak thongba”, stir fried parkia with vegetables (yongchak kanghou), fresh parkia salad (yongchak singju) and lastly boiled and mashed yongchak dish or “yongchak eromba”. Five different cutlets were formulated, one control and two each made with incorporation of different proportion of fresh and powder tree bean. Blanched tree bean powder is used, as it is less bitter than the simply dried and powdered one. The percentage incorporation was 20 and 30. Sweet potato was used in place of potato for more nutrients dense.

2.1 Procurement of ingredients

The ingredients except for the tree bean were procured from the local market. Tree bean was plucked from the trees grown in College of Community Science, West Garo Hills, Meghalaya.

2.2 Preparation Procedure of the Manipuri dishes

2.2.1 Tree bean curry: A variety of ingredients were used for making the curry, including 50g of tree beans, 40g of fish, 20g of potatoes, 15g of peas, 10g of onions, 5g of garlic, and 5g of ginger. Initially, roughly 15 millilitres of mustard oil were heated, and ginger, garlic, and

onion were added. Once the fish began to get partially cooked, tree beans were added and the fish and potato were cooked together with the spices. After the oil was completely absorbed, hot water was added to produce gravy and cook it for about fifteen minutes. After adding salt, it was removed from the flame.

2.2.2 Tree bean stir fried: Each ingredient was prepared and cleaned, including the tree bean (33g), potato (30g), peas (25g), brinjal (33g), onion (15g), and garlic (5g). Garlic and onion were added to a hot kadai along with roughly 15ml of mustard oil. After adding the other ingredients and stirring over a medium heat for around 20 minutes, 15 ml of water were added once the oil had been absorbed. After adding salt, the flame was out once the water had been fully absorbed.

2.2.3 Tree bean eromba: The ingredients – tree bean (69g), French bean (30g), potato (30g), chilli (4 no.) and spring onion for garnishing were prepped and washed. In a pressure cooker, all the ingredients except for the spring onion were cooked till four whistles. The ingredients were then allowed to cool in a bowl. Five grams of roasted fermented fish were added to the cooked mixture and mashed.Salt to taste were added and garnished with spring onion.

2.2.4 Tree bean salad: In a bowl, combine the 40g of tree beans (scraped from the green cover and sliced into quarter of a centimetre), 15g of onion, and 2g of roasted fermented fish. Add salt to taste and garnished with spring onions.

2.3 Formulation of cutlets

The process of standardization the cutlets are depicted in the Fig 1 given below. table 1 indicates the different formulation of the fresh and powdered tree bean in the proportion of 20g and 30g each, thus making a total of 4 formulated samples.

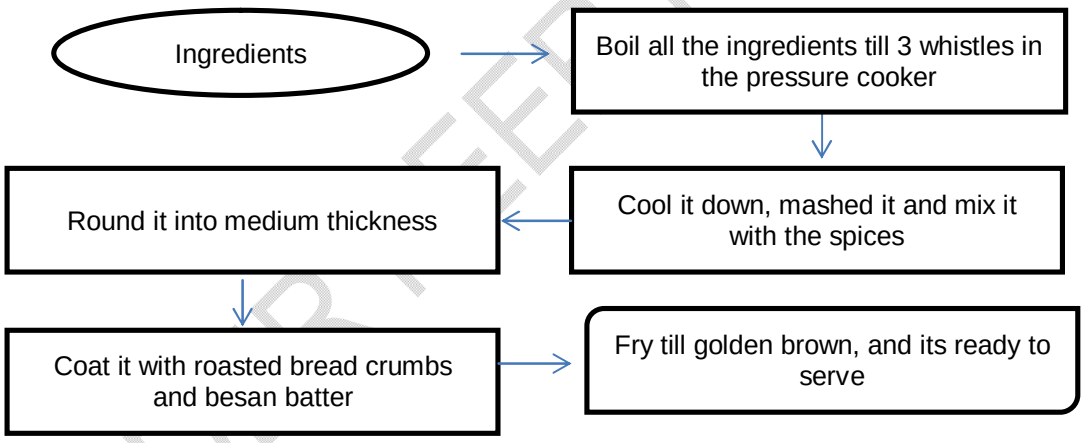

Fig 1: Process of making cutlet

Table 1: Sample formulations

Ingredients (g)	**Sample**				
	Control	Fresh 20%	Fresh 30%	Powder 20%	Powder 30%
Sweet potato	100	80	70	80	70
Tree bean	-	20	30	20	30

French bean	20	20	20	20	20
Carrot	20	20	20	20	20
Cauliflower	20	20	20	20	20
Chilli green	4 nos	4 nos	4 nos	4 nos	4 nos

2.4 Sensory evaluation

To determine the overall acceptability, the different dishes prepared and the recipes (supplemented and control cutlets) were assessed. The specified recipes were standardised both before and after the addition of 20 and 30 grams of fresh and dried tree bean powder, respectively. The acceptability of the recipes was also assessed in terms of appearance, texture, taste, and aroma. A nine-point hedonic scale, with one representing the disliked extremely and nine representing the like extremely was used for the sensory evaluation (Lim, 2011 and Chauhan et al., 2015). The samples were assessed by a panel of 25 semi-trained members from the College of Community Science. Random codes were assigned to the samples.

2.5Statistical Analysis

Sensory evaluation data for the developed tree bean dishes and cutlet were analyzed using descriptive statistics in Microsoft Excel 2010. A completely randomized design was employed for the experimental setup. The cutlet sensory data underwent further analysis using Kruskal-Wallis test. Statistical significance was determined at the 0.05 level.

3. RESULTS AND DISCUSSION

3.1 Organoleptic Evaluation

Organoleptic evaluation of the different treatments was conducted and their mean score indicates the acceptability of the products. Tables 2 and 3 provide data about the sensory qualities.

3.1.1 Organoleptic Evaluation the Tree Bean Dishes

The four Manipuri-style tree bean meals' mean scores for each sensory quality are displayed in Table2. The curry received the lowest overall approval rating, while the boiled and mashed dish (eromba) got the highest. The stir-fried dish were rated the highest for appearance, maybe because it had more veggies that made it seem more appetizing than the others. Both the salad and the curry were given the same appearance score. The curry showed the lowest mean score (7.08) for aroma. Despite the fact that the salad was made with raw tree beans, it obtained the highest texture score, indicating that panelists preferred it over the other dishes.

3.1.2 Organoleptic Evaluation of Formulated Cutlets

Table3, displays the mean score of the formulated cutlet with each of the many sensory characteristics.With the highest overall acceptability, the control sample is the most palatable, while the fresh 30% has the lowest acceptability. In the formulated items, the aroma was not good as it was in the control sample.The flavor component of powder samples was more as it is blanched. It was observed that the acceptance of preparation is less when the percentage of tree beans is increased. In contrast to powder formulation,

which imparts the bitter flavour in every bite, fresh tree beans formulation although being mashed and combined, lacks the bitter flavour, which increases the acceptability. The appearance score was highest in the control sample. Similar to other attribute, appearance score also reduce when the incorporation increases. Joshi and Mathur (2015) stated that compared to deep frying, shallow fried produced higher outcomes, particularly in terms of colour and appearances which is related to the present study in the inversely proportional relation the percentage and the appearance score.The therapy T1, which is at 10% enrichment of aloe vera leaves, received the greatest overall acceptance score (8.53) according to sensory evaluation (Priyanka et al.,2014).

Table2: Organoleptic Evaluation of Tree Bean Dishes

Tree Bean Products	Appearance	Texture	Taste	Aroma	Overall Acceptability
Curry	7.28±0.98	7.6±1.12	7.12±1.33	7.08±1.44	7±1.15
Stir Fried	7.84±0.80	7.56±0.87	7.4±1.00	7.76±0.97	7.52±1.08
Eromba	7.8±0.82	7.64±0.95	7.28±1.14	7.8±1.00	7.6±1.12
Salad	7.28±1.17	7.84±1.07	7.56±1.16	7.48±1.19	7.36±1.08

Table3: Organoleptic Evaluation of Cutlet Samples

Treatment	Appearance	Texture	Taste	Aroma	Overall Acceptability
Control	7.32±1.07	7.32±1.25	6.4±1.71	7.04±1.46	6.24±1.61
Fresh 20%	6.68±1.11	6.16±1.55	6.56±1.04	4.96±1.67	6.16±1.52
Fresh 30%	6.6±1.04	4.92±2.02	6.12±1.51	4.08±2.08	4.96±1.67
Powder 20%	5.04±1.59	5.84±1.68	5.04±1.72	4.04±2.01	5.76±1.61
Powder 30%	5.32±1.93	5.88±1.62	4.8±1.44	3.84±1.68	5.04±1.72

3.2 Statistical Analysis of the Formulated Cutlets

The data from the formulated cutlets sensory score are illustrated in the tables 4 to 6, statistically analysed using Kruskal Wali test. There is significant ($p = .05$) difference in the appearance, texture, taste and aroma among the sample products as indicated in the Table4. The control and the fresh 20 percent have the highest median ranks among the sample.Contradictory to the present finding, in a study “Development and evaluation of ‘Snacks’ from new varieties of Mung bean”, the three kinds (Pant Mung 5, Pant Mung 6, local variant) did not significantly differ in terms of colour, texture, appearance, or acceptability as a whole. Actually, in terms of flavour and taste, Pant Mung 5 was really different from the local kind. For each appearance, Pant Mung 5 received the highest score, while Pant Mung 6 and the local variety received the same score (Bindra, 2015).

Contradicting to the present study the value-added pea shells cutlets received higher mean scores than the control group, according to the results. All cutlet varieties' organoleptic mean ratings, however, fell into the "like very much" group (Beniwal *et al*., 2022).

Depending on how many samples are in a subset, one, two, three, or more alphabetical letters are used to indicate the samples.In each subset, one alphabet is common to all the samples in that subset which represents its similarity among them.As indicated in the table5, in testing the homogeneity of the samples, the sub set 1 (30%Fresh, 30% Powder, 20% Powder) and sub set 2 (20% Fresh and Control) are insignificant to each other.While the samples in each sub set are significant to each other. This test reveals that the sub set 2 was the most acceptable among all the samples.

The pairwise comparison of all the samples, revealing the significant pairs is represented in Table5. For the five different types of cutlet, ten pairs were clubbed for pairwise comparison. Among the ten pairs, four of them were found to be significant which are 30 % fresh- 20 % fresh, 30% fresh- control, 30%powder- 20% fresh and 30% powder- control.

Table4: KW Test of significance for cutlet

Treatment	Median Ranks	KW Test statistics	Significance
Control	7	13.692	<0.05
20% Fresh	7		
30% Fresh	5		
20% Powder	6		
30% Powder	5		

Table5: Homogeneity Test

	Subset		
Sample		1	2
	30% Fresh	48.34 [a]	
	30% Powder	50.16 [ab]	
	20%Powder	66.04 [abc]	
	20% Fresh		74.42 [d]

	Control		76.04 [de]

Table6: Pairwise comparison of treatments

Sample1- Sample2	Test Statistics	Std. Error	Std. Test Statistics	Sig.
30%Fresh-30%Powder	-1.82	10.035	-0.181	0.856
30%Fresh-20%Powder	17.7		1.764	0.078
30%Fresh-20%Fresh	26.08		2.599	0.009*
30%Fresh-Control	-27.7		-2.76	0.006*
30%Powder-20%Powder	15.88		1.582	0.114
30%Powder-20%Fresh	24.26		2.417	0.016*
30%Powder-Control	-25.88		-2.579	0.01*
20%Powder-20%Fresh	8.38		0.835	0.404
20%Powder-Control	-10		-0.996	0.319
20%Fresh-Control	-1.62		-0.161	0.872

Each row tests the null hypothesis that the sample 1 and sample 2 are same.

Asymptotic significances (2-sided test) are displayed.

*The significance level is .05

4. CONCLUSION

The tree bean recipes were effectively assessed using all the sensory characteristics, and findings show that the eromba is the most well-liked dish and the curry is the least.When compared to the other formulation, the 20% fresh and control samples had good overall acceptability, while the 30% fresh sample had the lowest level of acceptability. The investigation came to the conclusion that the stinky smell of tree bean in both fresh and dry supplementation was more evident with increase in percentage formulation. This in turn decreases the acceptability of the cutlet in the 30 percent formulation. The nutrient rich tree bean made the cutlet a much better version than the standard potato cutlet. Incorporation of tree bean in food products is very few as of now. Focus research on biochemical composition analysis, formulation and commercialization of tree bean rich/value added food products,should be undertaken to utilize this nutrient dense bean.

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